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PLANT DISEASES IN IOWA IN 1927

A report of the results of a survey for diseases of economic plants made by the Bureau of Plant Industry of the United States Department of Agriculture and the Botany and Plant Pathology Section of Iowa State College.

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INTRODUCTION

The survey for plant diseases in Iowa, concerning which the following is a report, was the outcome of a cooperative arrangement between the Office of Mycology and Disease Survey of the U. S. Department of Agriculture, and the Section of Botany and Plant Pathology of the Iowa State College. The writer was assigned to the work and headquartered at Ames, Iowa, from April 15, 1927 to April 15, 1928. The funds and facilities for the survey were apportioned equally between the two institutions.

The purpose of the survey was twofold: first, to gather as much field data as possible concerning diseases of economic plants and to collect specimens of the same; and second, to collect specimens of all available parasitic fungi irrespective of the host. Only the data relating to economic diseases are summarized in this report. It is intended to publish those data pertaining to the mycological survey later.

All specimens of interest have been prepared in duplicate; one set will be incorporated in the herbarium at Ames, and the other has been filed in the mycological herbarium of the Office of Mycology and Disease Survey, in Washington. In this report an asterisk (*) in connection with the name of a disease indicates that a specimen is on file in the Washington office.

It is realized that this report is a very limited one. It does not mention many diseases that undoubtedly occurred, but which were not observed nor reported. Neither are the records of prevalence and severity by any means complete. An adequate survey of the plant diseases of a state should extend over a period of years to be in any sense complete. This report is merely a statement of the diseases observed, reported and collected during the limited, summer, season of 1927.

The weather conditions of 1927 were by no means normal. The season was marked by a late, cold spring, followed by rather extreme drouth conditions which persisted in most sections of the state throughout the greater part of the growing season. These adverse conditions undoubtedly checked the usual severity of many diseases.

The author is indebted to a number of people for assistance in various capacities. Particular credit is due to Dr. J. C. Gilman for constant assistance in collecting specimens, in determining fungi, and in supplying data; to Mr. D. E. Bliss, Mr. D. V. Layton, and Dr. J. H. Muncie for specimens; and to Dr. I. E. Melhus, Mr. D. R. Porter, Mr. H. E. Nichols, Mr. R. H. Porter, Dr. C. S. Reddy, Mr. M. A. Smith, Mr. W. P. Raleigh, and Mr. L. D. Leach for supplying data.

An important result of this survey has been the establishing of proof of the presence of alfalfa wilt and crown rot (pp. 17, 19), and the obtaining of data on the actual severity and prevalence of these diseases by means of two special surveys. From the data accumulated on these surveys the Experiment Station has now begun an extensive research project. In this connection, it is felt that the finding of two apparently winter-hardy strains of alfalfa (p. 20) may prove to be of considerable value to the alfalfa industry of the state.

The following table contains a list of diseases which as far as the writer has been able to ascertain, have not been reported heretofore in the literature nor filed in herbaria, as having been found in Iowa. Most of them it is true, caused but slight losses this year, yet it will be important to keep them under observation and to compare their severity in other years when climatic conditions may be more favorable for their development.

Table 1. List of diseases apparently reported for the first time from Iowa.

HOST	DISEASE	ORGANISM	PAGE
Diseases of Cereals			
Corn	Black bundle	Cephalosporium acremonium	9
Oats	Bacterial stripe	Bacterium striafaciens	12
Rye	Leaf blotch	Septoria secalis	14
Diseases of Forage and Field Crops			
Alfalfa	Bacterial blight	Bacterium medicaginis	18
	Leaf blotch	Macrosporium sp.	18
	Yellows	Due to leaf hopper	20
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	Leaf spot	Stagonospora meliloti	21
Cowpea	Powdery mildew	Erysiphe polygoni	22
	Mosaic	Virus	22
Blue grass	Leaf blotch	Septoria sp.	22
Quack grass	Bacterial disease	Bacterium coronafaciens atropurpureum	22
Soybean	Bacterial pustule	Bacterium phaseoli sojense	23
Sugar beet	Leaf spot	Phoma betae	23

New diseases

Fruit Diseases

Apple	Fly speck	Leptothyrium pomi	24
Pear	Blister canker	Nummularia discreta	27
Apricot	Bacterial spot	Bacterium pruni	28
	Powdery mildew	Podosphaera oxyacanthae	28
Cherry	Bacterial spot	Bacterium pruni	29
Plum	Heart rot	Fomes fulvus	31
	Shot hole	Phyllosticta prunicola	31
German prune	Bacterial spot	Bacterium pruni	32
Grape	Chlorosis	Non-par.	34

Diseases of Vegetables

Carrot	Leaf spot	Cercospora apii carotae	39
Celery	Early blight	Cercospora apii	39
Dill	Stem and leaf spot	Phoma anethi	39
Horseradish	Leaf spot	Alternaria brassicae	40
	Leaf spot	Cercospora armoraciae	40
Bell pepper	Fruit rot	Alternaria sp.	41
Red pepper	Wilt	Fusarium sp.	41
Rhubarb	Leaf spot	Ascochyta rhei	44
		Phyllosticta straminella	44
Spinach	Downy mildew	Peronospora effusa	44
	Mosaic	Virus	44
Sweet potato	Mosaic	Virus	45
Swiss Chard	Leaf spot	Cercospora beticola	45
Tomato	Streak	Virus	46
Turnip	Powdery mildew	Erysiphe polygoni	47

Diseases of Trees and Ornamental Plants

Acer sp.	Seedling canker	Phomopsis ludiscyi	48

New diseases

Aesculus hippocastanum	Powdery mildew	Uncinula flexuosa	48
Althaea rosea	Leaf spot	Cercospora kellermanii	49
Aquilegia spp.	Powdery mildew	Erysiphe polygoni	50
Berberis vulgaris	(on stems)	Phoma berberina	50
Betula alba	Canker	Melanconium bicolor	50
Calycanthus floridus	Leaf spot	Macrosporium calycanthi	50
Caragana arborescens	Canker	Sphaeropsis sp.	51
Cosmos sp.	Stem canker	Phomopsis stewartii	52
Crataegus monogyna	Blight	Bacillus amylovorus	52
Crataegus oxyacantha	Blight Leaf spot	Bacillus amylovorus Phyllosticta rubra	52 52
Delphinium spp.	Black spot	Bacterium delphinii	53
Dianthus barbatus	Rust	Uromyces caryophyllinus	53
Forsythia sp.	Leaf spot	Alternaria forsythiae	53
Gaillardia spp.	Leaf spot	Septoria gaillardiae	54
Helenium hoopesi	Leaf spot	Septoria helenii	54
Iris spp.	On rhizomes	Leptosphaeria heterospora	55
Juglans nigra	Powdery mildew	Microsphaera alni	55
Limonium latifolium	Leaf spot	Ascochyta plumbaginicola	55
Lychnis coronaria	Leaf spot	Phyllosticta lychnidis	56
Morus spp.	Blight Twig blight	Bacterium mori Gibberella moricola	56 56
Paeonia sp.	Ring spot	Virus (?)	57
Populus alba nivea	Canker	Discella populina	58
Populus sp.	Canker Leaf spot	Discella populina Napicladium tremulae	58 58
Prunus besseyi	Bacterial spot Brown rot	Bacterium pruni Sclerotinia fructicola	58 58
Prunus hortulana	Hypertrophy	Exoascus mirabilis	59

Prunus sp. (Rocky Mountain dwarf cherry)	Bacterial spot	Bacterium pruni	59
	Brown rot	Sclerotinia fructicola	59
Salix pentandra, Salix vitellina, Salix spp.	Leaf spot	Cylindrosporium salicinum	61
Sorbus aucuparia	Blister canker	Nummularia discreta	61
	Leaf spot	Phyllosticta sorbi	61
	Leaf spot	Septoria aucupariae	61
Spiraea spp.	Leaf spot	Cylindrosporium filipendulae	62
Syringa spp.	Leaf spot	Cercospora macromaculans	62
Viburnum opulus, Viburnum opulus sterile, Viburnum trilobum	Leaf spot	Cercospora opuli	62

D I S E A S E S   O F   C E R E A L S

BARLEY

BACTERIAL BLIGHT (<u>Bacterium translucens</u> Jones et al.). Losses in 1927 were negligible. Counts were made in 15 rod rows in three experimental plots in different sections of the state, i. e., at Mason City in Cerro Gordo County, at Osage in Mitchell County, and at Ames in Story County. The same 20 varieties were planted in each plot. Bacterial blight was found only at Mason City on four varieties, as follows: traces on Minsturdi, Minsturdi (Minn. 439), and Hero, and 15 per cent on Colsess.

It has been observed that whenever a cold spring occurs high infection with corresponding damage follows.

ERGOT (<u>Claviceps purpurea</u> (Fr.) Tul.). In some years a trace is found but none was observed this year.

ANTHRACNOSE (<u>Colletotrichum graminicolum</u> (Ces.) Wils.). In some years slight losses have been reported but frequently it is not prevalent enough to attract attention. None found in 1927.

SCAB (BLIGHT) (<u>Gibberella saubinetii</u> (Mont.) Sacc.). Only scattered slight infections occurred. The damage was too slight to estimate. In an average year the losses vary from a trace to 2 per cent.

*STRIPE (<u>Helminthosporium gramineum</u> Rab.). Loss 2 per cent. The greater number of the fields in the state had some stripe but it was generally very slight and occurred only on the lower leaves. However, it was reported to be quite destructive in a number of localities in scattered fields. Dry weather during late spring presumably prevented a severe attack.

Counts made in July in three experimental plots in different sections of the state (See bacterial blight) gave the results shown in table 2.

Table 2. Percentage of infection of barley varieties with stripe, average of experimental plots in three different localities.

Average percentage infection	Varieties	Average percentage infection	Varieties
None	Horn	1.3	Manchuria (Minn. 184)
			Velvet (Minn. 477)
Trace	Featherston		
	Bonami	2.0	Alpha
	Sandrel		Colsess
	Trebi (C.I. 936)		
	Oderbrucker (W5-1)	10.0	Caucasian
0.6	Ontario No. 21	16.0	Manchuria (Iowa)
	Hero		
	Black Hull-less	27.0	Minsturdi (Minn. 439)
	Trebi (Colo.)		
		46.0	Minsturdi

SPOT BLOTCH (Helminthosporium sativum P.K. & B.). The loss in 1927 was too slight to be estimated. Even in an average year it is never more than a trace. Counts made on 19 different varieties (See stripe report) in experimental plots in three sections of the state revealed a rare trace of infection with a few ranging from 1 to 5 per cent.

NET BLOTCH (Helminthosporium teres Sacc.). Loss 2 per cent. The disease was observed generally but as a rule there was only a trace on the lower leaves. In a few localities moderate infection and damage were noticed. The dry season up to time of harvesting evidently prevented the usual 5 per cent loss.

Counts on 19 different varieties (See barley stripe table) in experimental plots in three sections of the state (See under bacterial blight) showed no infection or only a trace on most of the varieties. In one plot (at Ames) four varieties showed extremely high infection in comparison to the others, i. e. Colsess and Trebi (Colo.) 50 per cent, Trebi (C.I. 936) and Sandrel 70 per cent. These same varieties in the other two plots did not show signigicant infection.

STEM RUST (Puccinia graminis Pers.). Loss a trace. In June, fields over state were unusually free from infection but in general the crop matured with from a trace to 1 per cent infection.

LEAF RUST (Puccinia simplex (Koern.) Erik. & Henn.). Loss negligible. There was an unusually slight infection in the state, appearing as a trace in practically all sections.

LOOSE AND COVERED SMUTS (Ustilago hordei (Pers.) Kell. & Sw. and U. nuda (Jens.) Kell. & Sw.). Loss 1 per cent. In general there was only a trace but in some counties many fields showed infection varying from 10 to 25 per cent.

Table 3. Estimated percentage losses from barley diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Stripe	2	Stem rust	Trace
Loose smut	Trace	Other diseases	2
Covered smut	1	All diseases	5
Leaf rust	0		

CORN

EAR ROT (Basisporium gallarum Moll.). The total loss from ear rots in 1927 is estimated at about 7 per cent. Of this approximately 4 per cent was due to Basisporium gallarum, 2 per cent to Diplodia zeae, and 1 per cent to Fusarium. The most severe losses from Basisporium occurred in the southeastern part of the state.

Losses were reduced this year because of a drouth which was prolonged into late fall. Ear rot fungi are favored by high moisture content but most of the corn was mature and dry before the rainy season started so that there was small chance for development. On such ears as remained immature, i. e. moist, a great deal of infection occurred. In general the proper development of corn was greatly hampered this year by adverse weather conditions (a cool August and a warm September), in fact, the corn crop was saved only by postponed frost. The Weather Bureau reported the first general killing frosts on October 14 while in a number of counties none occurred until October 31.

At present the station is emphasizing early seed selection, rapid artificial curing after selection, and seed treatment with chemical dusts in the spring. The rapid drying has been demonstrated to be an extremely effective means of inhibiting the development of molds.

Continued experimental treatments with several dusts (Bayer, Merko, Semesan Jr. and others), carried on in plots in sixteen different counties have resulted in increased yields due to the prevention of seedling blight.

BLACK BUNDLE (Cephalosporium acremonium Cda.). Loss 0.5 per cent. This disease has occurred in the state for an indefinite length of time but this is the first report to the Plant Disease Survey. In a rare year the damage may be quite severe but commonly it is 1 per cent, in the main due to barren stalks. On the whole the loss is small in proportion to the percentage of infection.

EAR ROT (Diplodia zeae Lév.). In the past few years losses from Diplodia have usually out-weighed those of Basisporium but this year it occupied a minor place (See Basisporium gallarum).

EAR ROT (Fusarium sp.). Ear counts in different sections of the state would indicate that about 1 per cent of the ear rot damage was due to Fusarium. The disease was evidently less prevalent than in 1925 but the infection varied considerably in different fields (See Basisporium gallarum).

SHEATH SPOT (Fusaria and other fungi). Loss undoubtedly insignificant.

ROOT AND STALK ROTS (Gibberella spp. and Fusarium spp.). Probably occurs in Iowa to slight extent. Loss negligible.

HOLCUS SPOT (Pseudomonas holci Kendrick). Loss a trace. In 1927 the disease occurred throughout the state with infection severe enough to be the cause of noticeable damage to the crop. By August 15 infection was well under way.

The development of this disease is quite dependent upon weather conditions. In some years it will be quite prevalent in June and then disappear entirely, only to reappear later in the year.

RUST (Puccinia sorghi Schw.). The first infection was not observed until the first week in August. General infection did not occur until September and even then it was unusually scanty except in the north-central portions where it was plentiful. In many fields rust sori could be found on only a few plants. The drouth, which was prolonged until rather late in the fall, doubtlessly prevented infection. In a year of average conditions rust appears early in the summer and attacks the host moderately during the remainder of the season.

Infection on *Oxalis was first observed May 25, in northern Iowa.

SMUT (Ustilago zeae (Beck.) Ung.). Loss 3 per cent. During September, counts on percentage infection were made in scattered fields throughout the northern half of the state. A total of 3500 plants were examined with the following results:

Corn - Smut

Part of plant	Average percentage infection
Ear	3
Stalk above ear	6
Stalk below ear	3.7
Tassel	1
Leaf	Trace
Total	13

The occurrence of 6 per cent infection on stalks above the ear in comparison with 3 per cent below would signify that more favorable infection conditions existed later in the season, i. e. during the period of stalk development.

A count of 700 plants in Cass County in the southern part of the state gave the following results:

Part of plant	Average percentage infection
Ear	3.3
Stalk above ear	3.7
Stalk below ear	8.0
Leaf	0.1
Total	15

In this case it would appear that conditions were more favorable for infection earlier in the season

ROOT ROT (Associated with corn root worm). Severe lodging of corn involving 5 to 50 per cent of the stalks occurred in northern and west-central Iowa. Elsewhere the estimates averaged 1 to 5 per cent. In practically all examinations of lodged corn the roots were badly rotted but often traces were found of primary injury due to corn root worm or white grub. The entomology department reports an unusually severe infestation of the corn root worm in southeastern and northwestern sections; and of the white grub in the western part of the state.

LOSSES FROM CORN DISEASES.

Table 4. Estimated percentage losses from corn diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Smut (Ustilago zeae)	3	Ear rots (Fusarium, Diplodia)	7
Leaf rust (Puccinia sorghi)	0	Other diseases	0.5
Root rot (Gibberella, Fusarium)	0	All diseases	10.5

POP CORN

RUST (<u>Puccinia</u> <u>sorghi</u> Schw.). Rust infection was extremely slight, even less than on field corn.

SMUT (<u>Ustilago</u> <u>zeae</u> (Beck.) Ung.). The loss from smut was about 4 per cent. One field was seen with 9 per cent of the ears infected, but none on leaf, tassel or stalk.

SWEET CORN

BACTERIAL WILT (<u>Aplanobacter</u> <u>stewartii</u> (E.F.S.) McC.). None observed in 1927 in fields or in experimental plots.

EAR-ROT (<u>Basisporium</u> <u>gallarum</u> Moll.). Loss 4 per cent. Ordinarily the losses to sweet corn, caused by ear rots, are more severe on dent corn but the hot, dry weather of September this year interfered with the development of the fungi.

*EAR DRY ROT (<u>Diplodia</u> <u>zeae</u> Lév.). (See <u>Basisporium</u> <u>gallarum</u>.)

*STALK ROT (<u>Diplodia</u> <u>zeae</u> Lév.). In experimental plots (2 acres) at Story City about 12 fully grown plants of Golden Bantam were found which were infected by <u>Diplodia</u> <u>zeae</u>. The plants were dead and could be easily detected among the surrounding healthy ones. Discoloration extended up the stalk a short distance from the base, and pycnidia formed above ground for a distance of six inches or more.

RUST (<u>Puccinia</u> <u>sorghi</u> Schw.). Loss 2 per cent. Severe infection occurred in the southern half of the state. In many plantings there was a 90 to 100 per cent infection with the older leaves killed.

Sweet Corn - Downy mildew

*DOWNY MILDEW (Sclerospora graminicola (Sacc.) Schroet.). Artificial infection was obtained in experimental plots by the use of infected Setaria material which was placed over the seed at the time of planting. This artificial infection was the only source of the fungus early in the season since an examination of sweet corn fields and Setaria plants over the state revealed none. Later in the fall, however, natural infection was observed occurring abundantly on Setaria and in one instance on Golden Bantam sweet corn.

SMUT (Ustilago zeae (Beck.) Ung.). Loss 7.5 per cent. Sweet corn smut is important in Iowa not only because of actual loss in the field but also because of its relation to the canning industry. Since traces of smut in the product cause considerable loss to canners every year, a resistant strain of sweet corn would be immensely valuable. The actual loss in the field is estimated at 4 per cent while the additional loss to the canning industry would be 3.5 per cent.

OATS

*HALO BLIGHT (Bacterium coronafaciens Elliott). Only a trace was found in several localities, i. e. Fayette County. It was common in experimental plots at Ames (Story County) but the damage was negligible.

*BACTERIAL STRIPE (Bacterium striafaciens Elliott). The organism causing this disease was described recently by Charlotte Elliott (Jour. Agr. Res. 35, p. 811-824). The disease was seen twice in the state this year, and collected once by C. S. Reddy. It occurred on a few plants left standing in a field near Hastings (Oct. 21) and again in a field near Rockwell City (June) where slight damage occurred on lower leaves. The organism was isolated.

ANTHRACNOSE (Colletotrichum graminicolum (Ces.) Wils.). None found in 1927. A trace occurs in an occasional year.

SCAB (BLIGHT) (Gibberella saubinetii (Mont.) Sacc.). None found in 1927. In an average year the disease is of slight importance, in fact it is rarely prevalent enough to warrant an estimation of loss.

*CROWN RUST (Puccinia coronata Cda.). Loss 2 per cent. The first development of pycnia on Rhamnus lanceolata was observed April 27 in southwestern Iowa and northwestern Missouri. By May 7 aecidiospores were shedding in the same localities.

Oats - Crown Rust

During May and early June infection on oats throughout the state was only a trace although in the northern part about 1 per cent of the plants were affected. By the end of June infection was moderate generally. During early July severe infection occurred extensively in the south and particularly in some localities in the northeast. July was marked by severe drouth which not only checked further rust infection but also damaged the maturing grain. At this time considerable flecking occurred on leaves, indicating that the drouth had prevented the development of sori.

Despite the drouth, however, considerable damage from crown rust was reported in various localities. In general early varieties were harvested with slight loss while late varieties were moderately or severely damaged. In Kossuth County late oats were harvested green because of the severe infection.

STEM RUST (Puccinia graminis Pers.). Loss 0.8 per cent. Infection was extremely reduced this year on account of drouth conditions. During early June only a slight infection could be found in a greater part of the state and by early July many of the early oats had matured and were being cut with only a trace to 1 per cent infection; while some of the late oats, particularly in northwestern part of the state, had 1 to 2 per cent infection. The principal damage occurred on late oats which were harvested late.

SMUT (Ustilago avenae (Pers.) Jens. and U. levis (K. & S.) Mag.). The usual 3 per cent loss occurred this year.

BLAST (STERILITY) (Undet.). The loss this year, 3 per cent, was less than usual.

LOSSES FROM OAT DISEASES.

Table 5. Estimated percentage losses from oat diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Loose and covered smuts (Ustilago avenae & U. levis)	3	Other diseases	3
Stem rust (Puccinia graminis)	0.8	All diseases	8.8
Leaf rust (Puccinia coronata)	2		

RYE

*ERGOT (Claviceps purpurea (Fr.) Tul.). Loss 0.5 per cent. Reported from several parts of the state. In Muscatine County infection was extensive, particularly on rye which was used as a cover crop for vegetables, sweet potatoes and cantaloupes. In general there was about 10 per cent infection toward the end of the season and usually two or three sclerotia were borne on a single head.

ANTHRACNOSE (Colletotrichum graminicolum (Ces.) Wils.). None found since 1924. The occurrence of this disease is inconstant from year to year and when it does occur the damage is rarely more than a trace.

POWDERY MILDEW (Erysiphe graminis DC.). None found in 1927. A trace occurs in an occasional year.

SCAB (BLIGHT) (Gibberella saubinetii (Mont.) Sacc.). None found in 1927. The loss in the past has never been more than a trace.

LEAF RUST (Puccinia dispersa Erik.). In 1927 leaf rust was even less important than usual. Ordinarily the loss is a trace and rarely 1 per cent. This year, development of the rust was checked, no doubt, by severe drouth conditions. Sori were confined to the lower leaves where 5 per cent infection occurred.

STEM RUST (Puccinia graminis Pers.). Stem rust was scarce on rye throughout the season due to the extremely dry conditions. During June infection was estimated as a trace. In northwestern Iowa in July it was a trace to 1 per cent. The crop finally ripened with less than 1 per cent infection.

*LEAF BLOTCH (Septoria secalis Prill. & Del.). Loss a trace. The disease occurred generally with severe infection. Commonly the leaves on the lower half of the plants were severely attacked and killed, giving the fields a brownish color. This constitutes the first report of the disease in the state.

*STEM SMUT (Urocystis occulta (Wallr.) Rab.). Loss a trace. The occurrence this year is the first observed since 1924. In Muscatine County a 50 per cent infection was seen on rye used as a cover crop for vegetables. In fields 10 per cent infection occurred.

LOSSES FROM RYE DISEASES.

Table 6. Estimated percentage losses from rye diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Smut (Urocystis occulta)	Trace	Stem rust (Puccinia graminis)	0
Ergot (Claviceps purpurea)	0.5	Other diseases	Trace
Leaf rust (Puccinia dispersa)	0	All diseases	0.5

WHEAT

BLACK CHAFF (Bacterium translucens undulosum S. J. & R.). This disease was reported to be severe and common in 1919 but in succeeding years it was relatively unimportant, losses being estimated as a trace. In 1927 the disease was even less important, since it occurred generally in extremely scanty infections. In experimental plots in the northern part of the state the usual amount was observed on leaves of durum wheat and on the heads of hard red wheats.

ERGOT (Claviceps purpurea (Fr.) Tul.). None observed in 1927. Ergot on wheat has been reported but once, in 1922, when it was said to be rare.

ANTHRACNOSE (Colletotrichum cereale Manns.). None observed in 1927. The occurrence and importance of the disease varies from year to year. Often it is absent or not abundant enough to attract attention. Losses are reported ordinarily as a trace; the highest loss, 2 per cent, occurred in 1922.

POWDERY MILDEW (Erysiphe graminis DC.). None observed in 1927. Infection has not been known to occur since 1923. Occasionally it is reported in slight scattered infections but is never important.

*SCAB (Gibberella saubinetii (Mont.) Sacc.). In 1927 the infection was unusually slight. Only a rare head could be found and this usually with just a few of the kernels infected. In an average year the loss is estimated as a trace; rarely the loss is more, i. e. 4 per cent in 1923, 5 per cent in 1924.

BLIGHT (Helminthosporium spp.). None observed in 1927. Losses from this disease have never been reported to be more than a trace.

STEM RUST (Puccinia graminis Pers.). Loss 0.6 per cent. In general, winter wheat matured and was harvested (July 11) with a trace to 1 per cent infection; although a number of reports were received of severe infection and damage, particularly in Warren County. Here the county agent stated that the yield had been damaged fully 50 per cent in many cases. Spring wheat (July 11) had a trace to 1 per cent infection in northwestern Iowa and suffered more damage than winter wheat because of later maturity which allowed for rust development. On the other hand, spring wheat plantings were not common this year. The reduction in prevalence of the disease and of the loss is due directly to the drouth conditions which existed until near harvest time.

Pycnia were first noted on barberries April 28, in Wayne County and by June 8 a moderate infection on wheat occurred over the greater portion of the state; while in northeastern Iowa the infection apparently was somewhat heavier. Also general infection was noticeable about a week earlier in the south than in the north.

LEAF RUST (Puccinia triticina Erik.). Loss 15 per cent. The epidemic of leaf rust in Iowa this year was the most severe witnessed in many years. An extremely heavy infection occurred over the entire state; in fact some fields were so severely infected early in the season that the heads never formed while in others the heads did not fill properly. Fields commonly had an 80 per cent infection. In northwestern Iowa a 100 per cent infection in some fields caused the plants to be stunted to half the normal size and in southwestern Iowa plants frequently had half of their leaves killed. The main factor influencing the cause of the epidemic probably can be traced to the damp, wet weather of May which was extremely favorable for winter wheat infection.

LEAF SPOT (Septoria sp.). None seen in 1927 or in 1926. In an average year loss is reckoned at a trace to 1 per cent.

BUNT (Tilletia laevis Kühn and T. Tritici (Bjerk.) Wint.). Loss a trace. A slight amount was observed in scattered fields and although a number of reports of severe damage were obtained, yet a large majority of fields were clean.

LOOSE SMUT (Ustilago tritici (Pers.) Rostr.). Loss a trace. In most fields none occurred, while in a considerable number a 1 to 2 per cent infection was reported.

LOSSES FROM WHEAT DISEASES

Table 7. Estimated percentage losses from wheat diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Scab	0	Loose smut	Trace
Leaf rust	15	Black chaff	0
Stem rust	0.6	Other diseases	Trace
Bunt	Trace	All diseases	15.6

DISEASES OF FORAGE AND FIELD CROPS

ALFALFA

BACTERIAL ROOT-ROT (Aplanobacter insidiosum McC.). Loss, including crown rot, 25 per cent.

Distribution: The distribution of wilt in the state is given in figure 1. Undoubtedly the disease occurs elsewhere, especially in the counties along the western side of the state, which constitutes

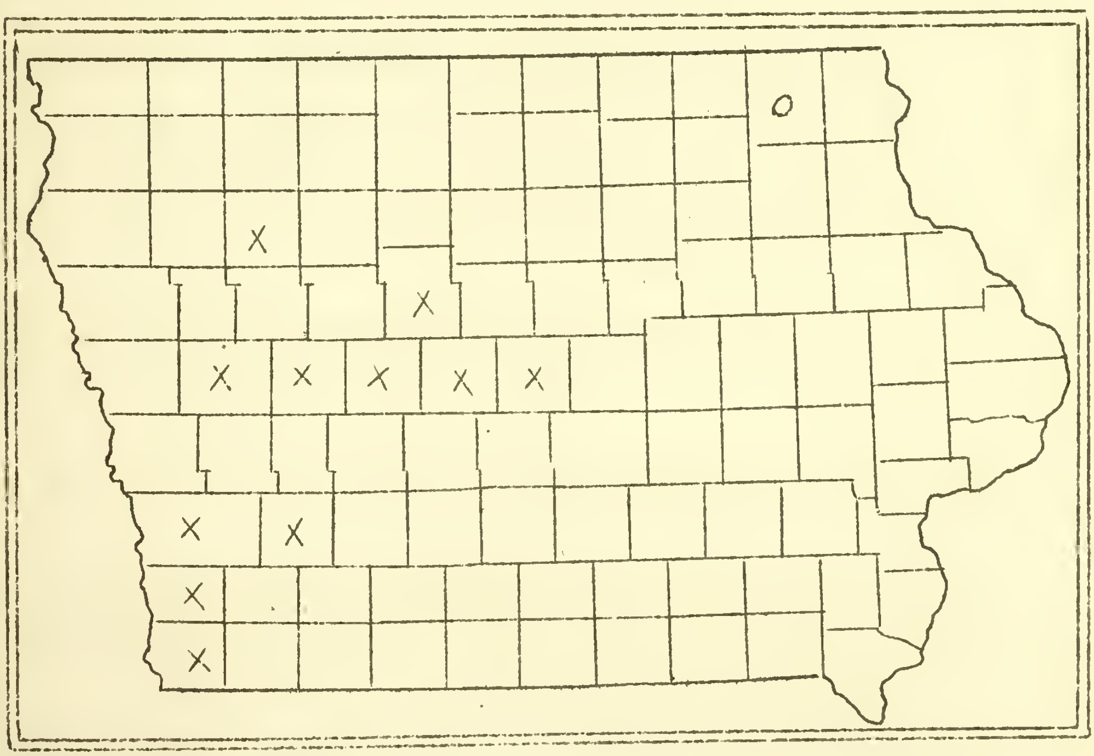

Fig. 1. - Distribution of alfalfa wilt in Iowa in 1927.
x - wilt present. O - no wilt found.

the principal alfalfa producing area, but not all of these counties were visited. An extensive survey early next spring would be desirable.

Extent of loss: Wilt is not particularly noticeable to the untrained eye except in fields over two years old. However, the disease was found frequently in 1 and 2 year old fields, but to a less extent than in older fields. In general, fields more than 5 years old have a greatly reduced stand, varying from one-half to practically complete. The majority of fields visited were less than 4 years old. Since approximately 3 years are required for the effects of the disease to be plainly evident, it is apparent that the large new acreage each year tends in a fashion to obscure the reduction in stand and yield of older fields. Mr. Westcott, county agent of Pottawattamie County, states that the county at present has only four-fifths of the alfalfa acreage that existed 5 years ago. He considers this reduction to be due to discouragement of farmers who have been unsuccessful in maintaining proper stands of alfalfa. There is good reason to believe that losses from wilt have been masquerading under such general terms as "winter killing", "improper soil conditions", etc.

The condition in Iowa is considered to be fully as serious as reported for Missouri in 1926 (Pl. Dis. Repr. Suppl. 53, p. 193).

Varieties affected: Wilt has been found in fields planted with certified seed of the following varieties: Dakota #12, Canadian Variegated, Grimm, Cossack, and Kansas Common. In the agronomy plots at Ames a few infected plants were found in one year plantings from certified seed of Dakota #12, Canadian Variegated, and Canadian Grimm. Dakota #12 has been planted extensively and in a number of fields where it was possible to secure accurate data this variety was found to be severely attacked. In Winneshiek County, where there has been a considerable increase of acreage in the past few years, only certified seed of hardy varieties, Grimm, Cossack, Canadian Variegated has been planted. An inspection of several fields in this county revealed no infection and in addition the county agent reports that no injury has been observed. At Cedar Falls (Blackhawk County), the local commercial club has sponsored an experimental plot of alfalfa on sandy soil for the last four years. In these plots and in fields near by on the same sort of soil no wilt has been found.

*BACTERIAL BLIGHT (Bacterium medicaginis (Sack.) EFS.). This disease was observed only in two localities in two different counties where the infection was general but the damage slight. First report for the state.

*LEAF BLOTCH (Macrosporium sp.). First report for the state. The importance was negligible.

*DOWNY MILDEW (Peronospora trifoliorum DBy.). Downy mildew was extremely scarce in 1927; the highest infection found was 1 per cent in a single field in Montgomery County. In other scattered localities only an occasional infection occurred.

In Iowa, this disease does not appear consistently year after year, i. e., none was found during the years 1920-25. In other years the reduction in yield has varied from a trace to 2 per cent.

Apparently infection occurs more frequently on fall seedings.

LEAF SPOT (_Pseudopeziza medicaginis_ (Lib.) Sacc.). Loss 5 per cent. Reports of severe infections came from counties in the western half of the state. Severe damage generally results only at one time of the year but in 1927 scattered cases of heavy damage were noted as early as May and as late as September; though in general most of the loss occurred in the fall.

*LEAF SPOT (_Pyrenopeziza medicaginis_ Fckl.). Loss a trace. Infection occurred only in a few scattered localities over the state, although where it did appear it often caused severe damage. The most severe case seen was in Buena Vista County where fully one-fourth of the leaves at the base of the stems had dropped, while three-fourths of the remaining leaves showed severe infection and were blackened with crowded fruiting bodies.

*RUST (_Uromyces medicaginis_ Pass.). Loss a trace. This season rust appeared during August. In most localities it was absent or slight; but in some fields in a few southern counties, Story, Cass, Warren, and Muscatine, unusually severe infections occurred, causing dwarfing of the leaves.

CROWN ROT (Probably winter injury.). For loss see _Aplanobacter insidiosum_. Figure 2 indicates the counties in which crown rot has been found. A comparison with bacterial wilt indicates a wider distribution for crown rot. Undoubtedly this disease will be found to occur widespread in the state when a more extensive survey is made.

Extent of loss: As previously stated it is rather difficult to distinguish between the loss caused by crown rot and that due to wilt,

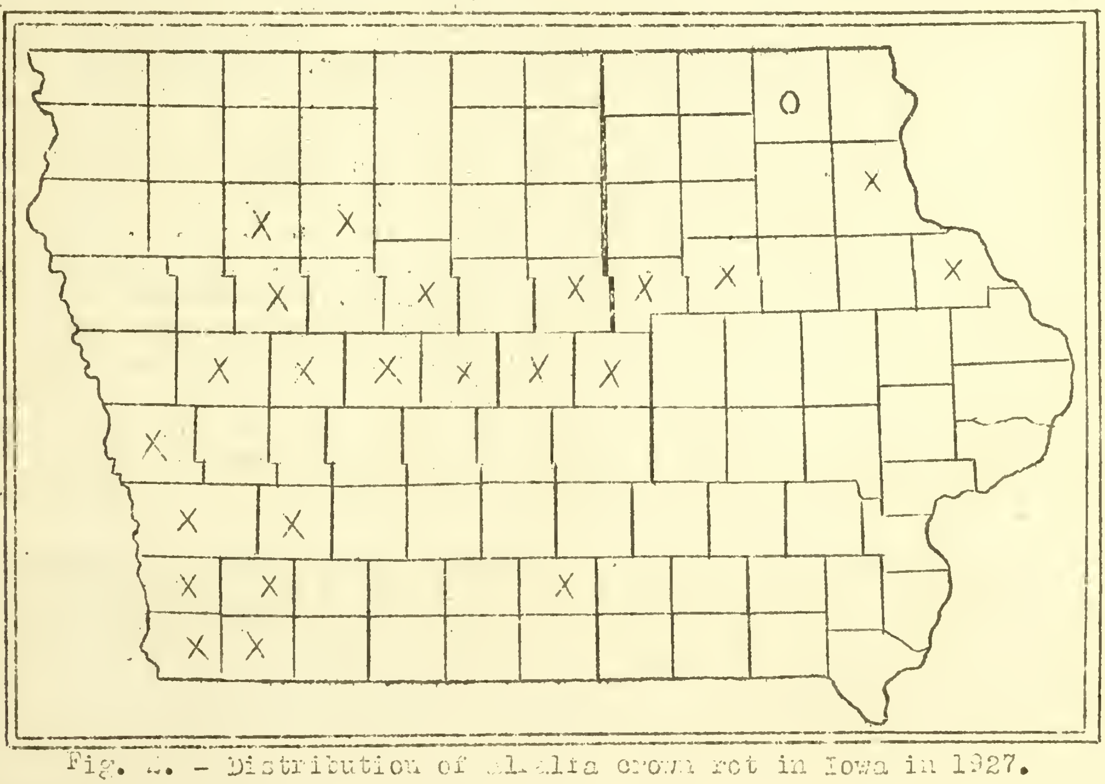

Fig. 2. - Distribution of alfalfa crown rot in Iowa in 1927.
x - crown rot present. 0 - none found.

but it will probably be safe to assume that at least half of the loss in alfalfa fields is traceable to crown rot. At any rate the first special survey showed a larger part of the plants to be affected by crown rot. In the second special survey late in the fall, however, more of the plants were affected by wilt. Generally it can be said that early evidences of crown rot are to be found in the great majority of 1 and 2 year old fields and in some of the fields of this age a reduction in stand of 1 to 10 per cent is found. In fields of 5 years or more the reduction in stand was commonly 1/3 to total. No evidence of crown rot was found in Winneshiek County, where only certified seed of hardy varieties are planted. Hardy varieties at Cedar Falls (Blackhawk County) on sandy soil seem to have escaped injury, in fact L. C. Boatman of the Agromony Department states that fields on sandy soil are less subject to injury.

Varieties affected: Few data have been collected but at Cedar Falls in the experimental plots on sandy soil, sponsored by the local commercial club, it was demonstrated that Kansas Common and Dakota #12 are not hardy while Cossack and Grimm do withstand winter conditions. In Winneshiek County where only certified seed of Canadian Variegated, Cossack, and Grimm are used no evidence of crown rot was found; but most of the fields were young. A 3-year old field of Dakota #12 in Sac County was found to be severely affected with only a third of the stand remaining. In Pottawattamie County a strain of alfalfa was located which has withstood winter conditions during the past 20 years. This strain is known locally as "Bebensee" --the name of the man who has propagated the seed for a period of years. However, William Huelle brought the original seed from Germany about 60 years ago where it was secured near the source of the original Grimm strain and it is more properly named after him "Huelle". The Huelle is now grown by a number of farmers near Council Bluffs. From time to time fields have been harvested for seed and in this way the strain has been perpetuated. A quantity of this seed was obtained and has been planted in the experimental plots at Ames. A similar quantity of seed was divided among H. L. Westover at Washington, D. C.; J. L. Weimer at Manhattan, Kansas, and F. R. Jones at Madison, Wis. Another strain, located at Griswold, on the farm of Edgar Daft, has withstood winter conditions during the past 15 years. The seed was purchased at a local market. An invasion of gophers destroyed the original field recently and it was plowed up. A hundred or so of the plants still remained in the head rows and from these there was secured this year a small quantity of seed which will be planted in order to secure enough seed to identify the strain and to investigate its hardiness.

*YELLOWS (Leaf Hopper). Yellows appeared during the summer and fall in a group of counties in the southwestern portion of the state. Ordinarily infection was slight, in most fields only a few diseased plants appearing, but in one there was 25 per cent. First report for the state.

CLOVER, ALSIKE

*RUST (Uromyces trifolii (Hedw. f.) Lév.). Rust occurred generally in the state but the damage was rather slight.

CLOVER, RED

*LEAF SPOT (Bacterium trifoliorum Jones et al.). Loss a trace. This bacterial disease is widespread in the state, occurring commonly on volunteer and cultivated plants. In a few northern fields, during September, some loss (5 per cent) occurred through extensive killing of leaves and stalks.

POWDERY MILDEW (Erysiphe polygoni DC.). Loss a trace. General infection was not evident until July. It appeared generally first in the southern section of the state. Thereafter, however, it occurred in severe form in all sections.

ANTHRACNOSE (Gloeosporium caulivorum L. Kirchner). This disease has not been observed in the state since 1923. Previous to that time it had been present in consecutive years since 1916, causing a loss estimated to be a trace each year.

*RUST (Uromyces fallens (Desm.) Kern). This rust was observed but twice. In one case it was severe on stems.

*MOSAIC (Virus). Mosaic was observed but once in 1927 on several plants in Pocahantas County.

CLOVER, WHITE

RUST (Uromyces trifolii (Hedw. f.) Lév.). A moderate infection was observed in several localities.

CLOVER, SWEET

*LEAF SPOT (Cercospora davisii E. & E.). This leaf spot was observed throughout the state on both volunteer and cultivated plants. In many localities conspicuous defoliation occurred.

*STEM SPOT (Mycosphaerella lethalis Stone). First report for the state, occasioned slight damage in one field at Adel (Dallas County).

COWPEA

POWDERY MILDEW (Probably *Erysiphe polygoni* DC.). First report for the state. A moderate amount was found in Muscatine County, where the damage was slight.

*MOSAIC (Undet.). First report for the state. One field was seen with 1 per cent.

FLAX

WILT (*Fusarium lini* Bolley). Loss 5 per cent. Twenty years ago flax production was an important industry in the state but the severity of losses from wilt brought about general discouragement so that the acreage shrank to practically nothing. In recent years, however, the universal use of wilt resistant varieties has reduced wilt losses and the acreage is increasing.

GRASS, BLUE

POWDERY MILDEW (*Erysiphe graminis* DC.). A moderate infection was found in one locality near Ames.

*RUST (*Puccinia epiphylla* Wetts.). A moderate infection occurred over the state.

*LEAF BLOTCH (*Septoria* sp.). First report for the state. In the single case observed the damage was moderate.

SMUT (*Ustilago striaeformis* (West.) Niessl.). Infected plants occurred scatteringly in the state.

GRASS, QUACK

BACTERIAL BLIGHT (*Bacterium coronafaciens atropurpureum* Reddy & Godkin). This disease is reported for the first time in this state by Dr. C. S. Reddy, who found infected plants near Osage (Mitchell County).

RUST (*Puccinia graminis* Pers.). Near Spencer, plants growing in a barberry hedge were heavily infected.

GRASS, SUDAN

*HOLCUS SPOT (Pseudomonas holci Kendricks). Occurred commonly in the state, with slight importance.

GRASS, TIMOTHY

STEM RUST (Puccinia graminis Pers.). This rust occurred commonly, to a slight extent, on volunteer plants and but rarely in cultivated fields except when mixed with clover.

*LEAF SPOT (Scolecotrichum graminis Fuck.). Widespread and frequently caused extensive killing of leaves.

*SMUT (Ustilago striaeformis (West) Niessl.). Roadside and uncultivated plants were commonly affected over the state but evidently cultivated plants were free from infection.

SORGHUM

HOLCUS SPOT (Pseudomonas holci Kendrick). General. One planting showed 50 per cent of the plants with a slight infection.

SOYBEAN

*BACTERIAL PUSTULE (Bacterium phaseoli sojense Hedges). First report for the state, being found in two localities, one southern and one northern. In both cases the infection was slight.

SUGAR BEET

*LEAF SPOT (Cercospora beticola Sacc.). This disease was widespread with the host and caused a loss of about 1 per cent. A slight infection occurred also on the mangel.

ROOT-ROT & LEAF SPOT (Phoma betae (Oud.) Frank). First report for the state. Loss a trace. General with the host.

DISEASES OF POME FRUITS

APPLE

BLIGHT (Bacillus amylovorus (Burr.) Trev.). Loss a trace. After 3 consecutive years of severe damage, blight in 1927 occupied a position of less than the usual importance. The loss this year is estimated as a trace. To be sure, this estimate is influenced considerably by the extremely light fruit crop, but aside from this there was comparatively little blighting of branches.

In June blight was generally scarce but by August moderate infection was more frequently encountered in scattered areas, i. e. in Guthrie, Page, Humbolt, Scott, and Lee Counties. In the last three counties named the disease was more severe even than last year, especially on young trees.

CROWN GALL (Bacterium tumefaciens EFS. & Town.). A few infected trees were found as usual in nurseries.

SOOTY BLOTCH (Gloeodes pomigena (Schw.) A. S. Colby). None was seen this year but it was common last year.

RUST (Gymnosporangium juniperi-virginianae Schw.). Loss a trace. The seriousness of the disease was undoubtedly minimized by the slight crop of fruit this season. By June 15 a moderate infection (pycnia) was apparent on leaves over the state. Bechtel crab and the native crab (Malus ioensis) likewise showed infection; the latter most severely with twig hypertrophy occurring occasionally. In a number of orchards Wealthy showed the usual decided susceptibility in comparison with other varieties.

FLYSPECK (Leptothyrium pomi (Mont. & Fr.) Sacc.). First report for the state. Very light this year but heavy last year.

BLISTER CANKER (Nummularia discreta (Schw.) Tul.). Loss a trace. Blister canker is becoming less important than formerly because the varieties most susceptible are not being planted. However, Stayman and Delicious are fairly susceptible.

BLOTCH (Phyllosticta solitaria Ell. & Ev.). Loss a trace. Blotch has been confined to the southern half of the state, i. e. the northern boundary of the blotch zone has corresponded to the so-called Delicious line. However, three recently discovered infections have extended the distribution. These have been found on Northwestern Greening in Monona, Fayette, and Calhoun Counties.

BLACK ROT (Physalospora malorum (Pk.) Shear). Loss a trace. Black rot was of slight importance, in part due to the failure of the apple crop. A slight to moderate leaf infection was observed generally. In Keokuk County the most severe infection ever seen occurred on some varieties.

Apple - Black Rot

The fungus, Coniothyrium pyrina, is found commonly on leaves in Iowa. According to the literature, this is a secondary invader of infection areas caused by Physalospora malorum.

*SCAB (Venturia inaequalis (Cke.) Aderh.). Loss 5 per cent. Mature ascospores were found May 19 on over-wintered leaves at McGregor in Clayton County. Scab lesions were first observed June 4 at Cedar Rapids and June 10 in Muscatine County. In general the infection for the state was about 2 weeks late, due probably to the cold weather. Scab developed about 10 days to 2 weeks after blossoming.

The loss this year cannot be estimated accurately since there was only a very light crop of apples. The dry season of 1926 was highly unfavorable to scab development but heavy rains late in autumn resulted in heavy leaf infection, thus supplying abundant inoculum for the following season. In general infection was quite uneven early in 1927; some orchards showing very little or none. Later in the season, however, the disease was more severe in most sections than at any time last year. Infection and damage were slight in western Iowa. Due to the scanty fruit crop, however, observations were limited principally to leaf attack.

The native wild crab, *Malus ioensis, suffered heavy leaf infection throughout the state. A moderate amount was observed on Bechtel crab in one locality.

Where spray was applied at calyx and 10 days after calyx (cover spray) there was good control. Unsprayed trees in June had about 30 per cent infection.

WINTER INJURY (Plate I. Fig. 1). The loss from winter injury is estimated at 1 per cent for 1927 and at 5 per cent for 1926. Dead or severely injured trees occur over the entire state. It is thought that the initial injury took place during the winter of 1924-25. Most of the injury is found on trees less than 10 years old, but older trees are also affected. In scattered home orchards losses of 50 to 95 per cent of the trees were frequent. In Clayton and Dubuque Counties along the bluffs overlooking the Mississippi River a 50 per cent loss has occurred. The main symptoms on severely affected trees are scanty or sparse foliage, longitudinal cracks in the bark, discolored or rotted heart wood. Quite often basal cankers are encountered. In one orchard where these cankers had been given careful treatment there were evidences that the bark would heal over the wounds. It is doubtful, though, if the trees will survive the injury which undoubtedly occurred on the roots and in the heart wood (See cherry winter injury).

LOSSES FROM APPLE DISEASES

Table 8. Estimated percentage losses from apple diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Black rot (Physalospora cydoniae)	Trace	Scab (Venturia inaequalis)	5
Blotch (Phyllosticta solitaria)	Trace	Other diseases	1
Cedar rust (Gymnosporangium)	Trace	All diseases	6
Fire blight (Bacillus amylovorus)	Trace		

PEAR

BLIGHT (Bacillus amylovorus (Burr.) Trev.). Although blight infection was considerably reduced on apple, it appears that the pear suffered severely, especially in eastern sections and even in localities not affected last year. In a number of places the damage was considered to be the most severe ever experienced. In young plantings and nurseries large losses occurred.

In scion orchards at Shenandoah, moderate loss occurred on Clapp Favorite and Flemish Beauty; severe loss on Bartlett, Beurré d'Anjou, Duchess, Kieffer, Lincoln, and Worden Seckel.

In the horticultural experimental orchard at Ames considerable varietal susceptibility was noted this year on seedling trees and hybrids as follows:

Infection on seedling trees

None	Slight	Moderate	Severe
Chinese	Aebley	Alamo	Emil de Hiyst
Dearborn	Bezi de La Motte	Ames	Flemish Beauty
Fluke	Lawrence	Orlando	Howell
McElroy	Lincoln		Longworth
New Orleans			Worden Seckel
Sheldon			
Walenta #1			

Pear - Blight

Infection on seedling hybrids

None	Slight	Moderate	Severe
Birkett X Mount Vernon	Kieffer X Seckel	Birkett X Bezi de La Motte	Birkett X Clairgeau
Howell X Birkett		Kieffer X Howell	Orel #15 X Bezi de La Motte
Fluke X Seckel			Seckel X Chinese
Lincoln X Howell			
Mt. Vernon X Duchess			
Seckel selfed			
Seckel X Bezi de La Motte			
Seckel X Kieffer			
Seckel X Longworth			
Seckel X Orel			
Warner X Howell			

*LEAF SPOT (Coniothyrium pirina (Sacc.) Shold.). This organism occurs rather commonly and abundantly in leaf spots of pear. In one large orchard of seedlings the leaf spotting persisted in spite of a regular spray schedule.

*LEAF BLIGHT (Fabraea maculata (Lév.) Atk.). This leaf blight was found only in nursery rows. Observations in September indicated considerable varietal differences in susceptibility as follows:

No infection--Patten, Kieffer, Duchess, Dwarf, Bartlett.

Infection but no defoliation--Garber 10 per cent; French 5 per cent; Clapp's Dwarf 5 per cent; Wilder 5 per cent.

Infection with defoliation--Flemish Beauty 10 per cent, and variety with name unknown, 60 per cent defoliated.

*BLISTER CANKER (Nummularia discreta (Schw.) Tul.). First report for the state. Blister canker on pear was found in a nursery in the northern part of the state. Several lower branches on a single tree were being attacked and killed. The infected tree was one of two varieties introduced from China about 20 years ago. Blister canker on pear has been previously reported to the survey only from Delaware. It was first found in Iowa (1926) near Levinville, in Adams County.

*SCAB (Venturia pyrina Aderh.). Observed but once in 1927. This was a severe infection on leaves and fruit at McGregor.

LOSSES FROM PEAR DISEASES

Table 9. Estimated percentage losses from pear diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Fire blight (*Bacillus amylovorus*)	10	Other diseases	0
Scab (*Venturia pyrina*)	0	All diseases	10
Leaf blight (*Fabraea maculata*)	Trace		

QUINCE

*LEAF BLIGHT (*Fabraea maculata* (Lév.) Atk.). Loss a trace. Quince in Iowa is found rarely outside of nursery rows. In nursery rows this year there was severe defoliation on all the varieties grown as follows: 95 per cent Angers and Meech; 85 per cent Orange; 55 per cent Osthern.

DISEASES OF STONE FRUITS

APRICOT

*LEAF SPOT (*Coccomyces* sp.). This leaf spot was plentiful in 1926 at Shenandoah in nursery rows. This year, however, infection was not observed.

*BACTERIAL SPOT (*Bacterium pruni* EFS.). First report for the state. A slight infection was observed in nursery rows at Shenandoah on the Alexis variety.

*POWDERY MILDEW (*Podosphaera oxyacanthae* (DC.) DBy.). Specimens collected in 1926 in a nursery at Shenandoah constitute the first report for the state. No observations were made this year.

CHERRY

*BACTERIAL SPOT (*Bacterium pruni* Sm.). Bacterial spot of cherry was located for the first time in the state. It occurred in five different counties, four of which (Sac, Boone, Harrison, and Page) are located in the southwestern quarter of the state; while the fifth, Winneshiek, is in the extreme northeastern corner. Thus it would appear that the disease is widespread in the state. Although the disease is reported for the first time, there is no doubt but that it has been present for a number of years, since Rolfs in 1915 (Cornell Expt. Sta. Memoir 8: 385) reports its occurrence in Iowa on hosts other than cherry.

The occurrence of the disease on cherry in a number of adjacent states has been reported in publications of the Plant Disease Survey. Possibly the presence of bacterial spot on cherry has been obscured by the commonly severe attacks of the Coccomyces leaf spot, and it is likely that some of the severe defoliation occurring in nursery rows may be on account of bacterial leaf spot.

No estimate of damage nor loss in the state can be made at this time on so few observations. Although the presence of *Bacterium pruni* on cherry was not detected early enough this year to make careful observations in the field, it has been determined that a large portion of diseased leaves collected during the year are affected by this organism. In Boone County a number of trees were found to have suffered moderate defoliation due to infection by *B. pruni*.

*LEAF SPOT (*Coccomyces hiemalis* Hig.). Loss 5 per cent. Severe infection and defoliation occurred in many places throughout the state and in Muscatine County were reported to be the most severe observed in the past five years. During late August and September trees were seen to be severely or entirely defoliated in many parts of the state. A complete spray schedule is a successful method of control, as shown in one orchard where the last spray application had been omitted in one section. In this the trees all showed moderate infection on young terminal growth. Infection was seen on wild cherry in one locality.

*POWDERY MILDEW (*Podosphaera oxyacanthae* (DC.) DBy.). Loss ½ per cent. The powdery mildew of cherry occurs throughout the state although more commonly in the southern half. The most serious damage occurred in nurseries where young trees (Montmorency especially) were severely attacked. On more mature trees in orchards the young terminal growth and water shoots were subject to attack. On grown trees, however, the damage was of little importance this year.

BROWN ROT (*Sclerotinia fructicola* (Wint.) Rehm.). No losses from brown rot occurred in 1927 because an early frost killed the cherry blossoms. In an average year the losses range from a trace to 2 or 3 per cent. Only once has a 5 per cent loss been reported.

This year a slight infection of brown rot was found on Sand Cherry (*Prunus besseyi*), Rocky Mountain Dwarf Cherry (*Prunus* sp.) and on Compass cherry. The report on *P. besseyi* is the first for the state for the host.

WINTER INJURY. Loss 4 per cent. During the growing seasons of 1926 and 1927 many cherry trees have died from winter injury which occurred initially during the winter of 1925. The autumn of 1925 was marked by severe drouth conditions, followed by a warm rainy period, then suddenly in early winter extremely low temperatures. It is reported that the soil was frozen to a depth of five feet. Following this there was a severe drouth in 1926 and again early in 1927, which undoubtedly augmented the original injury.

Frost at blossom time in 1927 killed practically the entire crop of fruit.

LOSSES FROM CHERRY DISEASES

Table 10. Estimated percentage losses from cherry diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Brown rot (*Sclerotinia cinerea*)	0	Other diseases	8
Leaf spot (*Coccomyces hiemalis*)	5	All diseases	13

PEACH

*BACTERIAL SPOT (*Bacterium pruni* EFS.). Loss a trace. An extremely slight infection occurred throughout the southern part of the state. In a few cases a slight to moderate defoliation was seen.

SCAB (*Cladosporium carpophilum* Thuem.). None observed in 1927. Two or three times in the past years scab has appeared when it caused damage estimated to be a trace.

*LEAF-CURL (*Exoascus deformans* (Berk.) Fckl.). Loss a trace. Infection and defoliation was quite severe throughout the southern half of the state.

LOSSES FROM PEACH DISEASES

Table 11. Estimated percentage losses from peach diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Leaf curl (Exoascus deformans)	Trace	Scab (Cladosporium carpophilum)	0
Brown rot (Sclerotinia cinerea)	0	Other diseases	Trace
Yellows and little peach (undetermined)	0	All diseases	Trace

PLUM

*BACTERIAL SPOT (<u>Bacterium pruni</u> EFS.). Two collections were made at widely separated places. The infection in both cases was slight.

*LEAF SPOT (<u>Coccomyces hiemalis</u> Higgins). Two collections were received. In one southern locality and in nursery rows severe defoliation occurred.

*POCKETS (<u>Exoascus pruni</u> Fckl.). Loss a trace. Infections were severe in Pottowattamie County, moderate in Fremont County, and slight in Muscatine County. The wild plum was much more susceptible than the cultivated varieties.

*HEART ROT (<u>Fomes fulvus</u> Fr.). First report for the state. Fruiting bodies were found in two parts of the state. They occurred on old trees: in one case on 30 year old Japanese hybrids in a nursery and again on Wild Goose in a home orchard.

*LEAF SPOT (<u>Phyllosticta prunicola</u> Sacc.). This leaf spot caused considerable shot-hole in some cases.

The specimens collected this year had spores corresponding to those of <u>P. circumscissa</u> Cke. but the spots were too large. (Cfr. Ellis and Everhart, N. Amer. Fungi #3353 and Fungi Col. #641.). The spores were ellipsoid, containing usually 2 oil droplets, olivaceous, 5-7 x 2-3.4 u. In general, the specimens are best considered as <u>P. prunicola</u>. (Cfr. Aderhold, "Über die Sprüh- und Dürrfleckendkrankheiten des Steinobstes." Landwirtschaftliche Jahrbücher 1901.)

*SHOT HOLE (<u>Phyllosticta virginiana</u> (E. & Hals.) Seaver). One collection on water shoots and seedlings was made at Griswold.

*BLACK KNOT (Plowrightia morbosa (Schw.) Sacc.). Loss a trace. Black knot was found but once this year, in a nursery in the northern part of the state. In some cases the varieties developed by Minnesota and by Hanson were quite susceptible. The Hansen variety, Wahnita, was severely attacked and some of the trees were practically killed. Japanese varieties and crosses developed by the Gardner nursery were slightly susceptible. In the seedlings from Japanese crosses those with the most Japanese blood were most susceptible.

*POWDERY MILDEW (Podosphaera oxyacanthae (DC.) DBy.). Powdery mildew is widespread in the state on this host but it occurs only sparingly on lower leaves and on water shoots in shady locations. Presumably the damage is negligible.

BROWN ROT (Sclerotinia fructicola (Wint.) Rehm.). Loss 5 per cent. Frost killed a good portion of the crop but occasional severe infection was found on trees which escaped. One case of twig blight was reported. In one orchard observations over a number of years indicate that the Hansen varieties are quite susceptible while Japanese hybrids developed by the Gardner nursery are very resistant.

On prune, which occurs but rarely in the state, one infection was found.

RUST (Tranzschelia punctata (Pers.) Arth.). In one locality a moderate infection occurred on seedlings growing in a shaded location.

GERMAN PRUNE

*BACTERIAL SPOT (Bacterium pruni EFS.). First report for the state on this host. In nursery rows at Shenandoah, the trees of this variety had 95 per cent infection. Some of it, however, was due to Coccomyces prunophorae.

*LEAF SPOT (Coccomyces prunophorae Higgins). In nursery rows at Shenandoah a slight infection occurred mixed with a severe infection of Bacterium pruni.

LOSSES FROM PLUM AND PRUNE DISEASES

Table 12. Estimated percentage losses from plum and prune diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Brown rot (Sclerotinia cinerea)	5	Other diseases	Trace
		All diseases	5

DISEASES OF SMALL FRUITS

BLACKBERRY

ORANGE RUST (Gymnoconia interstitialis (Schl.) Lagerh.). Loss a trace. The first infection of the year was observed May 19, on wild plants near McGregor. At this time only pycnia were present. The disease occurred generally with the host.

*ORANGE RUST (Kunkelia nitens (Schw.) Arth.). Loss a trace. The first infection, (and this severe), of the season was found on wild plants, May 25.

*LEAF SPOT (Mycosphaerella rubi Roark). Loss a trace. The disease occurs commonly to a slight or moderate extent wherever host is grown.

ANTHRACNOSE (Plectodiscella veneta (Speg.) Burkh.). Loss 3 per cent. The occurrence was general in the scattered plantings. This year the infection was severe, causing a loss equal to that of 1924. In an average year the disease is relatively unimportant.

WINTER INJURY. Loss 5 per cent. Evidences of winter injury on blackberry occurred throughout the state in the form of leaf burn followed often by death of the plant before or during full fruit. During the past two winters, weather conditions have been severe, that is, no snow with fairly low temperatures. These low temperatures injured the wood of plants which had failed to mature due to excessive moisture late in the fall.

CURRANT

*LEAF SPOT (Cercospora angulata Wint.). The crop is not commercial and is found only in gardens. This leaf spot was general over the state and caused severe defoliation. Usually all currants are totally defoliated by the latter part of September. The cause is not always Cercospora angulata since two other fungi (Mycosphaerella grossulariae and Pseudopeziza ribis) also occur and cause defoliation.

*LEAF SPOT (Mycosphaerella grossulariae (Fr.) Lindau). This leaf spot occurred in the southern part of the state as a moderate infection. See Cercospora angulata.

*ANTHRACNOSE (Pseudopeziza ribis Kleb.). Anthracnose was located in two gardens, one in Fayette and the other in Chickasaw County. In both cases there was severe defoliation. The same fungus attacks the wild gooseberry severely. See Cercospora angulata.

GOOSEBERRY

*LEAF SPOT (<u>Mycosphaerella grossulariae</u> (Fr.) Lindau). Loss a trace. In 1927, the disease was first observed June 15 in nursery rows at Shenandoah, where it occurred only on lower leaves. During July, in the nursery, infection spread to all the leaves; defoliation started in August and was quite severe during September. Defoliation occurred on 1 and 2 year plants as follows: Red Jacket 90 per cent; Downing 80 per cent; Houghton 60 per cent. A spray schedule reduced the infection on Downing and Pearl to 5 per cent with no defoliation.

*ANTHRACNOSE (<u>Pseudopeziza ribis</u> Kleb.). Loss a trace. The host is not commonly planted in Iowa but in several gardens and nurseries examples of severe infection and defoliation from anthracnose were found. The disease was found commonly throughout the state on the wild host, which was severely defoliated late in summer.

POWDERY MILDEW (<u>Sphaerotheca mors-uvae</u> (Schw.) B. & C.). Loss a trace. A severe infection occurred in one nursery where practically all the 2 year plants in a block were affected.

GRAPE

*BLACK ROT (<u>Guignardia bidwelli</u> (Ell.) Viala & Ravaz). Loss a trace. Due to the drouth this season, black rot infection was present only scantily. Generally slight, rarely moderate, leaf spotting was found. A slight infection on the fruit was met with several times. In several neglected vineyards in southeastern Iowa severe damage occurred. On wild grapes in southwestern Iowa frequently severe infection occurred on both leaves and fruit.

*DOWNY MILDEW (<u>Plasmopara viticola</u> (B. & C.) Berl. & De T.). Only two or three examples of slight to moderate infection on cultivated grape were seen this season. On the wild host infection was quite severe in a few central and southern localities.

ANTHRACNOSE (<u>Sphaceloma ampelinum</u> DBy.). A single report was received in 1927. This is the first report since 1910, when a slight amount occurred in one section of the state. In 1905, 25 per cent of the crop in one county was lost.

POWDERY MILDEW (<u>Uncinula necator</u> (Schw.) Burr.). Reports of infection were received from a single county (Muscatine) where the damage was slight.

CHLOROSIS. First report of occurrence in the state. Only a single specimen was received (Humbolt county). The symptoms resemble strikingly those described by F. E. Gladwin (N. Y. Agr. Expt. Sta. Bul. 449).

LOSSES FROM GRAPE DISEASES

Table 13. Estimated percentage losses from grape diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Black rot (Guignardia bidwellii)	Trace	Other diseases	Trace
		All diseases	Trace

RASPBERRY

CROWN GALL (Bacterium tumefaciens EFS. & Town.). A loss estimated as a trace occurred in scattered plantings.

ORANGE RUST (Gymnoconia interstitialis (Schl.) Lagh.). Loss a trace. Four reports were received of infection on cultivated plants. Wild raspberries were affected generally and moderately.

CANE BLIGHT (Leptosphaeria coniothyrium (Fckl.) Sacc.). Loss a trace. This blight occurs quite abundantly following winter injury. This year it appeared later in the fall than usual.

LEAF SPOT (Mycosphaerella rubi Roark). Loss a trace. The distribution was general as usual.

ANTHRACNOSE (Plectodiscella veneta Burkh.). Loss 2 per cent. Considerable loss was observed in Harrison County, and in addition many inquiries and specimens were received from other localities. The damage was considerably reduced due to the drouth.

MOSAIC (Virus). Loss a trace. The losses from mosaic are evident only in an indirect manner because mosaic infected plants may live for an indefinite number of years; but such plants are more subject to winter killing and other unfavorable conditions.

WIND WHIPPING. Loss 1 per cent. A common trouble in raspberries this season has been manifested in a die-back and wilt, which on careful examination, has been explained as follows: Young canes when blown back and forth by the wind are partially broken loose from the crown. This allows the entrance of fungi and other organisms which quickly girdle the entire cane and thereby bring about the die-back and wilting.

WINTER INJURY. Loss 12 per cent. Practically every raspberry grower experienced considerable loss this season from winter injury. The injury was manifested in marginal burning of leaves, blasting of blossoms, or quite frequently the sudden death of an entire cane while in full fruit. In addition, the situation was often complicated with over-loading. This is to say, the injured plants which bore a heavy crop of fruit could not stand the added load under the conditions of drouth which occurred throughout the season of 1927. In some plantings a 20 per cent loss occurred. This is the second consecutive year of severe winter injury. This trouble has been the largest factor contributing to losses in past years.

LOSSES FROM RASPBERRY DISEASES

Table 14. Estimated percentage losses from raspberry diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Mosaic and leaf curl (undetermined)	Trace	Other diseases	13
		All diseases	13

STRAWBERRY

LEAF SPOT (Mycosphaerella fragariae (Tul.) Lindau.). The loss was a trace this year. Undoubtedly the severity of the disease was lessened by the drouth.

D I S E A S E S   O F   V E G E T A B L E S

ASPARAGUS

*RUST (Puccinia asparagi DC.). Losses estimated as a trace occurred largely in home plantings. Commercial growers have reduced their losses by the use of resistant strains.

BEAN

BLIGHT (Bacterium phaseoli EFS.). A loss estimated as a trace occurred in the scattered plantings, principally home gardens.

ANTHRACNOSE (Colletotrichum lindemuthianum (Sacc. & Magn.) Briosi & Cav.). Only two reports were received. Infection was reduced due to drouth.

POWDERY MILDEW (Erysiphe polygoni DC.). Appeared late on various common garden varieties, including Lima. The infection was moderate and the damage negligible.

RUST (Uromyces appendiculatus (Pers.) Lk.). Not observed in 1927. This disease is somewhat variable in prevalence from year to year. In 1917 there was a trace; in 1918 it was common; in 1919 there was again a trace. In 1925 it again appeared causing a loss estimated at a trace. However, in the average year either the disease does not occur or else is not prevalent enough to attract attention.

MOSAIC (Undet.). Estimates of loss during the last six years vary from 2 to 6 per cent. In 1927, however, infection was so scant that no observations were made. The reason for this reduced infection is not known.

LOSSES FROM BEAN DISEASES
Table 15. Estimated percentage losses from bean diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Anthracnose (Colletotrichum lindemuthianum)	0	Root rots (Fusarium spp.)	0
Bacterial blight (Bacterium phaseoli)	Trace	Other diseases	Trace
Mosaic (undetermined)	0	All diseases	Trace

BEET

LEAF SPOT (Cercospora beticola Sacc.). Moderate infections occur commonly over the entire state but the damage is negligible.

CABBAGE

BLACK-ROT (Bacterium campestre EFS.). The principal cabbage growing section is located in Muscatine County. A survey in this area early in July failed to disclose any signs of black rot. After the peak of the harvest about two months later, however, infected plants were found commonly in several fields. Undoubtedly the absence of rains aided in checking the development of the disease.

YELLOWS (Fusarium conglutinans Woll.). Loss 30 per cent. Yellows was more prevalent than last year despite the cold weather during the early part of the season in 1927. The disease appeared later than usual, due probably to the cold wet weather in May and June. In Muscatine County by August 1, however, two commercial varieties, Copenhagen Market and Golden Acre, in the experimental plots showed nearly 70 per cent infection. On the same date Iacope and Marion Market approximated 10 per cent yellows. The strains of Iacope vary somewhat in the percentage of marketable heads; one which appears to be particularly promising produced 85 per cent.

Table 16. Amount of yellows on different varieties of cabbage as shown by counts during the growing season.

Variety	Amount of yellows Percentage infection				Percentage marketable heads
	June 10	July 9	August 4	August 20	August 4
Copenhagen Market	5	55	69	70	17
Golden Acre	6		70	70	22
Marion Market	2		11	10	60
Iacope	1	5	9	10	62

CANTALOUPE

BACTERIAL WILT (Bacillus tracheiphilus EFS.). Loss 5 per cent. The principal cantaloupe area is located in Muscatine County where bacterial wilt was serious this season. Striped cucumber beetles (Diabrotica vittata) and 12-spotted cucumber beetles (Diabrotica duodecimpunctata) were both unusually prevalent. Six applications of dust, using calcium arsenate and gypsum (1-20), in a 40-acre field did not prevent a high percentage of bacterial wilt, 10 per cent being found by August 15. Cucumbers were less susceptible.

ANTHRACNOSE (Colletotrichum lagenarium (Pass.) Ell. & Hals.). Loss a trace. In Muscatine County the disease did not appear until after the middle of August. The damage thereafter was very slight.

MOSAIC (Undet.). Loss a trace. Infection occurred with the crop and in one place 5 per cent of the plants were affected.

CARROT

SOFT ROT (Bacillus carotovorus Jones). Late rains in the fall following a dry period brought on soft rot in some plantings. A 5 per cent loss was reported in a small plot at Ames.

*LEAF SPOT (Cercospora apii carotae Pass.). First report for the state. In two northern counties the infection was moderate with damage negligible.

CELERY

*EARLY BLIGHT (Cercospora apii Fresen.). First report for the state. Only one case was found, in experimental plots at Ames where the damage was slight.

*LATE BLIGHT (Septoria apii Rostr.). Observed but once, causing severe damage in a home garden.

CUCUMBER

ANGULAR LEAF SPOT (Bacterium lachrymans EFS. & Bryan). In 1927 the disease had little significance although in some years it has caused losses as high as 2 per cent.

BACTERIAL WILT (Bacillus tracheiphilus EFS.). Loss 10 per cent. This is one of the most serious diseases of cucumbers, causing large losses nearly every year. In 1927, reports were received of total losses in a number of home gardens. During early August the losses for the state averaged only 1 to 2 per cent but by the end of the month the disease had assumed its usual severity.

POWDERY MILDEW (Erysiphe cichoracearum DC.). Observed but once, in experimental plots at Ames, where the infection was slight.

MOSAIC (Undetermined). Loss a trace. In Muscatine County the prevalence was local and the damage slight. Symptoms were probably masked due to the hot weather.

DILL

*STEM AND LEAF SPOT (Phoma anethi (Pers.) Sacc.). First report for the state. Severe infections were found in two different sections of the state.

EGG PLANT

LEAF SPOT (Phomopsis vexans (Sacc. & Syd.) Hart.). In an average year the loss is estimated as a trace but this year only a few infected plants were seen.

GROUND CHERRY

*SMUT (Entyloma australe Speg.). Moderate infections were observed in several gardens. The injury was slight.

HORSERADISH

*WHITE RUST (Albugo candida (Pers.) Kuntze.). A slight infection was observed in Muscatine County in one planting.

*LEAF SPOT (Alternaria brassicae (Berk.) Sacc.). First report for the state. A rather severe infection was observed at Shenandoah.

*LEAF SPOT (Cercospora armoraciae Sacc.). First report for the state. A slight infection occurred in one locality.

ONION

SMUT (Urocystis cepulae C. C. Frost). Loss a trace. During the last ten years slight losses due to smut have occurred only a few times. Commercial growers have been very successful in controlling the disease with formaldehyde. In Muscatine County, 17 rows were left untreated in one field. From these not a single onion was harvested while the adjoining treated rows had only 2 per cent infection.

PARSNIP

LEAF SPOT (Cercospora apii pastinacae Farl.). Infected plants were observed once in Story County.

PEA

POWDERY MILDEW (Erysiphe polygoni DC.). Loss a trace. In the northern part of the state the combination of drouth conditions and severe powdery mildew infection caused complete loss of the crop in some gardens. In other cases the disease became severe only after the plants had borne their usual crop.

ROOT ROT (Fusarium martii pisi Jones). Loss a trace. During June, severe damage to a considerable number of home gardens was reported. The fungus no doubt was aided in its development by the high temperatures.

PEPPER, BELL

FRUIT ROT (Alternaria sp.). Loss a trace. First report for the state. The distribution is general.

PEPPER, RED

WILT (Fusarium sp.). First report for the state. Several wilted plants were found in the home garden of an Italian family. A few of the plants are said to wilt every year in this garden. The symptoms were those of Fusarium infection and tissue isolations yielded a species of Fusaritm.

POTATO

SCAB (Actinomyces scabies (Thax.) Gues.). Loss 5 per cent. The disease was unusually prevalent and destructive this year. Various ideas have been advanced as to the reasons for this epidemic, none of which seem to explain the situation adequately. The following suggestions are offered:

1. The organism which causes potato scab is one which will grow in a wide range of soil temperatures, from 51.8° to 86° F.
2. The optimum soil temperature for scab infection is around 73° to 75° F.
3. The disease is influenced also to a marked extent by soil moisture. Dry soils favor scab while moist or wet soils are unfavorable to infection.
4. A combination of dry soil and favorable soil temperature makes an ideal condition for the development of scab.
5. The season of 1927 supplied these favorable conditions to a marked degree because in the first place it was very dry over the state as a whole, and in the second place, a dry soil always has a higher temperature than a wet soil provided other factors are the same in each case.
6. In addition to the above factors it has been found that the size and condition of the tubers when external factors are favorable for infection determine to quite an extent the amount of scab. This explains why some varietits escape and others do not.
7. Russet varieties are usually more resistant than smooth-skinned varieties.

8. The conditions which _favor_ potato scab are at the same time _unfavorable_ for the optimum growth of the potato plant.

EARLY BLIGHT (_Alternaria_ _solani_ (Ell. & Mart.) Jones & Grout. Loss a trace. Severe infection occurred in scattered home gardens.

BLACK LEG (_Bacillus_ _phytopthorus_ Appel). Loss 1.5 per cent. Black leg was widely distributed, especially in home gardens, where the greater part of the loss occurred. It has been determined that the use of certified seed and seed piece treatment are effective in the control of the disease. In the vicinity of Des Moines 5 per cent reduction in yield occurred. Here disease was common in fields planted with northern grown seed, while in one or two fields of home grown seed there were only a few infected plants. Near Clear Lake (Cerro Gordo County), a large acreage of Early Ohio and other varieties was more severely attacked than usual, although the loss was probably less than 1 per cent. This was true even with certified seed which had seed piece treatment.

SCURF (_Corticium_ _vagum_ Berk. & Curt.). Loss 6 per cent. Moderate infection was observed in different localities. At one place, in a large commercial field, the disease was severe enough to cause a slight loss; even though certified seed with seed piece treatment had been used.

WILT (_Fusarium_ _oxysporum_ Schl.). None found in 1927. Records of past years indicate that infection is rare or absent in the state, although there is a doubtful report from Adams County in 1911.

LATE BLIGHT (_Phytophthora_ _infestans_ (Mont.) DBy.). None found in 1927. This disease has occurred but rarely in the past. Since 1905 its presence has been reported only two or three times and then the damage was slight.

HOPPERBURN. Loss 15 per cent. This type of injury was quite common over the state and undoubtedly resulted in considerable loss. In two counties, Muscatine and Story, the loss was estimated at 20 per cent. At Magnolia (Harrison County) 10 per cent loss occurred. In general, growers interpret the damage as due to excessive drouth, but experimental plots in the potato section, in Muscatine County, sprayed with Bordeaux mixture, were practically free from injury. Neighboring fields belonging to private growers were badly injured.

LEAF ROLL (Undet.). Loss a trace. The distribution was general with the usual prevalence.

MOSAIC (Undet.). Loss a trace. In Polk County mosaic was quite general, although the damage was undoubtedly slight. It was common on Early Ohios and Irish Cobblers, causing considerable stunting and dwarfing. Mottling, however, was not common.

SPINDLE TUBER (Undet.). In Muscatine County the disease was local and caused very slight damage. Infection was more common in fields planted with uncertified seed. In general this is a rare disease.

LOSSES FROM POTATO DISEASES

Table 17. Estimated percentage losses from potato diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Mosaic (Undetermined)	Trace	Fusarium wilt (Fusarium oxysporum)	0
Leaf roll (Undetermined)	Trace	Tipburn & hopperburn (nonparasitic & leaf hoppers)	.15
Late blight (Phytophthora infestans)	0	Early blight (Alternaria solani)	Trace
Rhizoctonia (Rhizoctonia solani)	6	Other diseases	5
Blackleg (Bacillus phytophthorus)	1.5	All diseases	27.5

PUMPKIN

POWDERY MILDEW (Erysiphe cichoracearum DC.). Infection was common in experimental plots at Ames but the damage was slight.

RADISH

*WHITE RUST (Albugo candida Kuntze). Ordinarily white rust occurs on old plants, i. e., those which are maturing seed. Sometimes slight damage occurs on greenhouse plants. In 1927 slight infection was noted in several gardens on young plants. The loss is always negligible.

BLACK ROOT (Aphanomyces raphani Kendrick). A few infected plants were found in four or five gardens in Muscatine and Story Counties.

RHUBARB

*LEAF SPOT (Ascochyta rhei Ell. & Ev.). First report for the state. Shenandoah.

LEAF SPOT (Phyllosticta straminella Bres.). First report for the state. A moderate infection was observed in nursery rows at Shenandoah.

SPINACH

*DOWNY MILDEW (Peronospora effusa (Grev.) Ces.). The first report for the state. Diseased plants were found in the college greenhouses.

MOSAIC (Undet.). First report for the state. A moderate infection was found in one home garden.

SQUASH

BACTERIAL WILT (Bacillus tracheiphilus EFS.). In the past losses from this disease have been estimated as a trace. In 1927, the only infection noted occurred in the horticultural gardens at Ames with a loss of 1 to 2 per cent. Cantaloupe was more susceptible.

POWDERY MILDEW (Erysiphe cichoracearum DC.). Infection was observed in several localities. The damage in all cases was negligible. In one planting 5 per cent of the leaves had moderate infection.

SWEET POTATO

STEM ROT (Fusarium batatatis Woll. & F. hyperoxysporum Woll.). Loss 8 per cent. Stem rot appeared earlier than usual (1 per cent infection was common by June 10). Different lots of seed in experimental plots varied widely in their susceptibility. Studies during the summer indicate the possibility of selection of a resistant strain.

SURFACE ROT (Fusarium oxysporum Schl.). Loss a trace. First report for the state. In Muscatine County infection was generally prevalent although the damage was slight. Plants were killed in hot beds.

SCURF (Monilochaetes infuscans Hals.). The principal symptom occurs as a discoloration of slips in the hot bed. According to the growers, the yield is not reduced.

SOFT ROT (Rhizopus nigricans Ehr.). Loss a trace. The use of better storage conditions and seed selection has reduced losses from this disease to a minimum.

*LEAF SPOT (Septoria bataticola Taub.). In Muscatine County the prevalence was general but with slight damage.

BLACK ROT (Sphaeronema fimbriatum (E. & H.). Sacc.). Loss 2 per cent. The disease occurred commonly in the few slip beds where the seed had not been treated. In the field, the disease did not make an appearance until September.

MOSAIC (Undet.). First report for the state. Mosaic was first observed in Muscatine County in a seed bed but later the disease was present in a few fields where it caused extreme mottling and distortion of leaves, especially on Nancy Hall. Apparently the damage was slight.

LOSSES FROM SWEET POTATO DISEASES

Table 18. Estimated percentage losses from sweet potato diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Stem rot (Fusarium hyperoxysporum & F. batatatis)	8	Pox (Cystospora batata)	0
Foot rot (Plenodomus destruens)	0	Other diseases	1
Black rot (field losses) (Sphaeronema fimbriatum)	2	All diseases	11
Storage rots (various organisms including Sphaeronema)	Trace		

SWISS CHARD

*LEAF SPOT (Cercospora beticola Sacc.). First report for the state. The leaf spot occurs with the host, but infection is less than on beet.

TOMATO

EARLY BLIGHT (Alternaria solani (Ell.& Mart.) Jones & Grout.). Infection and damage were less than usual. A few plants in scattered gardens were attacked to a slight extent.

BACTERIAL SPOT (Bacterium vesicatorium Doidge). The loss was a trace in Muscatine County.

*LEAF MOLD (Cladosporium fulvum Cke.). Loss a trace. In 1927, as usual, the disease was important only on greenhouse crops. Occasionally the damage is severe in scattered houses and in some years the disease does slight damage in the field.

FUSARIUM WILT (Fusarium lycopersici Sacc.). Loss a trace. Occasionally wilt causes considerable loss in isolated areas but in Muscatine County, the principal tomato district, losses are always negligible. In 1927 only a few examples were observed.

LEAF SPOT (Septoria lycopersici Speg.). Loss 5 per cent. Early varieties of tomato in Muscatine County were severely attacked. One field of Earliana was entirely defoliated after most of the fruit had ripened. Late varieties escaped infection.

The drouth this year hindered development of the fungus.

BLOSSOM-END ROT (Non-par.). This disease was generally distributed but the loss was only a trace.

MOSAIC (Undet.). Loss 1 per cent. Mosaic was less prevalent and caused less damage than usual.

STREAK (Undet.). First report for the state. Streak appeared in greenhouses among plants affected by mosaic and seemed to be confined to Bonny Best. Only a few plants were affected.

LOSSES FROM TOMATO DISEASES

Table 19. Estimated percentage losses from tomato diseases, 1927.

Disease	Percentage loss	Disease	Percentage loss
Blight (Septoria lycopersici)	5	Early blight (Alternaria solani)	0
Fusarium wilt (Fusarium lycopersici)	Trace	Other diseases	1
		All diseases	6

TURNIP

POWDERY MILDEW (Erysiphe polygoni DC.). First report for the state. A slight infection was observed in one garden.

WATERMELON

ANTHRACNOSE (Colletotrichum lagenarium (Pass.) Ell. & Hals.). Loss a trace. The disease this year was held in check by the exceedingly dry weather of July and August. Lesions on leaves and fruit were not observed until late in August. The damage was slight.

WILT (Fusarium niveum EFS.). Loss 50 per cent. The seriousness of watermelon wilt in Muscatine County this season but serves to emphasize the losses that this disease has caused in former years. Before wilt was introduced into this section the annual crop was about 7000 acres and the annual carlot shipments sometimes reached 1000 cars. With the importation of watermelon wilt, however, the acreage and shipments started a steady decline, until in 1926 the acreage was about 600 and the carlot shipments about 10. The 1927 acreage was even smaller than that of 1926.

This year the first signs of watermelon wilt appeared shortly after the emergence of the first seedlings, a symptom heretofore unrecognized in the field. Many seedlings were lost by wilt, but after seedling wilt had taken its toll and the stand was thinned to one plant per hill a perfect stand still remained. Wilt continued to be destructive until August when nearly 90 per cent of the plants of 40 commercial varieties in three experimental fields had died. Soil infestation in these three fields was particularly heavy, but in many commercial fields wilt had killed nearly 35 per cent of the plants which had survived seedling wilt. It is likely that weather conditions tended to increase the rate of wilting during certain periods. The variety Conqueror is somewhat resistant in this section and the citrons and several African types appear to be nearly immune. Losses of 95 per cent were common in local areas over the state.

BLOSSOM END ROT (Undet.). The usual 1 per cent loss occurred in Muscatine County.

MOSAIC (Undet.). Mosaic occurred on some watermelon-citron hybrids developed in experimental studies, but was not observed on watermelon.

DISEASES OF TREES AND ORNAMENTAL PLANTS

ACER NEGUNDO (BOXELDER)

*Septoria marginata Heald & Wolf, leaf spot. Practically all lower leaves were affected on nursery plants at Shenandoah. The damage was slight.

*Sphaeropsis albescens E. & E., twig blight. This disease occurs quite commonly at Ames.

ACER SPP. (MAPLE)

*Phomopsis lebiseyi (Sacc.) Died., seedling canker. Apparently first report for the United States. At Shenandoah in seedling beds about 5 per cent of plants were lost. A total of 20 per cent were cankered but many of them recovered by sending out new growth from below the canker. The fungus develops in cankered areas and on the killed stems.

Diedicke (Kryptogamenflora Mark Brandenburg 9: 242) reports the occurrence of this fungus in nurseries.

Septogloeum acerinum (Pass.) Sacc., leaf spot. This disease occurred rather commonly in the nurseries at Shenandoah. Varietal differences were noted as follows: On *Acer dasycarpum pyramidale, pyramidal silver maple, only a few leaves were affected. On *Acer platanoides, Norway maple, there was moderate infection. On *Acer platanoides var. schwedleri, schwedler maple, there was 100 per cent infection.

AESCULUS GLABRA (OHIO BUCKEYE)

*Guignardia aesculi (Pk.) Stewart, leaf blotch. This year observations indicated a widespread infection. Mature trees and young second growth were severely defoliated during September.

AESCULUS HIPPOCASTANUM (HORSECHESTNUT)

*Guignardia aesculi (Pk.) Stewart, leaf blotch. The principal damage occurred in nursery rows where there was 100 per cent infection on seedlings. Over the state, mature trees showed moderate infection and defoliation. Water shoots were severely defoliated.

*Uncinula flexuosa Pk., powdery mildew. First report for the state. Infection occurred abundantly on the lower leaves of mature trees in a nursery in the northern part of the state.

ALTHAEA ROSEA (HOLLYHOCK)

Cercospora kellermanii Bub., leaf spot. First report for the state. A moderate infection causing slight damage was found.

*Puccinia malvacearum Bertero, rust. The disease occurs but rarely from year to year. Two reports were received in 1927.

AMELANCHIER SP. (SHADBLOW)

*Fabraea maculata (Lév.) Atk., leaf spot. In nursery rows at Shenandoah a 30 per cent infection occurred, causing considerable defoliation.

AMELANCHIER CANADENSIS (DOWNY SHADBLOW)

Nummularia discreta (Schw.) Tul., blister canker. Infected plants were first found in 1924 in Ledges Park, near Boone. The disease has been observed in the same locality in succeeding years.

AMPELOPSIS ENGELMANNI (ENGELMANN CREEPER)

*Cercospora ampelopsidis Pk., leaf spot. In nursery rows at Shenandoah 90 per cent of the leaves were infected, with slight shot-hole.

AMPELOPSIS QUINQUEFOLIA (VIRGINIA CREEPER)

*Cercospora ampelopsidis Pk., leaf spot. A slight infection occurred.

*Guignardia bidwellii (Ell.) Viala & Rav., leaf spot. Infection widespread. Considerable shot-hole occurred in nursery rows.

*Uncinula necator (Schw.) Burr., powdery mildew. Common.

AMPELOPSIS TRICUSPIDATA (BOSTON IVY)

*Guignardia bidwellii (Ell.) Viala & Rav. Occurring on plants in nursery rows.

*Septoria ampelopsidis Ellis, leaf spot. A 5 per cent infection occurred at Shenandoah in nurseries. In some cases, older plants suffered severe shot-hole.

ANTIRRHINUM MAJUS (SNAPDRAGON)

Puccinia antirrhini Diet. & Holw., rust. The disease occurred commonly in the state as the agent of considerable damage both in greenhouse and on outdoor plants.

AQUILEGIA SPP. (COLUMBINE)

Erysiphe polygoni DC., powdery mildew. First report for the state. Causing considerable infection in nursery rows at Osage.

BERBERIS VULGARIS

**Phoma berberina* Sacc. First report for the United States. The fungus fruited abundantly on living stems.

**Leptosphaeria berberidis* Rich. The perithecia were abundant on living stems in one locality.

BETULA SP. (BIRCH)

**Septoria betulina* Pass., leaf spot. Prevalent generally in southern nurseries.

BETULA ALBA

Melanconium bicolor Nees, canker. First report for the state. This disease occurred commonly and was particularly important in nursery rows.

CALENDULA OFFICINALIS (CALENDULA)

Mosaic. Common in greenhouses and gardens.

CALLISTEPHUS CHINENSIS (CHINA-ASTER)

Coleosporium solidaginis (Schw.) Thuem., rust. Severe infections occurred on plants in the formal gardens at Ames.

Yellows. Severe infections observed in several localities.

CALYCANTHUS FLORIDUS (COMMON SWEETSHRUB)

Macrosporium calycanthi Cav., leaf spot. First report for the state. An occasional leaf was infected in nurseries at Shenandoah.

CANNABIS SATIVA

**Septoria cannabis* (Lasch.) Sacc., leaf spot. The disease occurs commonly on plants escaped from cultivation.

CARAGANA ARBORESCENS (SIBERIAN PEA-TREE)

*Sphaeropsis sp., canker and dieback. This host is severely attacked at Ames with the result that many branches are killed each year. Associated with the death of the branches there ensues a peculiar enlargement of the lenticels and a brownish discoloration of the bark. The primary injury may possibly be initiated by winter injury.

CASTANEA DENTATA (AMERICAN CHESTNUT)

This host occurs but rarely in the state. A few scattered trees are to be found in yards and parks.

*Endothia parasitica (Burr.) P. J. & H. W. Anderson, blight. In September in a northern nursery, three medium sized trees which had been killed back to the roots by the blight were found. An infected tree was seen in the same nursery three years ago.

CASTANEA SP. (SORDEN VARIETY)

*Fusicoccum castaneum (Sacc.) Sacc., canker. This fungus does not seem to be reported in the literature as the agent of a disease; unless the Fusicoccum sp. reported in cankers from California should prove to be this organism. (U. S. Dept. Agr. Bul. 1366)

In the Gardner nursery, at Osage, several trees of the Sorden blight resistant variety were killed several years ago, presumably by winter injury. Seedlings from these trees now have an occasional cankered limb, on which the fungus has fruited abundantly. In one canker there occurred typical pycnidia and spores of Endothia parasitica.

CATALPA BIGNONIOIDES NANA (UMBRELLA CATALPA)

*Microsphaera alni vaccinii (Schw.) Salm., powdery mildew. In nursery rows, especially in shaded areas, 40 per cent of the leaves were affected.

CATALPA SP. (CATALPA)

*Cercospora catalpae Wint., leaf spot. Common in nurseries.

CELTIS OCCIDENTALIS (HACKBERRY)

*Mosaic (?). Practically 100 per cent of the leaves were affected in the nursery at Shenandoah.

CHRYSANTHEMUM SP. (CHRYSANTHEMUM)

*<u>Septoria chrysanthemella</u> Cav., leaf spot. In nursery rows at Shenandoah there was considerable difference in varietal resistance, e. g., Victory, none; *Little Bob, a few leaves infected; Mrs. C. Lowthian Bell, 50 per cent leaf infection.

CHRYSANTHEMUM MAXIMUM (SHASTA DAISY)

*<u>Septoria chrysanthemella</u> Cav., leaf spot. In nurseries at Shenandoah the Shasta Daisy had 5 to 10 per cent of the leaves affected, while Shasta Alba was immune.

CORNUS SPP. (DOGWOOD)

*<u>Septoria cornicola</u> Desm., leaf spot. Wild plants were generally affected over the state. In nurseries, *<u>Cornus stolonifera</u> and *<u>C. paniculata</u> were the most severely attacked. On the former there was 50 per cent leaf infection with moderate shot-hole.

COSMOS SPP.

*<u>Phomopsis stewartii</u> Peck, stem canker. This disease has been known to occur in Iowa for a number of years but it has not been previously reported in the literature. This year, the disease was found in two out of four gardens examined in several localities. About a fourth of the plants were infected.

CRATAEGUS MONOGYNA

*<u>Bacillus amylovorus</u> (Burr.) Trev., blight. Ames.

CRATAEGUS OXYACANTHA (ENGLISH HAW)

*<u>Bacillus amylovorus</u> (Burr.) Trev., blight. First report for the state. In nursery beds at Shenandoah (1926) about 3 per cent of the young seedlings were killed.

*<u>Phyllosticta rubra</u> Pk., leaf spot. First report for the state. In 1926, this fungus was the cause of considerable defoliation on young seedlings in nursery beds.

CRATAEGUS OXYACANTHA PAULI (SCARLET THORN TREE)

*<u>Fabraea maculata</u> (Lév.) Atk. At Shenandoah, in nurseries, plants were 80 per cent defoliated.

DAHLIA SPP. (DAHLIA)

Erysiphe polygoni DC., powdery mildew. A moderate infection was observed in two localities.

DELPHINIUM SPP. (LARKSPUR)

*Bacterium delphinii (EFS.) Bryan, black spot. First report for the state. The disease was observed in several different sections of the state. At Des Moines, infection was severe on some English hybrids, while nearby American varieties were only slightly affected. In nursery beds at Shenandoah, 2 per cent of Delphinium belladona plants were killed, while other varieties were only slightly susceptible. Specimens were also collected at Shenandoah in 1926.

DEUTZIA SPP. (DEUTZIA)

Cercospora deutziae E. & E., leaf spot.. At Shenandoah, infection was found only on languishing lower leaves of *D. gracilis. Other varieties were not affected.

DIANTHUS BARBATUS (SWEET WILLIAM)

*Uromyces caryophyllinus (Schr.) Wint., rust. First report for the state. At Ames a severe infection occurred in the formal garden on the campus, which undoubtedly was a factor in the early death of the plants.

DIANTHUS CARYOPHYLLUS (CARNATION)

Uromyces caryophyllinus (Schr.) Wint., rust. None was seen in 1927, although it undoubtedly occurred as usual on greenhouse crops.

ELAEAGNUS ANGUSTIFOLIA (RUSSIAN OLIVE)

*Septoria argyraea Sacc., leaf spot. Specimens of this disease were collected in 1926 and 1927 at Shenandoah.

EUPHORBIA MARGINATA

Uromyces proeminens (DC.) Pass., rust. This rust occurs rather commonly in gardens.

FORSYTHIA SP.

*Alternaria forsythiae Harter, leaf spot. First report for the state. This leaf spot was rather common at Shenandoah in 1926 and 1927. (Cfr. Mycologia 3: 154.)

FRAXINUS AMERICANA (WHITE ASH)

*Cylindrosporium fraxini Ellis & Kell., leaf spot. In nurseries at Shenandoah a 100 per cent leaf infection occurred.

Puccinia fraxinata (Lk.) Arth., rust. Slight damage at Shenandoah.

FRAXINUS LANCEOLATA (GREEN ASH)

*Cylindrosporium fraxini Ellis & Kell., leaf spot. In nursery rows a 20 per cent infection occurred. Infection was observed also on seedlings of wild plants in the woods.

*Puccinia fraxinata (Lk.) Arth., rust. Collected several times at various places, with one case of severe hypertrophy of young twigs.

GAILLARDIA SPP. (GAILLARDIA)

*Septoria gaillardiae E. & E., leaf spot. First report for the state. In nursery rows at Shenandoah, this leaf spot was common in 1926 and 1927. This season a 40 per cent infection occurred.

GLADIOLUS SPP. (GLADIOLUS)

Bacterium marginatum McC., scab. Infection occurs widely with the host. In the nurseries at Shenandoah a 5 per cent loss occurred.

HELENIUM HOOPESI (ORANGE SNEEZEWEED)

*Septoria helenii E. & E., leaf spot. First report for the state. A moderate infection occurred in 1926 at Shenandoah.

HELIANTHUS DEBILIS (CUCUMBER SUNFLOWER)

*Erysiphe cichoracearum DC., powdery mildew. On plants in garden at Ames.

*Puccinia helianthi-mollis (Schw.) Jackson, rust. On plants in garden at Ames.

HELIANTHUS GIGANTEUS (GIANT SUNFLOWER)

*Erysiphe cichoracearum DC., powdery mildew. Common with the host.

*Puccinia helianthi-mollis (Schw.) Jackson, rust. Common with the host.

IRIS SPP.

Bacillus carotovorus Jones, soft rot. Observed several times.

*Didymellina iridis (Desm.) V. Hoehn., leaf spot. In several localities, early in the spring before the drouth set in, the disease was noted to be causing the death of a considerable number of leaves. In one nursery, late in summer, it was noted that only those plants in shaded areas were severely affected. In another nursery, growing a large number of varieties, there was some evidence of varietal differences in susceptibility.

Leptosphaeria heterospora (DeNot.) Niessl., Specimens were received from two localities. In one case the organism was found during the summer, evidently following an attack of soft rot. Again material was found early in spring on dead overwintered corms. No evidence that it was the cause of a disease. First report for the state.

JUGLANS CINEREA (BUTTERNUT)

*Gnomonia leptostyla (Fr.) Ces. & DeNot., anthracnose. General, moderate damage.

JUGLANS NIGRA (BLACK WALNUT)

*Gnomonia leptostyla (Fr.) Ces. & DeNot., anthracnose. By October severe defoliation had occurred over a greater part of the state on both young and mature trees. Since 1905 there have been two periods of several consecutive years during which walnut trees were severely defoliated. In the intervening years the disease was of slight or moderate importance.

*Microsphaera alni (Wallr.) Wint., powdery mildew. First report for the state on this host. It was found only in a southern nursery where it occurred on young trees in moist situations. This mildew was reported once before (1888) on J. regia. (Iowa Erysiphaceae. Proc. Iowa Acad. Sci. 14.)

JUNIPERUS SPP. (JUNIPER)

*Phomopsis juniperovora Hahn, nursery blight. In seedling beds in nurseries at Shenandoah there was a 40 per cent loss by July. The Forestry nursery at Ames lost all one and two year seedlings by June. The loss for the state was estimated at 20 per cent.

LIMONIUM LATIFOLIUM KUNTZE (BIGLEAF SEA LAVENDER)

Ascochyta plumbaginicola P. Hennings, leaf spot. Evidently this is the first report of the disease in the United States. At Shenandoah many leaves were badly spotted and killed both in 1926 and 1927.

LONICERA SEMPERVIRENS (TRUMPET HONEYSUCKLE)

*Cercospora antipus Ell. & Holw., leaf spot. A moderate infection occurred in one nursery.

LONICERA SPP. (HONEYSUCKLE)

*Microsphaera alni (Wallr.) Wint., powdery mildew. This occurred commonly throughout the state. (*L. tartarica vars., alba, rosea, and sibirica.)

LYCHNIS CORONARIA (ROSE CAMPION, MALTESE CROSS)

*Phyllosticta lychnidis (Fr.) E. & E., leaf spot. First report for the state. This spot occurred in nursery rows at Shenandoah with a 20 per cent infection, especially on lower portions of the plants.

MALUS IOENSIS (DOUBLE FLOWERING CRAB)

*Gymnosporangium juniperi-virginianae Schw., rust. As usual, the rust was serious on leaves and branches in the nurseries at Shenandoah. By early September, 5 per cent of the branch tips had been killed. Where a regular spray was applied the damage was kept in check.

*Venturia inaequalis (Cke.) Aderh. See apple.

MORUS SPP. (MULBERRY)

Bacterium mori (B. & L.) EFS., blight. First report for the state. The disease occurs over the entire state, with few plants escaping infection. The Russian mulberry (*M. alba tartarica) was particularly susceptible, especially in nursery beds and rows. This season at Shenandoah, one block of 100,000 seedlings showed 75 per cent of the plants with one or more stem cankers. Leaf infection was noted to be especially severe on the lower portion of the same plants.

*Cercospora moricola Cooke, leaf spot. Infection occurred in one northern county.

*Gibberella moricola Ces. & DeNot., twig blight. This fungus was found widely over the state. There is reason to believe that it is a secondary organism following the attack of Bacterium mori. First report for the state.

OENOTHERA LAMARCKIANA (LAMARCK EVENING PRIMROSE)

*Septoria oenotherae West., leaf spot. Common in nursery rows.

PAEONIA SPP. (PEONY)

*Cladosporium paeoniae Pass., leaf mold. The disease was common in the state, causing considerable killing of leaves. The damage was slight.

*Mosaic, ring spot. First report for the state. Infected plants were rather common at Shenandoah. Material was sent to F. D. Fromme, at Blacksburg, Va., who reported that the trouble was similar to the ring-spot of tobacco recently described and illustrated by him (Phytopath. 17: 321-328.). The disease is perhaps the same as that described by Whetzel (Trans. Mass. Hort. Soc. 1915, p. 103-112.).

PANAX QUINQUEFOLIUM (AMERICAN GINSENG)

Alternaria panax Whet., blight. One report was received.

Phytophthora cactorum (Leb. & Cohn) Schroet, blight. Infected plants were received from one locality.

Papery leaf spot (nonpar.). Material was received from one locality.

PHLOX SPP. (PHLOX)

*Cercospora amphakodes Ell. & Holw., leaf spot. The disease was generally prevalent at Shenandoah on the Miss Lingard variety (*P. glaberrima suffructicosa). Infection occurred on 10 per cent of the leaves, causing yellowing.

Erysiphe cichoracearum DC., powdery mildew. The disease was common in the state and in some cases caused severe damage.

*Septoria phlogis Sacc. & Speg., leaf spot. Found commonly in nursery rows. (*P. paniculata, var. La Vague)

PINUS STROBUS (WHITE PINE)

Winter killing. A high percentage of seedlings were killed in the Forestry Nursery at Ames. The white pine is used extensively in windbreaks over the state and many of the younger trees in these were entirely killed; while older trees lost either limbs or the entire top.

PLATANUS OCCIDENTALIS (AMERICAN PLANETREE)

*Gnomonia veneta (Sacc. & Speg.) Kleb., anthracnose. (Plate II Fig. 1.) As usual anthracnose was severe in scattered localities. On the campus at Ames, several young trees were completely defoliated early in the spring. Each new set of foliage, developed from time to time throughout the year, was in turn attacked. Several trees were killed.

POPULUS SP. (VOLGA POPLAR)

*Discella populina Sacc., canker. The disease was rather abundant in nursery rows. (See under Populus alba nivea.)

POPULUS ALBA NIVEA (SILVER LEAF POPLAR)

*Discella populina Sacc., canker. Presumably this is the first report of this disease in the United States. (Cfr. Saccardo Ann. Myc. 6: 562 and Petrak, Ann. Myc. 20: 308) At Shenandoah more than half of one block of young trees, 5 to 7 feet high, was ruined because of cankered limbs. Abundant material was collected from another unnamed variety. The disease was first found in 1925.

POPULUS CANDICANS (BALM-OF-GILEAD)

*Melampsora medusae Thuem., rust. In nurseries.

POPULUS EUGENEI (CAROLINA POPLAR)

Marssonina brunnea (E. & E.) Sacc., leaf spot. In nurseries.

POPULUS SPP. (POPLAR)

Bacterium tumefaciens EFS., crown gall. In the nurseries at Shenandoah the poplars are attacked by this organism every year. In 1927 galls were found on 5 per cent of P. bolleana.

Cytospora chrysosperma (Pers.) Fr., canker. This organism is commonly a factor in the death of young trees in the nursery. It is especially prevalent on plants affected by winter injury.

Dothichiza populea Sacc., canker. Cankers on young trees are common.

Marssonina populi (Lév.) Sacc., leaf spot. In nurseries, where the infection was common.

*Napicladium tremulae (Frank) Sacc., leaf spot. First report for the state. Diseased leaves were received from one locality.

*Septoria populi Desm., leaf spot. In nursery rows.

PRUNUS BESSEYI (SAND CHERRY)

*Bacterium pruni EFS., bacterial spot. First report for the state. Specimens collected in 1913.

*Sclerotinia fructicola (Wint.) Rehm., brown rot. First report for the state. Slight infection.

PRUNUS HORTULANA (WILD PLUM)

*Exoascus mirabilis Atk., hypertrophy. Common near Randolph (Fremont County) in plum thickets

PRUNUS SEROTINA (WILD BLACK CHERRY)

Cercospora circumscissa Sacc., shot hole. Common throughout the state.

PRUNUS TOMENTOSA (NANKING CHERRY)

*Podosphaera oxyacanthae (DC.) DBy., powdery mildew. Evidently this host, in comparison with other cultivated varieties, is somewhat resistant.

PRUNUS VIRGINIANA (CHOKECHERRY)

Cercospora circumscissa Sacc., shot hole. Common throughout the state.

PRUNUS SP. (ROCKY MOUNTAIN DWARF CHERRY)

*Bacterium pruni EFS., bacterial spot. First report for the state.

*Podosphaera oxyacanthae (DC.) DBy., powdery mildew. Trees were severely infected at Shenandoah during the latter part of September. The upper half of the trees were whitened with mycelium.

Sclerotinia fructicola (Wint.) Rehm., brown rot. Slight.

QUERCUS ALBA (WHITE OAK)

*Marssonina martini (Sacc. & Ell.) Magn., leaf spot. This leaf spot occurred commonly. The damage was negligible.

QUERCUS RUBRA (RED OAK)

*Marssonina martini (Sacc. & Ell.) Magn., leaf spot. This leaf spot was abundant in 1926 and 1927 on young plants in beds at Shenandoah. The damage seemed to be slight. Infection was observed also on older trees in nursery rows and on trees growing wild.

QUERCUS SPP. (OAK)

*Gnomonia veneta (Sacc. & Speg.) Kleb., anthracnose. (Plate II, Fig. 2) Oak anthracnose is usually severe every year during the summer but ordinarily the trees recover before fall. In 1927, however, the disease assumed an epidemic form in nurseries, on city streets, and in woods. The white oak especially was attacked. Usually a severely defoliated tree recovers by sending out a second growth of leaves, but this year the second and in many cases the third growth was killed. This severe strain coupled with an extremely dry season resulted in the death of many trees. Late in the fall evidences of the infection were seen in numerous dead terminals and branches.

*<u>Microsphaera</u> <u>alni</u> (Wallr.) Wint., powdery mildew. The distribution of this disease was scattered and the infection was rather slight.

*<u>Taphrina</u> <u>coerulescens</u> (Mont. & Desm.) Tul., leaf blister. A mild infection was observed on saplings in one locality.

RHUS GLABRA LACINIATA (CUT-LEAF SUMAC)

*<u>Septoria</u> <u>rhoina</u> B. & C., leaf spot. At Shenandoah infection occurred on all lower leaves causing discoloration and some defoliation.

<u>Sphaerotheca</u> <u>humuli</u> (DC.) Burr., powdery mildew. At Shenandoah severe infection occurred on nursery plants 2 to 3 feet high. Twenty per cent of the young branches and in some cases the leaders were killed.

ROSA SPP. (ROSE)

<u>Bacterium</u> <u>tumefaciens</u> EFS., crown gall. A few infected plants were found in nurseries.

*<u>Cercospora</u> <u>rosicola</u> Pass., leaf spot. One collection was made this year.

<u>Diplocarpon</u> <u>rosae</u> Wolf, black spot. In nurseries most of the varieties were but slightly affected this year. Crimson Rambler was 50 per cent defoliated: while John Hopper had 50 per cent and Dorothy Perkins 10 per cent leaf infection.

<u>Sphaerotheca</u> <u>pannosa</u> (Wallr.) Lév., powdery mildew. In nursery rows Crimson Rambler had a 50 per cent infection. <u>Rosa</u> <u>multiflora</u> had 50 per cent of the growing points attacked. Dorothy Perkins and <u>Rosa</u> <u>setigera</u> showed 50 per cent leaf infection. Other varieties were affected slightly or not at all.

RUDBECKIA PURPUREA (PURPLE CONEFLOWER)

*<u>Cercospora</u> <u>rudbeckiae</u> Pk., leaf spot. In nursery rows. Importance slight.

SALIX PENTANDRA (LAUREL-LEAF WILLOW)

*Cylindrosporium salicinum (Pk.) Dearn., leaf spot. First report for the state. In nursery rows at Shenandoah severe defoliation practically ruined several blocks of 1 year plants. Many wild trees were affected throughout the state.

SALIX VITELLINA (GOLDEN WILLOW)

Cylindrosporium salicinum (Pk.) Dearn., leaf spot. First report for the state. This host was as severely affected as Salix pentandra (see above).

SALIX SPP. (WEEPING WILLOW)

Cylindrosporium salicinum (Pk.) Dearn., leaf spot. First report for the state. This host was but slightly affected in comparison with Salix pentandra and S. vitellina (see above).

SEDUM SPECTABILE (SHOWY STONECROP)

*Septoria sedi West., leaf spot. This disease occurred commonly in nursery plantings. In 1926 the fungus caused a stem canker also. In 1927 *S. spectabile var. Brilliant showed 3 per cent leaf infection and *S. spectabile variegata 30 per cent.

SORBUS AUCUPARIA (EUROPEAN MOUNTAIN-ASH)

*Cytospora rubescens Fr., canker. About 80 per cent of the young trees in nursery rows at Shenandoah had cankers on the main stem. However, the fungus may be a secondary invader on tissue affected by winter injury.

*Nummularia discreta (Schw.) Tul., blister canker. (Plate I Fig. 2) First report for the state. Collected from two localities. At Osage, in an avenue of these plants in the Gardner nursery, a number of trees have been killed, while in others many branches were attacked.

*Phyllosticta sorbi West., leaf spot. First report for the state. Common with the host. In nurseries a moderate infection occurred on young seedlings in beds; on 3 to 4 year old plants in rows there was severe infection and defoliation; and on mature trees there was heavy infection with slight defoliation.

*Septoria aucupariae Bres., leaf spot. First report for the state and apparently the first report for the United States. Common in nurseries at Shenandoah.

SPIRAEA SPP. (SPIREA)

Cylindrosporium filipendulae Thuem., leaf spot. First report for the state. At Shenandoah there were varietal differences in susceptibility: *S. douglasi 40 per cent defoliation, *S. margarita 40 per cent, S. thunbergii 30 per cent, *S. vanhouttei 15 per cent.

SYMPHORICARPOS SPP. (SNOWBERRY)

*Microsphaera diffusa Cke. & Pk., powdery mildew. Infection is common and heavy wherever the host occurs. In nursery rows young plants were damaged considerably. (*S. racemosa, *S. vulgaris variegatus.)

SYRINGA SPP. (LILAC)

*Cercospora macromaculans Heald & Wolf, leaf spot. First report for the state. A slight infection occurred at Shenandoah.

Microsphaera alni (Wallr.) Wint., powdery mildew. The disease occurred commonly as usual. Evidently the damage was negligible.

Winter injury. Reported from one locality.

TILIA AMERICANA

*Rabenhorstia tiliae Fr. This organism was abundant at Shenandoah on branches of young trees which had been recently killed.

ULMUS SPP. (ELM)

*Gnomonia ulmea (Sacc.) Thuem., black spot. This disease was extremely common and widespread.

VIBURNUM OPULUS (EUROPEAN CRANBERRYBUSH)

*Cercospora opuli (Fckl.) V. Hoehn., leaf spot. Generally prevalent with slight damage.

VIBURNUM OPULUS STERILE (COMMON SNOWBALL)

*Cercospora opuli (Fckl.) V. Hoehn. Common.

VIBURNUM TRILOBUM

*Cercospora opuli (Fckl.) V. Hoehn. Slight infection at Shenandoah.

VIOLA CUCULLATA (BLUE MARSH VIOLET)

*Cercospora violae Sacc., leaf spot. This native species is cultivated in one nursery where the leaf spot was found moderately.

ZINNIA SP. (ZINNIA)

*Erysiphe cichoracearum DC., powdery mildew. Infection was moderate or severe over the state.

EXPLANATION OF PLATES

I.

Fig. 1. Apple tree affected by winter injury. Note sparse foliage. Grundy County, Iowa. Sept. 13, 1927.

Fig. 2. A tree of Sorbus aucuparia killed by Nummularia discreta.

II.

Fig. 1. Young Platanus tree defoliated by Gnomonia veneta.

Fig. 2. Dead branches on Quercus caused by Gnomonia veneta.

PLATE I

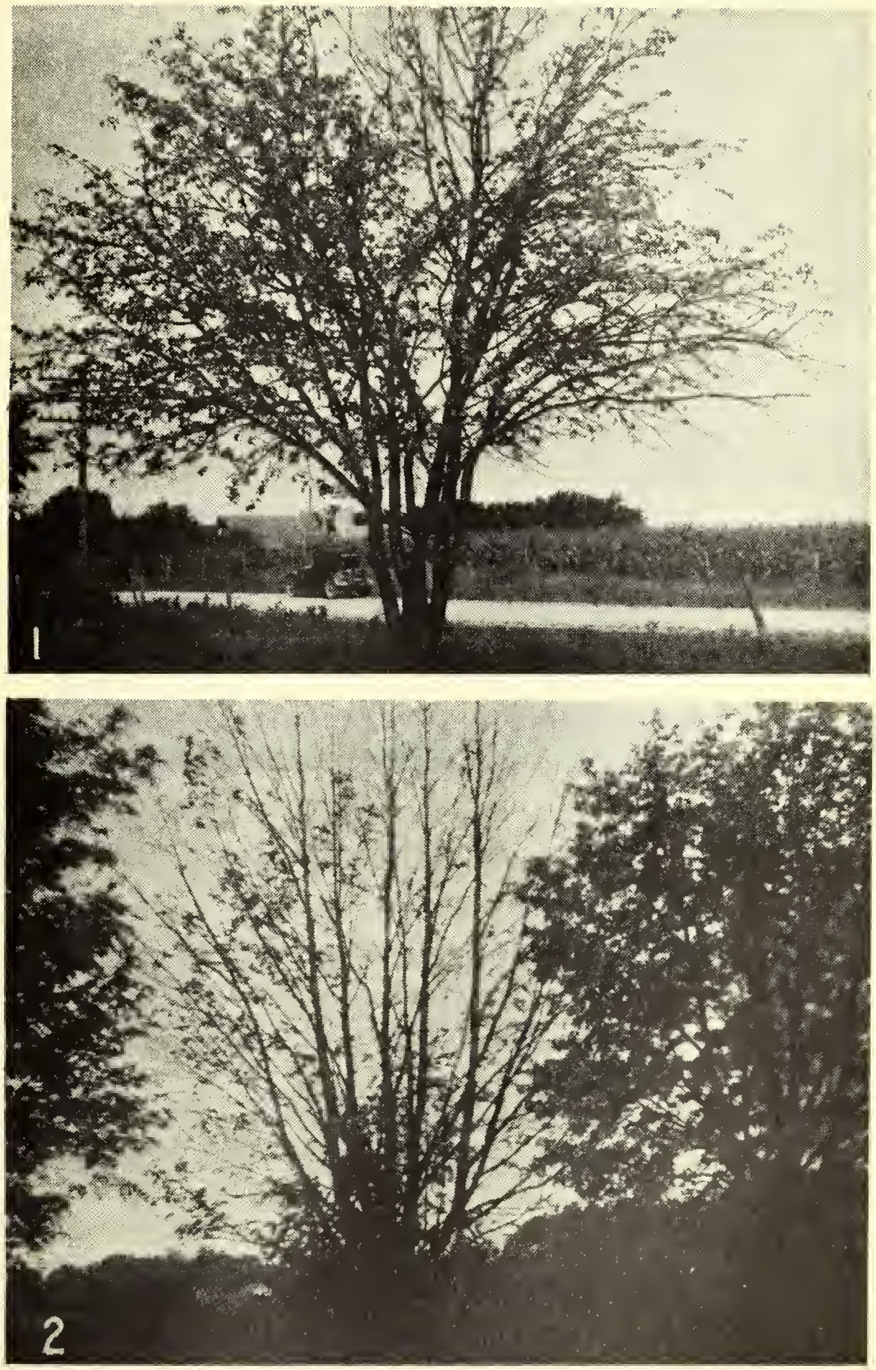

PLATE II

THE PLANT DISEASE REPORTER

ISSUED BY

THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

Supplement 59

Plant Diseases in Utah in 1927

May 15, 1928.

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

PLANT DISEASES IN UTAH IN 1927

A report of a plant disease survey conducted with cooperative support of the Utah Agricultural Experiment Station and the Bureau of Plant Industry of the United States Department of Agriculture

prepared by

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Plant Disease Reporter
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INTRODUCTION

This report is based chiefly on the findings of a field to field survey conducted by the writer from June 15 to September 15, 1927, with joint support of the Utah Agricultural Experiment Station and the Office of Mycology and Disease Survey of the United States Bureau of Plant Industry. The purpose of the undertaking was to determine as accurately as possible the nature and extent of plant pathological problems throughout Utah. Accordingly, a large part of the time was spent in making field observations with appropriate notes and collecting specimens in as many of the agricultural areas of the state as time allowed. Travel by automobile permitted the carrying of necessary equipment at all times, including trowel, spade, small pick, pruning saw, vasculum, plant press, tallying register or mechanical counter, and portable microscope. The writer worked largely by himself, but he was graciously assisted at many times by members of the experiment station staff, county agricultural agents, state agricultural inspectors, representatives of canning companies, and others.

Notes were taken on especially prepared cards, four by six inches, bound in books of 25 cards each. They were printed on buff stock to relieve the glare of intense sunlight. In infested fields, counts of percentages of diseased plants or diseased heads were made wherever this was feasible.

In the relatively compact agricultural areas of the north-central counties where travel was not a limiting factor, some of the more important crops were given individual attention. In this way peas, wheat, potatoes, and tomatoes were, one at a time, given almost exclusive attention for a limited period when each was at the most suitable stage for examination. In the outlying counties, distances made such procedure impracticable. Generally, therefore, the survey covered each area only once, at which time the attempt was made to examine as nearly all the crops as possible. Obviously it was not possible, in this way, to see each crop at the most desirable time.

Of the 29 counties in the state, six were not entered: Rich, Summit, Daggett, Tooele, Wayne, and San Juan. All the major and many minor crops, totalling 64, were included in the observations, and 218 diseases are discussed in this report, although not all of them were seen in 1927. During the survey, 1024 separate note cards were utilized, recording observations from a somewhat greater number of observations. Specimens, both wet and dry, numbered 192, many of which were duplicates, as in the case of bunt of wheat of which specimens were gathered from 36 fields for a comparative study of the causal organisms. Notes and specimens are deposited in the Department of Botany and Plant Pathology, Utah Agricultural Experiment Station, with duplicates of the more important specimens in the Office of Mycology and Disease Survey, Bureau of Plant Industry, Washington, D. C.

An attempt is made in this report to list all the diseases known to occur on each important crop, whether seen during the survey or not. In small part the writer has drawn this supplementary information from his own earlier collections and his experience as student and assistant at the Utah Agricultural College. Of the utmost importance, however, has been the fund of accumulated experience of Dr. B. L. Richards, Experiment Station Pathologist, and of Mr. H. L. Blood and others now or formerly associated with plant pathological work at the Utah Experiment Station. The cooperation of these workers has not only aided in completing the lists of diseases but has provided a background for interpreting the observations made during this survey. In several instances information concerning rusts and smuts has been drawn from the work of Mr. A. O. Garrett of Salt Lake City. A list of diseases in Salt Lake County and vicinity, prepared by the department of agricultural research of the American Smelting and Refining Company under the earlier direction of Dr. P. J. O'Gara, and now of Dr. George R. Hill, has been used freely. Credit is given in the text by reference to the A. S. & R. Co. The "Check list of diseases of economic plants in the United States" (U.S.D.A. Bul. 1366) has proved very useful.

The writer wishes to express his gratitude not only to those who have thus contributed information, but also to those colleagues whose active cooperation and encouragement have contributed largely to both the conduct of the survey and the preparation of this report. The writer alone, however, is responsible for any errors of interpretation and judgement that may be recorded herein. The writer is keenly aware of the inadequacy of this survey, unavoidably limited in thoroughness by the brief period of the study and by the extensive and agriculturally diverse areas involved. The findings recorded here cannot be considered ultimately complete nor exact in all detail, but it is hoped that this report may be serviceable until a more thorough field study of plant diseases in Utah has been made.

NEW OR LITTLE KNOWN DISEASES

Several diseases observed during the survey which appear to be hitherto unrecorded are presented in the following list, with reference to the pages on which they are discussed. Numbers 5 and 6 are known fungi on new host species. In the text, several other diseases are discussed which have been observed in Utah for several years but which have not been recorded formerly. Needless to say each of these diseases, even though apparently minor, merits close observation and, as far as possible, research.

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OTHER DISEASES NOW REPORTED FROM UTAH FOR THE FIRST TIME

Diseases known to occur elsewhere but now reported from Utah for the first time are listed below. Numbers 5, 13, 15, 17 and 19 were known to the experiment station workers but had not been reported in the past. The remainder were found and identified as a direct result of the survey. In addition to the following should be mentioned the finding of Protomyces pachydermus on Taraxacum officinale, identified by Dr. J. J. Davis. This European fungus is very rare in North America if, indeed, it has been reported from any other state.

1.	Alfalfa, Cercospora leaf-spot........... page	72
2.	Barley, bacterial blight....................	74
3.	China-aster, yellows........................	110
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11.	Horseradish, Alternaria leaf-spot	89
12.	Hydrangea, powdery mildew	111
13.	Iris, leaf-spot	111
14.	Lima bean, bacteriosis	89
15.	Onion, pink-root	89
16.	Pea, Ascochyta foot-rot	92
17.	Rhubarb, Phyllosticta leaf-spot	99
18.	Sunflower, downy mildew	114
19.	Tomato, bacterial canker	100
20.	Wheat, black-chaff	78

PLANT DISEASES OF OUTSTANDING IMPORTANCE

For emphasis, a few of the most important disease problems observed during the survey are here given special mention. Each is discussed more fully on the page indicated. Some problems are of long standing while others are newly recognized; but each, because of its actual or potential economic importance, is demanding either research or extension work or both.

Of most general importance is chlorosis of woody plants (p. 115) which affects numerous fruits and ornamentals throughout the state. Fundamental investigation of cause or causes and also attempts at control through experimental application of control measures found helpful in other areas are imperative. This problem is now being attacked by Dr. F. B. Wann of the Experiment Station.

Root and crown-rot of alfalfa (p. 72) caused in part by winter injury is a particularly important cause of low productivity outside of the intensive, diversified farming areas of the north-central counties, and needs both research and extension work.

Barley stripe (p. 74) is causing important losses which might be eliminated through effective extension work. The smuts of oats (p. 77) and wheat (p.79) are also demanding chiefly extension work. The need is especially acute in oats for the losses are needlessly great and very little effort is now being expended for control.

A bacteriosis of bean (p.82) has proved potentially destructive and has now assumed great actual importance in Cache County. Close observation and investigation of underlying causes of the 1927 outbreak are needed. Bean mosaic (p.83) is a generally present cause of low productivity for which adequate control measures are not available.

Pink-root of onion (p.89), recently discovered in Davis County, requires study as to cause and control.

As in other parts of the West, curly-top of sugar beet (p.85) continues to be an outstanding disease not yet under control. The cause and control of beet seedling-blights and root-rots (p.84) demand more intensive study. Dr. C. M. Tompkins of the United States Department of Agriculture is now working upon these latter problems with the cooperation of the Experiment Station.

The potato, a crop notoriously susceptible to the ravages of disease, was affected in 1927 by the new psyllid-yellows disease (p.95) which assumed gigantic proportions as a destructive force. This disease is the outstanding new plant pathological problem of recent years in Utah, and demands research almost to the exclusion of other potato diseases. At the same time the need for extension work in the control of mosaid (p.94) and allied diseases continues.

Bacterial-canker of tomato (p100) has come to the front abruptly as a problem demanding both fundamental research and immediate extension work. The tomato wilts (p102) caused by _Fusarium_ and _Verticillium_ should be differentiated and both be taken into account in the control work now in progress. Like curly-top of beets, yellows (yellow blight) of the tomato (p102) presents a disease control problem not yet solved.

Among fruit crops the disease problems in addition to chlorosis which most need attention are fire-blight of pear (p.103) and apple (p.105), and winter injury and die-back of peach (p.107) and cherry (p106).

DISEASES OF FORAGE AND CEREAL CROPS

ALFALFA (*Medicago sativa*)

Hay*/: 495,000 acres; 1,609,000 tons.
Seed : 69,000 acres; 17,300,000 pounds.

BACTERIAL BLIGHT (*Bacterium medicaginis*). Bacterial blight was prevalent in first-crop alfalfa in the north-central counties this year as usual. Here it was observed in all fields examined before the first crop was harvested, generally occurring on a large percentage of stems. In Morgan County losses of 40 per cent of the first crop were seen in a few fields, such losses resulting from both reduction in numbers of stems per plant and destruction of the lower leaves on affected stems. In the seed fields of Millard, Uintah, and Duchesne counties this disease was of no importance in 1927. A bacterial leaf-spot that may be distinct from this disease was observed several times in different parts of Utah, causing no significant injury.

BACTERIAL WILT (*Aplanobacter insidiosum*). This was first collected in Cache County by the writer in 1925, and the pathogen was isolated by Dr. Fred R. Jones from specimens collected at that time. It was later collected by B. L. Richards in several fields in Salt Lake County. During 1927, however, this disease was found only in a single field in Juab County where but a trace was observed. The seed-producing counties were searched for it in vain. Under Utah conditions it appears to be of very slight importance.

CROWN-WART (*Urophlyctis alfalfae*). Crown-wart occurs widely in Utah. In 1924, Richards (Plant Disease Reporter *8*: 127) reported it from seven north-central counties and also found it in Kane County, and it is now reported from three additional counties (see fig. 3). Several counties, including the two major alfalfa-seed areas, appear to be free. Observations in 1927 failed to find crown-wart as severe or widespread in infested counties as in 1924. Infested fields often contained plants apparently damaged in former seasons but this year free from fresh galls. The potentially destructive nature of this disease demands that future spread or increased severity be followed closely.

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*/ All crop statistics are based on 1926 figures, except where noted.

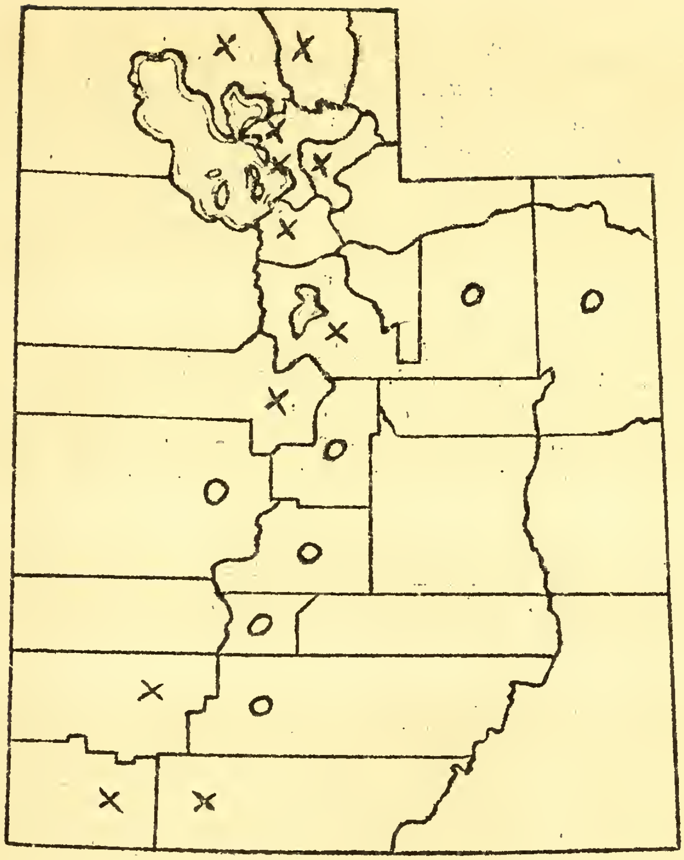

Fig. 3. - Distribution of crown-wart of alfalfa in Utah as observed to end of 1927 (X- present; O- several fields examined in 1927 without finding the disease).

DOWNY MILDEW (Peronospora trifoliorum). This disease is practically coextensive with alfalfa culture in Utah, occurring most abundantly in the spring on the first crop and again assuming prominence on the third crop. During 1927, losses of 2 to 5 per cent of the first cutting were observed frequently; the maximum loss observed was 15 per cent in one field. In the lower and warmer valleys, mildew is rarely present during mid-summer even in fields infested before the first cutting. In Uintah and Duchesne counties, however, this disease was found most frequently in fields that had been clipped once for hay before being allowed to set seed. In Garfield and Piute counties, at high elevation, the disease became severe in late summer and caused an average loss of about 5 per cent of the second cutting in these counties. In Sevier and Sanpete counties many fields suffered losses of 2 to 5 per cent of the third crop. In other counties, the second and third crops of alfalfa were almost wholly clean.

LEAF-SPOT (Pseudopeziza medicaginis). After the middle of July this disease was found in almost all fields examined, occurring chiefly on the older leaves and generally causing no appreciable damage. It reached its most conspicuous development in alfalfa seed fields in Duchesne and Uintah counties where nearly every field was heavily infested long before the seed was mature. This resulted in early defoliation, the effects of which upon the setting and maturing of seed should be determined. Even in the immediate locality of heavily infested seed fields, fields cut at the proper time for hay seldom showed heavy defoliation. Seed fields in Millard County were almost completely free from this disease when examined. The heaviest losses in hay fields were observed in Piute and Garfield counties, but here they seldom exceeded 2 per cent of any cutting.

YELLOW LEAF-BLOTCH (Pyrenopeziza medicaginis). Widespread but of very minor importance in 1927. A maximum defoliation of 5 per cent was observed in a single field grown for hay. In abandoned orchards and on ditch-banks much more severe injury was noted than in any cultivated fields. In 1926 important injury was observed by B. L. Richards in Utah and Cache counties.

LEAF-SPOT (Cercospora medicaginis). Collected in Utah for the first time this year. It occurred sparingly in mixture with other leaf diseases in Uinta County.

LEAF-SPOT (Ascochyta spp.) Two types of leaf-spot bearing Ascochyta pycnidia were collected several times in different counties, but neither was causing economic injury. The more common type is a light tan or gray spot, irregular in outline, margined with a dark brown line or banded with several lines. Pycnidia were usually clearly visible in these spots. The less common type of spot is dark brown, roughly circular, and not margined, with inconspicuous pycnidia. The two are probably distinct since intergrading types were absent even when both occurred on the same plant.

DODDER (Cuscuta spp.) Widespread. Most destructive in areas in Duchesne County. See page 115for further discussion. (Plate III, fig. 1)

STEM NEMATODE (Tylenchus dipsaci). Reported only from Salt Lake County by Richards (Plant Disease Reporter 8: 91) in 1924. Not observed during 1927 although the known infested area was not searched. This disease should be watched closely for its appearance in new localities.

MOSAIC or CALICO (cause undetermined). What appears to be a mosaic or calico disease affects scattered plants all through the state but notably in the Uinta Basin and in south-western Utah. Affected plants besides showing a pronounced mottling are lacking in vigor and yield poorly but the disease has caused no considerable losses due to the lightness of infestation. Possibly part of this mottling is associated with a decay of the roots.

ROOT AND CROWN-ROT (winter injury in part). Alfalfa growers in Utah are sustaining heavy losses annually through their failure to break up and replant their fields when the stand of plants becomes too thin to be profitable. It is a common boast among some growers that their fields have stood eight, twelve, or more years without replanting, and many of these old fields are producing only a fraction of what a young stand of vigorous plants would yield. Utah soils and climate do favor longevity of alfalfa, and in some fields from which a seed crop has been harvested annually, natural reseeding has kept the stand in good condition for decades through the constant replacing of the old, weak plants by young, vigorous ones. Outside of the seed-producing areas, and the better agricultural districts in which diversified farming leads to crop rotation, fields which are yielding only 50 to 75 per cent of what they should are numerous. Such reductions in yield come sometimes from a very thin stand alone, and sometimes from a reasonably thick stand of weak plants.

The causes of weakening and dying of the plants are several and are not well understood. In fields infested with the crown-wart disease, that appears to be an important cause of low productivity or early death of plants. In several fields in Duchesne County, particularly on the lighter soils, plants affected with a dry root-rot of undetermined cause were found sparingly. Such plants were sometimes merely weakened by partial destruction of the root system. In other instances they were found wilting abruptly. The cause of this disease needs to be determined. In Kane, Washington, and Iron counties, a root and crown decay characterized by rather firm, purplish brown lesions, was found to be the chief cause of early dying of plants in several fields, chiefly, however, fields of great age (six years or over). Several species of Fusarium were isolated from specimens of this rot.

The most prevalent type of crown injury in fields in which plants are not making vigorous growthis a type regarded by Weimer, Jones, and others, as probably winter injury. This includes injury to the cortical and phloem tissues as well as to the heart of the crown and upper taproot. Such injury may be found sparingly in nearly all parts of Utah, but it is nearly always more evident in old fields and in fields that have suffered from drouth. Under Utah conditions, plants outgrow this injury more fully than in some other states, and alfalfa grown under irrigation on suitable soils appears to suffer relatively little. Fields that have suffered from drouth for several years have been seen to recover almost entirely in a single season when given proper irrigation.

In some counties where livestock production is the chief industry, alfalfa fields are frequently ruined by too close pasturage, particularly with sheep. Some growers, in fact, make a practice of using sheep to help kill the alfalfa plants in advance of plowing up a field. Alfalfa fields that are pastured carelessly are easily ruined for hay production.

The causes of dying of alfalfa in Utah need study, but, in the meantime, effective relief from losses can be secured by closer attention to crop rotation and to the breaking up of alfalfa fields after they have stopped yielding profitably.

WHITE-SPOT (cause undetermined, associated with unbalanced water supply). This non-parasitic disease which is produced under some conditions by the application of irrigation water, has been observed in several localities in Cache County and locally in Salt Lake County. Losses to individual growers are sometimes heavy, but in the state as a whole this trouble is of minor importance. (Richards, Phytopath 18:136-137)

ANTHRACNOSE (Gloeosporium medicaginis). Reported from Salt Lake County by American Smelting and Refining Co. Not seen 1927.

RUST (Uromyces medicaginis). Collected in Salt Lake County in 1920 by Garrett (Mycologia 13: 212).

BARLEY (Hordeum vulgare)

20,000 acres; 800,000 bushels.

BACTERIAL BLIGHT (Bacterium translucens). This disease, reported from Utah for the first time this year, has been found in five fields in the same number of counties, - Cache, Boxelder, Weber, Piute, and Garfield. A more thorough survey would doubtless find it to be general throughout the state. In one of these fields there was a mere trace of the disease, but in each of the others serious losses occurred, estimated to be 4, 30, 75, and 95 per cent respectively. If the fields examined this year are considered representative of the state, then the average loss from this disease was 4 per cent of the crop in the state. This figure is probably much too large, since these infested fields were all smaller than the average barley field.

STRIPE (Helminthosporium gramineum). Stripe is the outstanding disease of barley in Utah. It was found in 21 of the 47 fields of barley searched, with an average infestation in these 21 fields of 10.7 per cent, and an average in the total of 47 fields of 4.8 per cent. The highest percentage of affected plants counted, 51 per cent, was in a small field said to have been planted with seed from Colorado. The heaviest single loss from the disease occurred in an 80 acre field of dry-farm barley in which 25 per cent of the plants were completely crippled. The growers are doing practically nothing to rid their barley of this disease.

SPOT-BLOTCH (Helminthosporium sativum). This is of minor importance in Utah. The writer observed a little of it in three fields, but was told of a few fields in Tooele County that had suffered severely, with many plants failing to head. B. L. Richards found it destructive in some fields in Salt Lake County in 1926 and 1927.

COVERED SMUT (*Ustilago hordei*). Barley smut occurs generally throughout Utah but the infestations are seldom heavy. It was seen in 46.8 per cent of the fields examined in 1927, with an average infestation of 0.9 per cent of heads. The five most heavily smutted fields gave counts of smutted heads as follows: 4, 5, 5, 7, and 15 per cent.

STEM RUST (*Puccinia graminis*). This rust was observed in a few fields late in the season, but nowhere doing serious damage. The heaviest infestation was seen directly adjoining a rusted wheat field near Price, Carbon County.

LOOSE SMUT (*Ustilago nuda*). Not collected in 1927. Reported from Salt Lake County by the A. S. & R. Co.

KENTUCKY BLUEGRASS (*Poa pratensis*)

POWDERY MILDEW (*Erysiphe graminis*). General, especially in waste places. Seldom conspicuous in lawns or closely pastured fields.

RUST (*Puccinia poarum*). Probably general throughout Utah late in the season in tall grass in moist places. Of no importance. Collected by writer in Uinta and Cache counties. Reported by Garrett (Mycologia 2: 292) from Salt Lake County.

ALSIKE CLOVER (*Trifolium hybridum*)

SOOTY SPOT (*Phyllachora trifolii*). Collected in 1927 only in Cache County where the writer and the Experiment Station workers have collected it other years. Of no importance.

ANTHRACNOSE (*Colletotrichum destructivum*). Not seen 1927. Reported from Salt Lake County by A. S. & R. Co.

RED CLOVER (*Trifolium pratense*)

POWDERY MILDEW (*Erysiphe polygoni*). Observed in 1927 only in Uinta County. Not looked for elsewhere. Has been observed widely during the last two years by B. L. Richards, but has not been seen to cause important loss.

RUST (*Uromyces trifolii*). A trace of this rust was collected in Cache County in 1925. Not seen in 1927.

ANTHRACNOSE (*Colletotrichum destructivum*). Reported by O'Gara from Salt Lake County. Not seen 1927.

WHITE CLOVER (*Trifolium repens*)

LEAF-SPOT (*Cercospora zebrina*). Collected in Uinta County where it occurred on about four per cent of the leaves in the only pasture examined. This appears to be the first report from Utah.

SOOTY SPOT (*Phyllachora trifolii*), and RUST (*Uromyces trifolii*): Not seen in 1927, but reported from Utah in former years.

CORN (*Zea mays*)

18,000 acres; 432,000 bushels.

SMUT (*Ustilago zeae*). General in Utah where corn is grown, but frequent only in the central agricultural counties where corn is an important silage crop. B. L. Richards reports it more severe on sweet corn than silage corn. Where corn is grown sparingly, fields with more than one per cent of smutted stalks are rare. In Utah, Salt Lake, Davis, Weber, and Boxelder counties, and in small areas in other counties infestations of 5 to 10 per cent are frequently found. The heaviest infestation counted in 1927 was 27 per cent of the stalks. Under Utah conditions, smut usually occurs late enough in the season not to reduce the yield of silage corn seriously, although it does diminish returns from ear corn materially in some instances.

RUST (*Puccinia sorghi*). A single uredinium, presumably of this fungus, was collected in Duchesne County in 1927. Careful search of the surrounding plants revealed no more. This appears to be the first record of rust on corn in Utah.

PURPLE LEAF-SHEATH-SPOT (caused by miscellaneous bacteria and fungi). This disease, described by Durrell (Phytopath. 10: 487-495) as a universal disease of corn, was observed widely in Utah, but it did little if any damage.

OATS (*Avena sativa*)

54,000 acres; 2,160,000 bushels.

LEAF-SPOT (*Helminthosporium avenae*). This disease was general in fields of late oats in Sanpete and Sevier counties but was not seen elsewhere during 1927. In former years it has been observed in the north-central counties. In several fields extensive foliage destruction resulted in losses estimated at five to ten per cent of the yield. Apparently the same fungus was found on wild oats near an infested field.

POWDERY MILDEW (Erysiphe graminis). This has been observed by B. L. Richards in past years but was not collected during 1927.

SMUT (Ustilago avenae and U. levis). Smut constitutes the most destructive disease factor in oat production in Utah. Both covered and loose smut are present but in this survey no attempt was made to distinguish between them. Of a total of 44 fields examined in all parts of Utah, only four were found smut-free, and the average infestation for all 44 was 7.6 per cent of heads. Losses exceeded five per cent of the crop in 46 per cent of these fields, and exceeded ten per cent of the crop in 25 per cent of the fields. The heaviest infestation counted was 50 per cent of heads in a single field, although several other fields suffered losses of 20 per cent or more.

Such losses are occurring in the best agricultural counties in the state, and at present smut control is receiving very little attention. In the area of Juab County where covered smut of wheat has been controlled almost completely in recent years through the community treatment of seed, oat smut is at its worst and nothing is being done about it. Six fields in this county in which counts were made contained 7.5, 8.5, 9.5, 20.5, 21.5, and 23 per cent of smutted heads, with an average of 15 per cent. In general, infestations were lightest in Garfield, Piute, Sevier, and Sanpete counties. The occurrence of such heavy, preventable losses demands prompt attention of the Extension Service.

STEM RUST (Puccinia graminis). This rust occurs in all parts of Utah but it was seen during 1927 in only eight oat fields. One of these contained a general infestation, but the lateness of infection prevented any considerable injury to the crop.

REDTOP (Agrostis palustris)

LEAF-SPOT (Ovularia pulchella). This leaf-spot was found in the only pasture examined at Vernal, Uinta County. It was patchy in its distribution, affecting approximately 50 per cent of the leaves of this grass and apparently diminishing the productivity markedly. This is the first report of this disease from Utah, and appears to be the first report of the fungus on this species of grass anywhere although it has been described on several other grasses.

SUGAR SORGHUM (Holcus sorghum saccharatus)

BACTERIOSIS (Bacillus sorghi). This disease has been reported from Salt Lake County by the A. S. & R. Co. Not observed 1927.

HEAD SMUT (Sorosporium reilianum). This smut occurs sparingly in Washington County where it was collected in 1927, and has been reported from Salt Lake County by the A. S. & R. Co. It is unimportant in Utah.

COVERED KERNEL SMUT (Sphacelotheca sorghi). Reported from Salt Lake County by the A. S. & R. Co. Found other years by Experiment Station workers but not observed in 1927.

SWEET CLOVER (Melilotus alba)

LEAF-SPOT (cause undetermined). Of frequent occurrence in very small amounts. Probably more than one causal agent is involved. Unimportant.

WHITE-SPOT (cause undetermined, associated with unbalanced water supply.) Sweetclover develops a spotting similar to white-spot of alfalfa under conditions which favor the alfalfa trouble. On sweetclover, however, the spotting is not white but rather gray-brown. Very minor. A trace only was seen in 1927, in an affected alfalfa field. Produced by B. L. Richards in 1926 by experimental irrigation.

MOSAIC (cause undetermined). Not seen in 1927, but reported by H. L. Blood to occur in northern Utah.

WHEAT (Triticum aestivum)

Winter wheat:	149,000 acres;	3,129,000 bushels.
Spring wheat:	88,000 acres;	2,376,000 bushels.
All wheat:	237,000 acres;	5,505,000 bushels.

BLACK-CHAFF (Bacterium translucens undulosum). The leaf-blight phase of this disease was collected in three fields about the middle of July, two in Boxelder and one in Millard County. All three fields were of irrigated, Dicklow wheat, and in two of them the disease was almost confined to the lowest, wet parts where irrigation water had been impounded. Elsewhere the disease occurred only as a sparse streaking of the lower leaves, in which little injury was done. This appears to be the first report of a bacteriosis of wheat from Utah.

POWDERY MILDEW (Erysiphe graminis). Only a trace of this disease was seen in Utah this summer. The disease is known to occur generally throughout the irrigated wheat districts and has sometimes been the cause of important losses in individual fields where, favored by abundant moisture, it has led to the early death of the lower leaves.

FOOT-ROT (Helminthosporium sativum). Not observed during 1927; the period of this survey did not favor study of seedling troubles in wheat. This was first recognized by the Experiment Station staff about 1922 when it was the cause of heavy losses in some fields in Morgan County. Its range in the state is not known.

SCAB (Fusarium culmorum). Not observed 1927. Reported from Salt Lake County by A. S. & R. Co.

SEEDLING BLIGHT (Podosporiella verticillata). Reported from Salt Lake County by O'Gara. Not seen 1927.

LOOSE SMUT (Ustilago tritici). Loose smut occurs generally in spring, irrigated wheat, commonly affecting from one to five per cent of heads. In dry-farm wheat, on the contrary, it is seldom abundant and many fields are entirely free from it. The average loss in spring wheat exceeds two per cent in the state as a whole, while in winter wheat it is probably less than half of one per cent. The worst infestation observed was 15 per cent in a single field; the next highest six per cent in three different fields. It is said that in Sevier and Uinta counties, loose smut is more troublesome than in most other counties. Losses of four to ten per cent of the irrigated wheat crop are said to be common some seasons in Sevier County. Little effort is being made by the growers to reduce losses from this disease.

COVERED SMUT or BUNT (Tilletia laevis and T. tritici). This is the most generally destructive disease of wheat in Utah. In 1927 it caused an average reduction of yield estimated, on the basis of calculations from survey notes, at 2 per cent, besides lowering the market value of much otherwise high grade grain. This disease was especially troublesome in 1927 in the dry-farm wheat sections of Cache and Boxelder counties (see table 20). B. L. Richards reports it very severe also in the Coalville district. In some other sections, notably the famous Levan Ridge of Juab County, it was almost wholly absent. Irrigated wheat was generally somewhat less affected than the dry-farm crop, although many fields were badly smutted.

Of the 160 wheat fields examined for disease, 148 were sufficiently matured to permit the detection of this smut, and 80 of them (54 per cent) were infested. More than a trace of smut was found in 46 fields (31 per cent of the 148 fields). The heaviest infestations were 37 per cent in a field of dry-farm wheat in Boxelder County and 36 per cent in an irrigated field in Utah County. The average infestation in the 148 fields was 2.2 per cent of heads.

Both the smut fungi, Tilletia tritici and T. laevis, occurred in these fields. To determine the relative importance of each, samples of smutted heads were collected from 72 fields, and several heads from each sample, usually ten, were examined microscopically. T. tritici occurred in 23 of these, and T. laevis in the same number. Both fungi occurred together in samples from fifteen fields. Samples from two of the three fields which contained the highest percentages of smut proved to be predominantly

T. tritici. The two fungi appear to be of almost equal importance in this state. No geographical differences were detected.

TABLE 20. - Covered smut of wheat in Utah, 1927, by counties.

County	Number fields examined a/	Fields infested no.	Fields infested per cent	Fields with more than a trace of smut no.	Fields with more than a trace of smut per cent	Maximum infestation per cent	Average infestation per cent
Boxelder	49	33	67	18	37	37	2.9
Cache	39	29	74	22	56	23	3.9
Juab	17	4	24	0	0	trace	-
Millard	14	1	7	0	0	trace	-
Utah	14	7	50	3	21	36	3.
Uinta	6	3	50	2	33	12	2.3
Duchesne	5	2	40	1	20	2	0.4
Other counties	4	1	25	0	0	trace	-
Total	148	80	54	46	31	37	2.2

a/ Fields examined when plants were too young to detect covered smut if present are not included in this tabulation.

STEM RUST (Puccinia graminis). Stem rust was not seen until July 19, when a mere trace was found in a single field in Millard County. Very little more was seen during the rest of the month, and dry-farm wheat throughout the state was harvested almost entirely free from rust. During early August, however, rust quickly became widespread on late irrigated spring wheat. In several localities it was observed in nearly every field bu in such sparse infestation or on wheat so nearly matured that the injury was negligible. In a few fields the injury was much more severe. In Utah, Duchesne, and Iron Counties several fields suffered reductions in yield estimated at five per cent or above, the heaviest losses being in the region of Price, Utah, where with extreme shrinkage of the kernels, yields were reduced as much as 20 per cent in a few very late plantings. In the state as a whole, both spring and winter wheat, losses from stem rust did not exceed 0.2 per cent.

LEAF RUST (Puccinia triticina). This rust was all but absent from winter wheat, and occurred only sparingly in spring wheat in 1927. A trace of it was observed in the first wheat field examined, on June 29, but no fields were seen during the survey in which losses amounted to as much as one per cent. Other years it has been relatively more abundant, and B. L. Richards reports that generally it is more severe than stem rust in the northern counties.

STRIPE RUST (Puccinia glumarum). This rust was not seen during the survey. It has occurred in Cache County during several years past, but during 1927 the infested area was not surveyed.

TERMINAL BLEACHING (cause undetermined; associated with water supply). A physiological disturbance leading to the abrupt dying and bleaching of the apical portion of the uppermost leaf or leaves has been observed in irrigated wheat in several of the north-central counties. The cause and importance of this trouble have not been determined.

TABLE 21. - Summary of losses in forage and cereal crops.

Crop	Disease	Cause	Estimated loss per cent
Alfalfa	Bacterial blight	Bacterium medicaginis	1.3
	Crown wart	Urophlyctis alfalfae	.5
	Downy mildew	Peronospora trifoliorum	1.0
	Root and crown rots	Winter injury, in part	15.0
	Other diseases		.5
	Total		18.3
Barley	Bacterial blight	Bacterium translucens	0.5
	Stripe	Helminthosporium gramineum	4.8
	Spot-blotch	Helminthosporium sativum	0
	Covered smut	Ustilago hordei	1.
	Stem rust	Puccinia graminis	0
	Total		6.3
Corn	Smut	Ustilago zeae	2.
Oats	Smuts	Ustilago avenae & U. levis	7.6
	Leaf-spot	Helminthosporium avenae	t
	Stem rust	Puccinia graminis	0
Wheat	Bacterial blight	Undetermined	t
	Loose smut	Ustilago tritici	1.
	Covered smut	Tilletia tritici &T. laevis	2.2
	Stem rust	Puccinia graminis	.2
	Leaf rust	Puccinia triticina	t
	Total		3.4

DISEASES OF VEGETABLE AND ROOT CROPS

BEAN (*Phaseolus vulgaris*)

BACTERIOSES (chiefly *Bacterium phaseoli*). This year, for the first time, bacterial diseases of beans assumed notable importance in Utah, particularly in green beans grown for canning. The most severe losses were experienced in Cache County where bacterial stem girdle was widespread, killing from 5 to 95 per cent of plants in numerous fields. When first seen, on July 26, before picking had begun one field had suffered the loss of 75 per cent of plants. At this time some of the remaining plants appeared healthy while others were in various stages of the disease. After a single picking the field was abandoned; only a few plants, none of them free from the disease, survived through the season. No other fields as badly diseased as this were encountered but in the county as a whole this stem blight took about fifteen per cent of the canning beans. Green Refugee is the variety grown in this district.

Unlike the usual stem girdle caused by *B. phaseoli*, this disease was not limited to any one or two nodes of the stem. Numerous points of infection, especially at the nodes (apparently working down from the pulvini of the leaf petioles) but also in the internodal region, led to longitudinal cracking of the enlarging stem. Such cracking was sometimes apparent several inches below the soil line and well up onto the aerial stem. Water-soaking of lesions was generally to be seen, but usually not conspicuous. Spotting of the leaf laminae was rare. Vascular invasion extending through several internodes was observed in a number of plants studied.

Bacterial blight of more usual nature was seen sparingly in other sections, usually as a sparse spotting of leaves, but reaching maximum severity on stems and pods in two gardens, one in Emery County where the loss was 50 per cent, and one in Washington County where the loss was about 20 per cent of the crop. The disease was found also in Beaver, Sanpete, Utah and Boxelder counties.

A very heavy infestation of a different bacterial disease characterized by abundant spotting of leaves and pods of both common bean and Lima bean was observed in Boxelder County in trial grounds of a seed company. A single row of Hodson Wax appeared to have carried the infection, and from this row the disease spread laterally to several adjoining rows. Miss Florence Hedges, to whom the writer showed this material, expressed the opinion that it is different from the ordinary bean blight (*B. phaseoli*) if not from all the described diseases of the bean, but similar to a collection she had made in Montana this summer.

POWDERY MILDEW (Erysiphe polygoni). Late market beans in the south and of Davis County were damaged by an outbreak of powdery mildew which affected not only leaves and stems but also pods, deforming them and rendering them unfit for market. Owing to the limited production of late beans this caused no extensive losses. One small grower, however, was forced to abandon his planting. A similar severe development of mildew was noted in Utah County in 1926 by B. L. Richards.

ROOT-ROT (Corticium vagum, Fusarium spp.). Rhizoctonia and species of Fusarium were isolated several times from specimens of root-rot and stem-rot of bean from different counties. A field was seldom searched in any part of the state without finding some plants with decay of subterranean parts, but in most instances such plants were few and losses were therefore minor. In several fields in Utah County, however, and one garden in Washington, losses were considerable, as high as 12 per cent of the plants wilting from the disease in one commercial field.

MOSAIC (cause undetermined). Mosaic is coextensive with bean culture in Utah, generally occurring in heavy infestations and with moderate severity. Thirty-two fields in which mosaic was counted, fields distributed in ten counties, had an average infestation of 31 per cent. In some fields the affected plants appeared to yield fairly well but, in canning beans, affected plants produce fewer pods of desirable shape and bear through a shorter season.

CURLY-TOP (cause undetermined). Not observed during 1927, but recorded in former years.

BEETS (Sugar beets, mangels, and table beets) (Beta vulgaris)

Sugar beets: 69,000 acres; 1,064,000 tons2/

LEAF-SPOT (Cercospora beticola). Only a trace of this disease was observed during 1927, in sugar beets in Utah County where it has been known for many years and sometimes has caused important losses.

LEAF-SPOT (Phoma betae). Phoma leaf-spot was found sparingly in all sugar beet areas examined after mid-summer. Even in the most heavily infested fields, however, losses were so slight as to be negligible. Phoma root-rot was not observed during 1927 but has been prevalent during some seasons (see discussion under Late Blight, below).

2/ Figures given are for 1925. The 1926 crop was seriously reduced by disease.

DRY-ROT CANKER (Corticium vagum). This disease assumed greater importance this year than ever before, and demonstrated its potentialities as a root decay. It was first seen August 1 at which time it had caused only slight thinning of stands in infested fields in northern Cache County. During September, however, C. M. Tompkins reported a two-acre field in Cache County to be a total loss from this disease, and a four-acre field in Weber County in which 50 per cent of the plants had been destroyed, with the disease still progressing. A number of other fields in these counties and Utah County were seen to suffer losses of from one to 10 per cent. Beets ar still being grown on the farm at Cornish, Utah, where this disease was first seen and from which the original description by Richards was published. This particular field is now in alfalfa, but in adjoining fields the disease was destructive in small areas. The farmer on this place states that the severity of the disease has varied widely from year to year.

LATE BLIGHT (water relationships). A disease of sugar beets attributed to irregular supply of moisture, apparently chiefly a protracted drout with inadequate applications of irrigation water, has a few times in past years and notably in 1921, caused heavy losses. This condition shows itself in a general retardation of growth. Associated with dwarfing, the leavs blight irregularly with the formation of dead spots, sometimes zonate, with which no parasitic organisms are associated. The roots undergo various type of decay but predominantly, in 1922, a firm, black root-rot caused by Phoma betae. This disease was not seen during this survey.

SEEDLING-BLIGHTS (causes imperfectly known). Cause important losses annually. Not included in this survey.

Diverse ROOT-ROTS (cause undetermined). Sugar beet root-rots of diverse types caused very severe losses in Utah in 1927. With the exception of the dry-rot canker discussed above, the causes are unknown and have not yielded readily to study. Dr. C. M. Tompkins of the United States Department of Agriculture, with headquarters at the Utah Agricultural Experiment Station, is now giving them his attention.

These troubles are of widely different nature. Some are soft rots, others are firm (the dry-rot canker appears to be the only characteristicall spongy dry rot among them); some are almost black and others show little alteration from the color of the normal beet. Some occur chiefly at the lower extremity of the beet root, while others are found predominantly in a lateral position. These several types of decay are sometimes found intermingled, but they may occur separately, and usually in any one field there is a marked similarity in the types of decay found on different beets.

During 1927 root-rots were beginning to be apparent by August 1. At the end of September, Dr. Tompkins estimated that in Cache County alone, 500 acres of sugar beets were severely affected with one or another of these rots. On August 8, the writer was in a six acre field in Utah County where 50 per cent of the beets were already fully decayed and nearly all those remaining were somewhat affected.

Root-rots appear to be almost coextensive with beet culture in Utah. They were noted during the survey in all counties where beets were examined carefully: Cache, Boxelder, Weber, Utah, Sevier, Sanpete, and Carbon, but were most prevalent in the first four named. The opinion has been expressed by one competent observer that no small part of the loss attributed to curly-top in 1926 in some parts of Utah was really due to root-rots.

One special type of root trouble that appears to be distinct from the others may be designated provisionally as "wilt". It is frequently but not always associated with conspicuous root decay. This disease first manifests itself by a flagging of the leaves during the heat of the day, in wet soil even more than in relatively dry. In extreme cases the foliage may lie prostrate, but at night or during cloudy weather, turgor is regained unless complications have set in. When such beets are removed from the soil with care to preserve the tip of the long taproot intact, this root usually shows an increased brittleness and a water-soaked appearance on the fractured surface. From this condition, all steps may be found to a soft rot of the apex of the fleshy root. When the decay is only beginning, internal browning or blackening, clearly distinct from the curly-top blackening, may extend far into the heart of the beet. This symptom has suggested the name "blackheart" sometimes applied to this trouble.

Even when rotting does not follow, affected beets make little growth. A two acre field of sugar beets in Cache County showed 18 per cent of wilting plants one bright day in late July. A few plants were rotting at that time, but at the end of September the majority of the plants were still alive and counts of wilting plants never again reached the high mark of 18 per cent. Almost none of the beets in this planting developed to a normal size.

This wilt appears to occur almost wholly in poorly drained fields or parts of fields. In this respect it agrees with most of the soft-rots of the beet, but not with all beet root decays. It is not closely correlated with the previous growth of beets; the only record of its occurrence in Carbon County was in a field growing its first crop of beets. Wilt has been seen in Cache, Boxelder, Utah, Sevier, and Carbon counties.

MOSAIC (cause undetermined). Has been known in Utah for several years but has nowhere proved important. During 1927 the writer observed it sparingly in Cache County only: B. L. Richards reported it from Utah County.

CURLY-TOP (cause undetermined). This disease developed tardily in 1927. For a time it looked as if the crop might escape severe injury, for the early season infection was very light, but in late July and early August the disease increased rapidly in importance until many fields throughout the state suffered losses of 25 to 90 per cent of the crop. Some fields not worth digging were abandoned to pasturage. The most severe development of the disease noted was in Sevier and Sanpete counties where the average yield would not exceed 50 per cent of normal. Garden beets and mangels were affected as well as sugar beets; some market growers lost their late plantings entirely.

NEMATODE (Heterodera schachtii). No special study of this trouble was undertaken in this survey.

ROOT-KNOT (Heterodera radicicola). Not observed during 1927. This has been seen in past years in Weber and Davis counties, particularly on sandy soils in tomato-growing districts, causing heavy losses in the seedling stages.

CABBAGE (Brassica oleracea)

LEAF-SPOT (Alternaria brassicae). This is the only disease of cabbage noted during the survey, and it is of no importance. It was found on only two occasions; once in Emery County on defective plants in a field of early cabbage that had already been harvested, and once in Washington County where cabbage was being grown on a small scale under conditions of too high temperature. Only small amounts of the disease could be found in either place.

CANTALOUPE (Cucumis melo)
(including honeydew melon)

POWDERY MILDEW (Erysiphe cichoracearum). This was highly destructive in the Green River district in Emery County in 1925 and 1926, but was not found during the 1927 survey.

LEAF-BLIGHT (Macrosporium cucumerinum). At Green River, where the cantaloupe is an important crop, this disease occurs widely and in 1927 caused serious losses in some fields. In one five-acre tract there was almost 100 per cent leaf infection and 20 per cent defoliation. Here the yield was estimated by the grower to be only 30 per cent of normal in number of fruits. The melons were small and of poor shape, and complaints from the markets indicated that they were of inferior quality. Cantaloupes were grown in this field in 1925 and 1926 but the disease was not observed either year, probably because it was obscured by the presence of powdery mildew.

Cantaloupe, honeydew melon, and cucumber were affected almost equally, and watermelon and squash somewhat less severely at Green River.

CARROT (Daucus carota)

SOFT-ROT (Bacillus carotovorus). Heavy losses from this trouble are reported from Utah and Salt Lake Counties by B. L. Richards. Frequently associated with the following.

ROOT-ROT (Corticium vagum, and others). Root-rot of carrots was found in nearly every planting of this vegetable examined, including Cache, Davis, Salt Lake, Utah, Uinta, Grand, and Sevier counties. Usually less than five per cent of the plants were affected; at the worst, 30 per cent of the roots were decayed in the ground. Rhizoctonia was isolated freely from the only collection cultured.

ROOT-KNOT (Heterodera radicicola). This was found in a single planting of carrots in Utah County, affecting a small percentage of plants.

CURLY-TOP (cause undetermined). What appears to be the same disease as the curly-top of sugar beets was observed affecting an occasional plant in carrot patches in several places, notably in one garden in Garfield County. Its importance is negligible.

CELERY (Apium graveolens)

LATE-BLIGHT (Septoria apii). This disease was seen only twice during the survey, and most fields were entirely free from it. In a commercial planting in Beaver County where it was seen August 27, all plants were affected severely. No control measures had been applied, and the crop appeared definitely lost. Seedlings of remaining in the seed-bed at a distance from the field were also infected, indicating that seed-borne infection was the probable cause of this outbreak. Other fields in the neighborhood were clean. In a field in Utah County only a trace of this disease was seen. Locally severe outbreaks have occurred in other localities in past years, especially in Cache County.

MOSAIC (cause undetermined). A mere trace of this disease was seen in one field in Utah County.

BLACK-HEART (cause undetermined). This trouble which results, apparently, from irregular supply of soil moisture during periods of high temperature in midsummer, is a serious factor limiting the production of early celery in all but the wettest soils in the Ogden trucking district. Where growers plant on suitable soils and irrigate with care, losses are light, and late celery is grown successfully even on soils which would give trouble with the early crop.

YELLOWS (cause undetermined). (Plate III, fig. 3) This disease was seen this year for the first time. Though it caused no great injury, its nature is such as to demand study to determine its cause and potential importance.

It is characterized by a dwarfing and rosetting of the plant with marked shortening of the petioles, by a yellow or pinkish yellow color of the leaves, and by increased brittleness of the leaves. The phloem portion of the vascular bundles in the petioles is necrotic and discolored while the xylem portion remains normal in appearance. These symptoms suggest a relation to the insect-borne, virus diseases, but this is not supported by the field occurrence of the disease. Affected plants occur in groups; sometimes a single row will be affected for several yards in length. In such instances, the plants in the middle of the affected strip are the most severely damaged, and at either side there is close intergrading with the healthy individuals. Plants that show clear symptoms are worthless for market, and plants at the center of affected strips are sometimes dead by the end of the season.

This disease was seen in Salt Lake and Weber Counties, in the latter of which it is said to be widely distributed although affecting relatively few plants in any field. This appears to be distinct from the yellows disease of celery caused by a species of Fusarium, a disease not recorded in Utah.

CUCUMBER (Cucumis sativus)

ANGULAR LEAF-SPOT (Bacterium lachrymans). This disease which was reported from Utah for the first time during 1927, was found in a small market garden in Piute County where it caused complete failure of the cucumber crop. Nearly every leaf was spotted, and the young fruits, becoming infected early, dropped from the vines before attaining usable size.

LEAF-BLIGHT (Macrosporium cucumerinum). At Green River, where the disease was prevalent on cantaloupe, cucumbers were affected almost as severely, but cucumbers are not grown on sufficient scale for this to constitute a serious economic problem.

MOSAIC (cause undetermined). Cucumber mosaic was not seen during 1927, but it is reported by B. L. Richards to have been seen in Cache County several years ago.

EGGPLANT (Solanum melongena)

WILT (Verticillium alboatrum). Wilt was found in all of the five plantings of eggplant examined after August 1, in Weber, Davis, and Washington counties. In these plantings, infestation ranged from a trace to 50 per cent. The heaviest loss was in a market garden in Weber County where the yield was reduced at least 40 per cent. B. L. Richards reports that in 1926 this disease was severe in Davis County and that in the Magna district of Salt Lake County there was 100 per cent infestation in two fields. The eggplant is a minor crop in Utah, but this disease constitutes a great handicap to its profitable culture in the trucking districts.

ANTHRACNOSE (Colletotrichum atramentarium). Reported from Utah by O'Gara, but not seen during 1927.

HORSERADISH (*Radicula armoracia*)

LEAF-SPOT (*Ramularia armoraciae*). This leaf-spot has been collected in late summer at Logan during several past years. None was observed during this survey. Very minor.

LEAF-SPOT (*Alternaria brassicae*). Collected in a single garden in Carbon County where it occurred only sparingly. This is its first recorded occurrence in Utah.

MOSAIC (?), CURLY-TOP (?) (cause undetermined). An incompletely diagnosed disease was found destroying a small commercial planting at Price. The symptoms suggested both mosaic, in the leaf mottling, and curly-top, in the leaf distortion and prominent veins. The roots showed conspicuous internal browning or blackening, and in late stages were decaying, but in early stages the discolored tissue appeared to be sterile. This was the third successive year that this disease had been troublesome, increasing each year until all plants were affected and most of them dead. In other localities complaints of similar trouble were heard.

LETTUCE (*Lactuca sativa*)

TIP-BURN (cause undetermined). Tip-burn was found sparingly in Weber County in the locality where black-heart of celery was troublesome, occurring under apparently the same conditions of unequal water supply. It is said to cause heavy losses some years and to be a factor restricting lettuce culture to moist soils.

LIMA BEAN (*Phaseolus lunatus macrocarpus*)

BACTERIAL BLIGHT (cause undetermined). As noted on page 26, under the discussion of bacterioses of common bean, Lima beans were found carrying bacterial spotting in small trial grounds in Boxelder County late in the season. The infection apparently had spread from an adjoining row of common beans. Miss Florence Hedges regards this, tentatively, as distinct from the bacterial diseases that have already been described on beans and Lima beans.

ONION (*Allium cepa*)

PINK-ROOT (cause disputed: probably either *Fusarium malli* or *Phoma* sp.). Pink-root was first observed in the state this year by members of the Experiment Station staff before a survey of onion fields was begun. The observed occurrence of the disease indicates, however, that it had been present for several years. It caused heavy losses to onion growers in the

Woods Cross and Bountiful trucking district of Davis County, especially in the low lying fields. The severity of pink-root here is such that in infested parts of fields, large percentages of the bulbs fail to attain marketable size and maturity, and some fields this year were infested in two-thirds of their area. The production of sweet Spanish onions is a young and growing industry in this county that is seriously threatened by this disease.

NECK-ROT (Botrytis spp.). The period during which this survey was made was such that observations on this disease were not possible. Neck-rot, however, is a factor wherever onions are grown in Utah, causing important losses particularly in years when wet weather interferes with proper curing of the bulbs. B. L. Richards reports that two or more species of Botrytis are involved.

MOLD (Macrosporium porri). Not seen in 1927. Reported from Salt Lake County by A. S. & R. Co.

PARSNIP (Pastinaca sativa)

LEAF-SPOT (Cylindrosporium pastinacae). This was observed in two plantings of parsnips in Utah County. At Provo, a half-acre planting was sparingly affected; at American Fork a garden planting was thoroughly infested but only slightly damaged. In both instances, parsnips growing wild in the vicinity carried what appeared to be the same fungus. It may be questioned whether this is to be regarded as Cylindrosporium pastinacae (West.) Lind; a European species, or as C. heraclei Ell. & Ev., which was described from a collection of Heracleum from Ogden, Utah, collected in 1888.

MOSAIC (cause undetermined). Observed sparingly in Utah County in 1927. Also seen in Cache County in the past.

PEA (Pisum sativum)

BACTERIAL BLIGHT (Bacterium pisi). Traces of this disease were found frequently in Alaska variety peas and less often in late varieties. Of 73 plantings examined, chiefly canning peas, 11 plantings or 15 per cent contained this disease. These were distributed in Cache, Weber, Salt Lake, Utah, Morgan, Carbon, and Piute counties. Infection was generally limited to the lower leaves and the base of the stem, and occurred sometimes as a leaf-spot and sometimes as a stem-blight. The only severe development of the disease observed this year was in a home garden where home-grown seed which had not been entirely separated from the chaff had been planted earlier than the usual planting date for canning crop peas. Here, early spring rains had permitted severe injury to the lower leaves, but the plants outgrew this and yielded well. The sparing and widespread occurrence of this disease is clearly the result of planting infected seed. Adverse weather conditions ordinarily prevent the disease from becoming destructive.

ROOT-ROT (Aphanomyces euteiches). Pea root-rot occurs rather generally in canning crop fields in Salt Lake, Weber, and Morgan counties, but it was not found in Wasatch and Utah Counties where considerable numbers of fields were examined. Of the 73 fields inspected in the state 17, or 23 per cent, contained this root disease. Losses ranged from frequently a mere trace up to 75 per cent of the crop in one two-acre field. The average loss in all fields examined is computed at 3.7 per cent, a figure that is somewhat too high for the state as a whole since in some localities the assistance of canning company representatives led to selection of the worst fields for observation.

This disease appears to be less generally destructive than in Wisconsin, and to be less closely correlated with repeated cropping with peas. Irrigation water appears to function importantly in distributing the causal agent, and excessive irrigation provides conditions favorable for development of the disease. In some instances, at least, the disease affects only part of a root system, developing, apparently, while the soil is wet during irrigation, and stopping with the later drying of the soil before involving the entire root system.

Canners and growers in Utah commonly refer to the decay of long vines, lodged and matted on wet soil, as root-rot. This is a separate trouble which is encountered especially with the tall varieties such as the Admirals, when grown on rich soil. The vines, becoming closely matted together on the ground, decay readily when wetted by heavy rains or by irrigation, in the absence of any specific parasite.

DOWNY MILDEW (Peronospora viciae). This disease was observed in Cache, Weber, Morgan, Utah, and Wasatch counties, in a total of 13 fields in only two of which there was more than a trace of injury. In the remainder the mildew occurred chiefly in small, scattered spots as is usual for this disease, but in these two fields it developed in the "systemic" manner, completely overrunning the affected shoots and either killing the plant or forcing the production of secondary shoots. This resulted in a loss of about one per cent in one field and a much heavier loss in another. In this latter field, in Wasatch County, five per cent of plants were completely crippled or killed by the disease and an additional four per cent showed a crippled primary shoot and the production of one or more lateral shoots which were relatively clean. Other plants were heavily spotted. A conservative estimate places the loss in this field at eight per cent of the crop, a record severity for this disease in the experience of the writer.

POWDERY MILDEW (Erysiphe polygoni). Of no importance this year. Observed in only four garden plantings late in the season, in Cache, Emery, Iron, and Garfield counties. This does not represent the total range of the disease in Utah. It is probably general throughout the state, especially in the higher valleys, but it seldom develops until after the canning crop is harvested.

BLACK-LEAF (Fusicladium pisicola). Mere traces of this disease were found in 1927 in Cache and Weber counties. The disease has been known to occur in northern Utah since 1921 and has been found in Cache, Weber, and Morgan counties. It rarely affects plants before they are in blossom. After this time it may cause heavy defoliation, but the lateness of attack prevents heavy reduction of yield. Morgan County, this year, was surveyed too early to expect this disease.

ASCOCHYTA LEAF-SPOT (Mycosphaerella pinodes (micro" form). Of the three types of Ascochyta described by Linford and Sprague (Phytopath. 17: 381--397) as parasitic on peas, this is the only one that was found during the 1927 survey in Utah. Traces of it were collected in Cache, Davis, and Piute counties on leaves that either rested on the ground or hung near it. This is identical with the foot-rot fungus mentioned below.

FOOT-ROT (Mycosphaerella pinodes "micro" form, and Fusarium spp.). A widespread but minor disease. Isolations made during the survey from plants showing this injury yielded chiefly the Mycosphaerella (Ascochyta), although Fusarium martii pisi and other species of Fusarium were also obtained. Infestations in different fields ranged from a trace up to 15 per cent, with one outstanding field in which 50 per cent of the plants were affected. Only ten of all the fields examined contained enough of the disease to be significant, but very few fields were entirely free from this trouble. Generally, affected plants suffered little reduction in vigor. The loss in the state as a whole is a trace.

SEEDLING BLIGHT and STEM CANKER (Rhizoctonia). This survey was begun too late to observe the earliest seedling injury. Stem-canker in young plants was observed in nine fields, and cultures of a Rhizoctonia were readily obtained from specimens collected in two localities. In two fields, losses of eight per cent of stand resulted; in one, a loss of 15 per cent. Some of the losses caused by Rhizoctonia may be included under the head of "undetermined root-rots".

Undetermined ROOT-ROTS. In old pea fields in all the older canning districts surveyed, fields were found in which pea roots were damaged by some sort of cortical decay which differed from those discussed above. In four fields 50 per cent or more of the plants were affected, with a resultant reduction of yield of 10 to 35 per cent. Symptoms were not alike in all instances. At least one undetermined disease resembles the Aphanomyces root-rot in the appearance of affected roots, but affected tissues lack the oospores so characteristic of that parasite. This disease weakens the plants but seldom kills them outright. In Morgan County, however, many fields are suffering from a disease that resembles Rhizoctonia stem-canker in its tendency to cut the stems off above the cotyledons, but differs in the absence of the characteristically rich brown color of the Rhizoctonia lesion. Also it severs the stem with less evident corrosion. This form of root injury causes rather abrupt death of scattered plants, frequently taking from five to ten per cent of the stand, and sometimes much more. It is most frequently seen when the plants are only a few inches tall, but may continue to thin out the stand up to harvest time. The causes of these root and stem diseases should be determined.

ROOT-KNOT (<u>Heterodera radicicola</u>). This nematode disease was found in a single field of Admiral peas on sandy soil in a tomato-growing section in Weber County. It affected 25 per cent of the plants, reducing the yield about 10 per cent.

MOSAIC (cause undetermined). Mosaic was found in eight fields in Cache, Weber, and Utah Counties, affecting peas of Alaska, Horsford, and Green Admiral varieties. The heaviest infestation was a trace, and the injury was insignificant.

PEPPER (<u>Capsicum annuum</u>)

SUNSCALD (cause undetermined). Injury which appears to be sunscald primarily, followed by the secondary invasion of several saprophytic fungi, has caused important losses in market garden plantings of the large fruited peppers in Salt Lake, Davis, Weber, and Boxelder counties. A maximum severity of eight per cent of damaged fruits was noted in a Davis County field. This scald develops before the green peppers are ready for market, and is limited to the side of the fruit that is exposed to the sun.

POTATO (<u>Solanum tuberosum</u>)

17,000 acres; 2,465,000 bushels.

(The widespread prevalence and destructiveness of the new psyllid-yellows discussed below rendered almost futile detailed observation of the other diseases of the potato. The following summaries, admittedly very inadequate, are presented for what little value they may possess.)

BLACK-LEG (<u>Bacillus phytophthorus</u>). This was seldom found in more than slight traces. In a single field in Weber County a loss of ten per cent of plants was counted, and in two fields in Davis County the loss amounted to seven per cent. In the vast majority of fields none of this disease could be found.

SCAB (<u>Actinomyces scabies</u>). The survey closed before the main potato harvest began, and consequently observations on potato scab were limited to a few early fields in Davis and Weber counties. Here, in some fields, scab was present on as high as 90 per cent of the tubers, but the majority of fields were entirely free from it. Other sources of information indicate that scab occurs widely throughout the state. B. L. Richards reports it especially severe in Davis and Weber Counties.

WILT (Fusarium spp. and Verticillium alboatrum). Both Fusarium and Verticillium wilts were found in Utah during 1927. Isolation studies were not sufficiently thorough to determine the relative importance of the two, but the Fusarium disease appeared to be the most widely present and usually most destructive. It was found sparingly in nine representative counties and would doubtless have been detected elsewhere had not necrosis from yellows rendered diagnosis doubtful. Infestations were generally only a trace, but maximum counts of 26 and 40 per cent were obtained in Uinta and Boxelder counties respectively. Verticillium wilt was positively identified in collections from Cache, Uinta, and Salt Lake counties. In the last named, this disease was the cause of losses amounting to eight or ten per cent in numerous fields of late potatoes in the estimation of B. L. Richards and H. L. Blood.

EARLY BLIGHT (Alternaria solani). Almost wholly absent during 1927, or hidden by leaf necrosis caused by the yellows disease. Collected only in slight traces in Cache, Uinta, and Iron counties. Sometimes severe locally.

ANTHRACNOSE (Colletotrichum atramentarium). Has been reported from Utah, but was not seen during 1927 survey.

STEM-CANKER (Corticium vagum). Perhaps more than usually destructive this season. Coextensive with potato culture, but highly variable in severity. The most extreme development noted in 1927 was in the alfalfa seed producing area of Millard County where potatoes are planted chiefly on the lightest soils after a crop of alfalfa has been turned under or after heavy applications of manure. Of seven fields examined here, five were severely infested; and on the basis of all seven there was an average of 22 per cent of plants affected with deep stem cankers and damaged stolon tips. At Oak City, only a few miles away, where the crop is grown under very different soil conditions, this disease was very minor. The loss in the state as a whole is estimated at three per cent. The sclerotial stage of the parasite which disfigures the tubers was not seen because the survey was limited to the summer months. It is known, however, to occur generally on late potatoes

MOSAIC (cause undetermined). Potato mosaic, chiefly the rugose mosaic, is, next to the new psyllid-yellows, the most generally destructive disease of potatoes in Utah. The more progressive potato growers are now avoiding this disease very effectively through the planting of certified seed potatoes or other potatoes of known freedom from mosaic, but in so doing they are incurring extra expense which becomes serious in seasons such as 1927 in which other diseases assume destructive proportions. The majority of potato growers, however, are still planting common stocks for seed, with the result that infestations of 20 to 60 per cent are frequently seen, and still heavier infestations may be found. The prevalence of psyllid-yellows prevented counts of mosaic in most fields, but of 56 fields examined up to August 8 in which it was possible to count mosaic, the disease was found present in 50, and the average infestation in the whole 56 was 26.2 per cent. This was chiefly rugose mosaic, but mild mosaic when present was included in the count. This average would be too high for Utah as a whole, for it did not include many of the early potato fields in Davis and Weber counties where certified seed is used extensively, nor Piute County where certified seed potatoes are being produced. Twenty per cent infestation would perhaps better represent the entire state.

LEAF-ROLL (cause undetermined). Leaf-roll was particularly difficult to distinguish from some of the psyllid-yellows symptoms, but in the 56 fields selected for the calculation of average mosaic infestation, an average of 2.3 per cent of plants were affected. Leaf-roll occurs wherever potatoes are grown in Utah.

CALICO (cause undetermined). Traces of calico were seen in Cache, Salt Lake, Utah, and Millard counties.

SPINDLE-TUBER (cause undetermined). Potato spindle-tuber has been observed in northern Utah for several years, but the prevalence of yellows prevented additional observations in 1927. What was probably this disease was seen several times in Cache and Davis counties.

PSYLLID-YELLOWS (cause undetermined). A state-wide outbreak of psyllid-yellows, a new and highly destructive potato disease, was the outstanding plant pathological event in Utah in 1927. This disease (Plant Disease Reporter 11:93-94 and 110-111, and Phytopathology 18:140-141) in its maximum severity led to complete destruction of the crop in some areas and, in the state as a whole, caused the heaviest losses ever known to have resulted in Utah from a single potato disease.

This disease first came to the attention of plant pathologists on June 12 of this year when H. L. Blood observed it in experimental plantings at Farmington. On June 15, B. L. Richards found it prevalent in fields of early market potatoes at Bountiful, Davis County. Its serious nature was apparent even at that early date. When the writer began his survey of potato fields on June 29, early potatoes in Weber and Davis counties were generally infested, and before the survey was concluded on September 15 this disease had been found in every county where potatoes had been examined for it.

It became apparent during the survey that this was not the initial outbreak of psyllid-yellows which had thus been observed. Early in the spring of 1927 this same disease had caused the complete failure of potatoes in Washington County in the extreme southwest corner of the state. Furthermore, it is reported by County Agent O. R. Madsen, and by growers, that this disease had occurred locally in destructive form at Green River, Emery County, during 1925 and 1926. This is confirmed by the writer's memory of having examined a specimen plant at the Utah Experiment Station while visiting there in 1925, a specimen sent in by Mr. Madsen, which showed the characteristic symptoms of this disease but which was then diagnosed as probably a form of Rhizoctonia injury because of the tuberization of aerial parts.

The local occurrence of this disease during two former years, together with its widespread occurrence during 1927, makes it appear probable that psyllid-yellows may have occurred in other outlying areas in years past. Evidence on this point is lacking, but it is very clear that no appreciable amount of it had occurred in recent years in the more important potato areas of Utah. Detailed study of potato virus diseases in several of the northern and central counties by the Experiment Station, and seed potato certification work by the State Department of Agriculture extending into south central counties as well, have involved such close observation of potatoes in the important producing areas that this disease would surely have been detected had it been present in more than traces.

Symptoms have already been described briefly in the notes cited above, but it is essential here to state the nature of the losses incurred by this disease. Such losses were of two types: reduction in gross yield, and lowering of quality of the product. Plants which were affected early, before tuber formation had begun, yielded almost no tubers of usable size. At the other extreme, if the tubers were already well developed at the time the disease appeared, the market quality of these tubers was lowered by the development of knobby growth or by the sprouting of the eyes with the formation either of leafy shoots or of stolons which in turn set small tubers. Between these two extremes the usual condition prevailed: the yield of tubers of marketable size was greatly diminished, and these tubers were frequently malformed and were beginning to sprout when harvested. (Plate IV).

Almost universally the disease developed earliest and attained the greatest severity in the earliest planted potatoes in any locality. This included everywhere the home garden crop and in certain areas the chief market crop as well. In these early plantings the disease first affected scattered individual plants and then rapidly spread until all plants were affected. For a time it appeared as if the late crop would escape injury, but the disease spread progressively throughout the season as long as healthy plants remained in any locality. Field observations suggest that the initial outbreak on early potatoes occurred almost simultaneously throughout the central counties, but much later here than in Washington County.

All varieties appeared susceptible to yellows. Symptoms varied with the variety of potato, both on the vines and the tubers, and, as a result of differences in time of planting there were sometimes apparent differences in the severity of injury. Where planted side by side on the same date, however, the varietal differences that could be seen appeared to result chiefly from the interaction of the seasonal development of the disease and the different rates of maturity of the varieties. No indication of immunity was observed.

When other conditions were equal, the disease developed with equal freedom in potatoes grown from seed from diverse sources. This appeared to be true even at Green River where the disease had occurred before. Seed-borne infection could not, therefore, be held responsible for this outbreak.

As reported in the notes cited above, a species of psyllid, reported by Richards to be Paratrioza cockerelli Sulc., was found almost constantly associated with plants showing early stages of this disease. This relationship appears first to have been observed on June 29 when the writer in company with H. L. Blood of the Utah Agricultural Experiment Station and County Agent A. L. Christiansen began the survey of early market potato fields in Weber County. A disturbance of tomato plants in this county had been attributed to psyllids, and accordingly potato plants affected with the new disease were searched for this insect. From the very first plant examined, a diseased individual was rarely searched that day without being found to carry either psyllid nymphs or their casts, and although numerous healthy plants were examined similarly in the same fields, the insect was rarely found upon them. Before the survey was concluded on September 15, this relationship had been observed by the writer and others in the geographic extremes of the state. Plants which appeared healthy rarely carried the insect, while diseased plants, except in late stages, almost always harbored the nymphs or their casts. As far as circumstantial evidence can be relied upon, field observations convict this insect of being in some way responsible for potato psyllid-yellows. See the note by Richards (Phytopathology 18: 140-141) for experimental confirmation of this.

At the close of the survey psyllid-yellows appeared to coextensive with potato culture throughout Utah. Table 22 lists the 23 counties in which it was found during the survey. Potatoes were not examined in the remaining six counties of the state. It is significant of the thoroughness of distribution of psyllid-yellows that in all but three of the 19 counties for which figures are presented in the table the disease was found in every field examined, and that in at least two of these three exceptions, Cache and Salt Lake counties, nearly every field was infested before harvested. The severity of injury, however, was by no means equal in the different counties, but varied widely with the earliness of inception of the disease even where the thoroughness of infestation was essentially equal at the close of the season,

The maximum severity of this disease, total destruction of the crop, was seen many times in 1927, most frequently in early potatoes. Home garden potatoes which generally represented the earliest plantings in their respective localities were practically a failure throughout the state. In the commercial potato crop, the most conspicuous losses were sustained by the producers of early market tubers. Recital of a few special examples will serve better than generalizations to make clear the importance of potato psyllid-yellows in Utah in 1927.

In Washington County potatoes are said to have been a complete failure. This county was surveyed late in August, long after potatoes normally are harvested, but there had been no harvest. Plants which remained alive at this time showed late stages of psyllid-yellows. Inquiry among growers failed to find a farmer or home gardener who had eaten new potatoes from his own plantings this year. Such a total failure of the crop is without precedent in this county.

TABLE 22 - Psyllid-yellows of potato in Utah, 1927, by counties. a/

County	Number of fields examined	Fields infested number	Fields infested per cent	Heaviest infestation per cent	Average infestation per cent
Cache	16	9	56.2	100	53.1
Carbon	15	15	100	100	61.1
Beaver	5	5	100		84
Boxelder	5	5	100	100	53.2
Davis	32	32	100	100	56.6
Duchesne	5	5	100	100	91
Emery	1	(disease said to be prevalent throughout)			
Garfield	4	4	100	100	61.2
Grand	1	1	100	100	100
Iron	21	21	100	100	83.8
Juab	1	1	100	10	10
Kane	4	4	100	100	70
Millard	17	9	52.9	97	24.2
Morgan	(disease reported prevalent late in season)				
Piute	11	11	100	100	38.2
Salt Lake	24	13	54.2	100	21.7
Sanpete	12	12	100	100	95.8
Sevier	10	10	100	100	80.8
Uinta	6	6	100	100	68
Utah	9	9	100	100	44
Weber	11	11	100	100	74.9
Wasatch	(disease present)				
Washington	(crop a total failure from this disease)				

a/ The figures in this table include data from many fields that were examined before the disease had reached its maximum spread. The different times at which different counties were surveyed thus make comparisons of figures in this table from different counties somewhat misleading.

In Duchesne and Uinta counties potatoes were not a complete failure but losses were far more severe than average for Utah. With about a 50 per cent crop in prospect the inhabitants of the Uinta Basin were facing the necessity of substituting some other carbohydrate food for potatoes, since freightage costs from the nearest railroad make importation of so heavy a product almost prohibitive.

Davis and Weber counties, producing chiefly early market tubers, suffered perhaps the most acute financial losses, amounting to approximately 60 per cent of the crop. Numerous commercial fields were not even dug, and yields of 10 to 20 per cent were frequent among the better fields of early potatoes that were harvested. Yields of even late potatoes rarely exceeded 75 per cent of the normal production of marketable tubers. Many of the progressive growers in this area plant chiefly certified seed, and seed costs generally are higher here than in most other parts of the state.

Severe losses from reduction in yield of the market crop occurred in Utah and Sanpete counties, and from reduction in quality of tubers in almost every producing area. Reduction in quality and marketability was most acute in the seed-producing centers, particularly in Piute County where the production of certified seed is a young and thriving industry. Because of the uncertain advisability of using tubers from affected plants for seed, much otherwise valuable seed stock was refused certification and forced into the common market.

A summary estimate of the total loss to the state from this disease is hard to formulate. "Crops and Markets" for November 1927 indicates an acre yield in Utah for 1927 that is 19 per cent below the ten-year average, and a quality ten per cent below the ten-year average. These figures, however, probably do not allow fully for the failure of garden potatoes and potatoes grown solely for home consumption in the outlying districts. On the basis of observations made during the survey, an average reduction for the entire state of 25 per cent of the total crop appears to be a conservative estimate. Even this figure fails to reveal the potential menace of psyllid-yellows to profitable potato culture and even to agricultural prosperity in certain parts of the inter-mountain region. In areas where potatoes are now a chief cash crop, frequent repetition of the 1927 outbreak would be disastrous.

RHUBARB (Rheum rhaponticum)

LEAF-SPOT (Phyllosticta straminella). Traces collected at Price and Logan, Utah. B. L. Richards reports it present in Cache County and abundant in Davis County in 1926. Probably widespread in the state, but very minor.

ROOT-ROT (cause undetermined, probably Phytophthora sp.). A soft root-rot caused 95 per cent loss of stand in one new planting in Davis County.

ROOT-KNOT (probably Heterodera radicicola). A one-acre field of rhubarb at Bountiful, Davis County, was reported completely unproductive. The plants, which were two years old, supported only a few small leaves. Every plant dug was found to have its roots affected with galls of varied form and size, apparently those of the root-knot nematode. This field was planted from home-grown plants: examination of the parent field revealed some of the same condition, but not nearly as much. No similar condition was seen elsewhere in the state.

SPINACH (_Spinacia oleracea_)

CURLY-TOP (cause undetermined). The only field of spinach examined contained one per cent of plants affected with what appeared to be the curly-top disease. The plants were dwarfed, the leaves crinkled with prominent and malformed veins, and the phloem in leaf petioles was necrotic.

DOWNY MILDEW (_Peronospora effusa_). Not seen in 1927. Reported earlier from Salt Lake County by A.S. & R. Co.

SQUASH (_Cucurbita maxima_ and _C. pepo condensa_)

BACTERIAL WILT (?) (cause undetermined). Plants affected with what appears to be a bacterial, vascular disease distinct from that caused by _Bacillus tracheiphilus_, were frequently found associated with attacks of the squash bug in Salt Lake, Davis, and Weber counties. B. L. Richards reports having seen a similar condition in the absence of the insects. A bacterial culture has been obtained from such plants several times by the Experiment Station workers. This opens the question as to whether part of the deadly action of the squash bug may be due to the transmission of a bacterial disease.

POWDERY MILDEW (_Erysiphe cichoracearum_). Collected only in Grand County in 1927. Minor. Has been reported from Salt Lake County by A. S. & R. Co.

LEAF-BLIGHT (_Macrosporium cucumerinum_). This disease was somewhat less severe on squash than cantaloupe at Green River, the only locality found infested.

CURLY-TOP (cause undetermined). This disease varied from a trace up to a maximum infestation of 12 per cent. Affected plants produced almost nothing. Aside from the questionable bacterial disease, this is the most important disease of squash observed in Utah. In the state as a whole it caused less than one per cent of loss.

TOMATO (_Lycopersicum esculentum_)

BACTERIAL CANKER (_Aplanobacter michiganense_). (Plate III, fig. 2) This disease first came to the attention of Experiment Station workers in Davis County in 1923, but its identity and serious nature were not recognized at that time. A survey of tomato fields by these workers for virus diseases in 1923 failed to record any considerable amount of this disease. Upon its identification in 1927, confirmed by Miss Mary K. Bryan of Washington, D.C., the Experiment Station began active investigation of this problem.

In 1927 bacterial canker proved the most destructive disease of the tomato in the state as a whole and was particularly prevalent in canning crop tomatoes. It was collected in nine of the 17 counties in which tomatoes were examined, and in 37 of the total of 82 fields and gardens examined, or 45 per cent of the plantings. The average infestation in these 82 plantings was 10.5 per cent of plants. In Boxelder, Weber, Davis, Salt Lake, and Utah counties, the counties where tomatoes are grown for canning, 41 fields were examined and of these, 32 fields or 78 per cent, contained the disease. In these five major tomato counties the plantings examined contained an average of 18.2 per cent of affected plants. The maximum loss in any field was 95 per cent of the plants.

Bacterial canker was not entirely limited to canning crop tomatoes, but these were characteristically more affected than were garden tomatoes. While final evidence is not yet available it is highly probably that this disease is carried in the seed, and the field evidence in Utah this year indicated that the seed stocks used by the canners in 1927 were badly infested. This seed was grown almost wholly within the state in 1926 under the canners' supervision. The seedlings set in the field were sometimes home grown and sometimes imported from Nevada and California. Severe outbreaks of the disease could not be traced exclusively to either source, but there was clear evidence of great differences in the amount of disease in seedlings from different seedbeds. Hope for control of this disease would seem to lie in the planting of clean seed and in the prevention of seedbed infection.

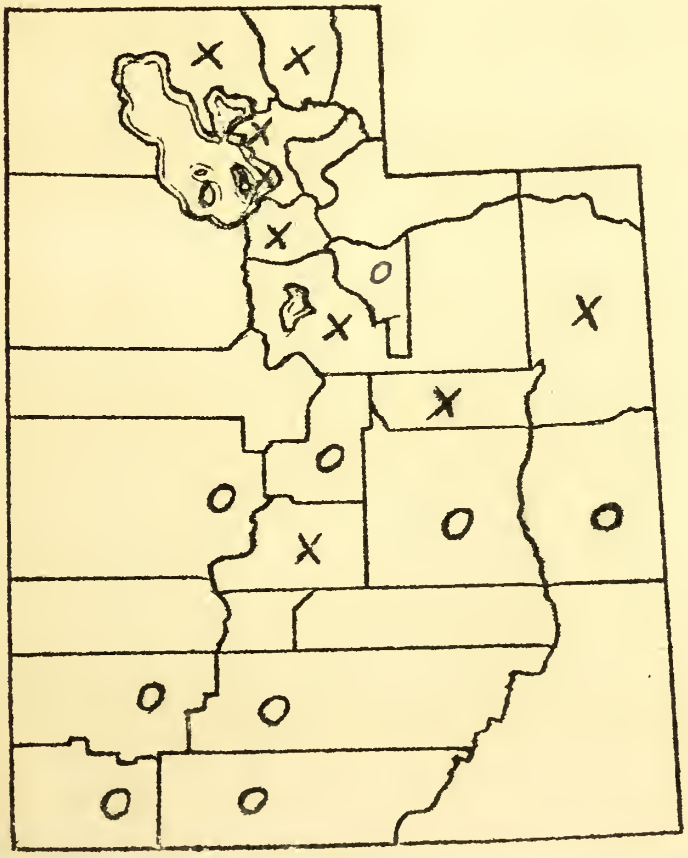

Fig. 4. - Distribution of bacterial canker of tomato in Utah as observed in the 1927 survey (O - absent; x - present).

WILT (Fusarium lycopersici and Verticillium alboatrum). Tomato wilt in Utah is caused by both the fungi named, and available information is inadequate to indicate the importance of each. Both fungi were isolated during 1927, and apparently the Fusarium is most abundant in the major tomato counties but, in view of the work now being done by the Experiment Station aiming towards the perfection of tomatoes resistant to the Fusarium, it is important that the relative importance of these diseases be determined more precisely and the range of each be charted. Besides the five major tomato counties named above, wilt was found in Uinta, Grand, and Washington counties representing the geographic extremes of the state. Ten per cent of plants was the maximum infestation counted. The loss for the state as a whole is estimated at 2 per cent of the yield.

FRUIT ROTS (Corticium vagum and others). Tomato canners complained of more loss than usual through the decay of ripening tomatoes in the field. This rot was most prevalent in old tomato fields. Irrigation is probably an important factor in wetting the fruits and starting the decay.

BLOSSOM-END ROT (cause undetermined). Less than usual this year. Was observed in a single field in Boxelder County on a gravelly soil.

YELLOWS (YELLOW BLIGHT) (cause undetermined). This disease was coextensive with tomato culture in Utah in 1927. Like curly-top of the sugar beet, it was relatively late in appearing in heavy infestation and was less destructive throughout the state than in 1926. It is said to have been practically absent in 1925. Of 82 fields examined, 58 were found infested, or 70.7 per cent of fields; and the average infestation computed for the 82 fields was 11 per cent of the plants. This latter figure is deceptive, for most of the fields in which very high percentages of diseased plants were counted were small fields or home garden plantings outside of the commercial tomato producing areas. The 41 fields examined in the five tomato canning counties showed an average count of only 5.7 per cent affected plants, and many of these developed the disease after they had already begun to produce. The heaviest infestation recorded was in a small garden planting in Emery County where 70 per cent of the plants were affected.

MOSAIC (cause undetermined). In addition to the tomato canning counties, mosaic was observed in Grand, Sanpete, and Cache counties, and in the last two named the diseased plants had been shipped from Davis County where the disease is abundant. At Moab, in Grand County, as frequently in the central counties, Physalis plants growing near the tomatoes carried a mosaic disease. In the three south-west counties, Washington, Kane, and Iron, a total of sixteen plantings showed no trace of the disease. The extreme variation in infestation, from 0 to 60 per cent in commercial plantings, indicates the operation of local factors that are not fully understood. In one field with an average of 25 per cent mosaic, many of the plants showed symptoms on only the uppermost leaves, indicating relatively late infection. An outside row in this field gave a count of only 4 per cent mosaic. Here the spread was clearly not limited to the seedbed, but, in some other instances, seedbed contamination has appeared to be responsible for heavy infestations in the field. The maximum infestation observed was 60 per cent of plants in a commercial field in Utah County. The vast majority of fields even in the tomato-canning counties were practically or wholly free from mosaic.

STREAK (cause undetermined). Streak was found sparingly over approximately the range covered by mosaic, but less abundantly than mosaic in any given field. The maximum infestation observed was in a home garden planting in Sanpete County where 8 per cent of plants were affected. In this garden 50 per cent of plants showed mosaic, and potatoes were directly adjoining the tomatoes on two sides.

ROOT-KNOT (*Heterodera radicicola*). Known to occur in Utah, Davis, Weber, and Cache counties. Not observed during 1927.

TURNIP (*Brassica rapa*)

POWDERY MILDEW (*Erysiphe polygoni*). A single collection was made in Boxelder County near the town of Garland. Doing slight damage late in the season.

LEAF-SPOT (*Alternaria* sp.). Reported from Salt Lake County by A. S. & R. Co.

WATERMELON (*Citrullus vulgaris*)

WILT (*Fusarium niveum*). Has proved a serious handicap to melon production in the south end of Davis County. Not reported elsewhere in the state.

LEAF-BLIGHT (*Macrosporium cucumerinum*). Observed in two fields at Green River. In the worst field, adjoining badly diseased cantaloupe, the loss was estimated at 15 per cent of yield. The crowns of the plants were nearly defoliated, and even the younger leaves were affected.

BLOSSOM-END ROT (cause undetermined). Several plantings at Sandy, Salt Lake County, were troubled with a blossom-end withering and decay of undetermined cause. The loss was not serious.

BLACK ROOT-ROT (*Thielavia basicola*). Reported from Salt Lake County by A. S. & R. Co.

TABLE 23. - Summary of losses in vegetable and root crops.

Crop	Disease	Cause	Estimate loss per cent
Bean	Bacterioses	Bacterium phaseoli (and others?)	1.
	Root-rots	Corticium vagum and Fusarium spp.	1.5
	Mosaic	Undetermined	8.
	Total		10.5
Sugar beets	Root-rots (in field)	Chiefly undetermined	2.5
	Curly-top	Undetermined	15.
	Other diseases		3.
	Total		20.5
Pea	Root-rot	Aphanomyces euteiches	3.
	Other root-rots	Miscellaneous and undetermined	2.
	Other diseases		.2
	Total		5.2
Potato	Yellows	Undetermined	25.
	Stem-canker	Corticium vagum	3.
	Black-leg	Bacillus phytophthorus	.1
	Wilt	Fusarium and Verticillium	1.5
	Mosaic	Undetermined	10.
	Leaf-roll	Undetermined	2.
	Other diseases		.2
	Total (misleading: losses overlap)		41.8
Tomato	Bacterial canker	Aplanobacter michiganense	12.
	Wilt	Fusarium and Verticillium	2.
	Yellow blight	Undetermined	6.
	Mosaic	Undetermined	1.
	Total		21.

DISEASES OF FRUIT CROPS

ALMOND (Amygdalus communis)

BLIGHT (Coryneum beijerinckii). Not collected during 1927. Reported by B. L. Richards.

APPLE (Malus sylvestris)

BLIGHT (Bacillus amylovorus). Found sparingly in all apple growing districts. Body cankers of serious extent are rarely found on the apple, but in a few instances severe blossom and twig blight was seen to have prevented fruiting almost wholly. Said to have been more destructive other years than in 1927.

CROWN-GALL (Bacterium tumefaciens). Said by nurserymen to be rare. Still generally confused with the non-parasitic excess-callus growth at poorly fitted grafts.

POWDERY MILDEW (Podosphaera leucotricha). Collected only twice this year; in an abandoned home orchard in Iron County, and in a nursery in Salt Lake County. Minor.

CANKER AND DIE-BACK (Cytospora sp.). This fungus is frequently found associated with die-back and canker in uncared-for apple trees, but it has not yet been shown to be an aggressive parasite. Most frequent on trees that have suffered from drouth or frost.

COLLAR-ROT (cause undetermined). Causes the death of scattered trees in orchards generally. At Hurricane, Washington County, one small orchard has 95 per cent of the trees affected - a very unusual condition.

CHLOROSIS (cause undetermined). One of the most serious menaces to apple culture. Widely prevalent. See page 115.

JONATHAN SPOT (cause undetermined). Frequently troublesome with Jonathan apples in storage.

INTERNAL BREAKDOWN (cause undetermined). A general or sometimes local internal browning and necrosis developing sometimes just before but usually soon after the apples are placed in storage. Has proved very troublesome in some seasons, particularly in large apples of the Jonathan variety.

WATER-CORE (non-parasitic). Sometimes present but negligible.

ROOT-KNOT (Heterodera radicicola). Occasionally collected by nursery inspectors. Very minor.

APRICOT (*Prunus armeniaca*)

BLIGHT (*Coryneum beijerinckii*). Frequently the cause of disfiguring spots on the fruits.

CHERRY (*Prunus* sp.)

BODY-CANKERS and DIE-BACK (cause undetermined). In Utah and Boxelder counties and in the counties which lie between, the older sweet cherry orchard and some younger are suffering from the rapid and irregular dying of scattered trees. A tree which blossoms freely in the spring may wilt even before the oldest leaves are mature. Sometimes a single large branch is first affected followed by other branches; sometimes an entire tree dies at once. This trouble is most serious in the older orchards, but young trees in their first to fourth years have also been seen to die in apparently the same way. The cause of this trouble has not been studied. Doubtless it is in part a form of winter injury, but it is not wholly that. Cankers, apparently of parasitic origin, have been detected on aerial and underground parts, but their importance and relation to the death of the tree is not known. Some growers hold that proper care to keep the orchard clean and in good tilth, and the trees free from mechanical injury solves the problem for all but the oldest trees. These they expect to replace when they begin to lose vigor. The susceptibility of younger trees, however, demands that the nature and cause of these losses be determined if possible.

BLACK-KNOT (*Plowrightia morbosa*). Not observed on cultivated cherry nor plum in Utah, but prevalent on the native chokecherry. Many old cankers and relatively few new ones were seen in 1927.

LEAF-SPOT (cause undetermined). A shot-hole leaf-spot resembling the disease caused by *Coccomyces hiemalis* was observed several times on wild and cultivated cherry, but no fungus was found associated with the lesions.

GOOSEBERRY (*Ribes* spp.)

POWDERY MILDEW (*Sphaerotheca mors-uvae*). Was seen during the survey only at Castle Dale, Emery County. Reported by B. L. Richards to have occurred in serious form in Boxelder and Weber counties for years.

GRAPE (*Vitis* sp.)

CROWN-GALL (*Bacterium tumefaciens*). Occurs locally in Davis and Utah counties. Seriously weakens affected vines.

POWDERY MILDEW (*Uncinula necator*). Occurs in all important grape areas. Said to be much less severe in 1927 than in some former years. B. L. Richards reports that it destroyed the entire crop in unsprayed vineyards in Davis County in 1925.

CHLOROSIS (cause undetermined). A serious limiting factor, restricting grape culture to soils and localities where it occurs least destructively and reducing the vigor and yield of many home garden and some commercial plantings. Much less frequent in the southern counties than the northern.

PEACH (*Amygdalus persica*)

CROWN-GALL (*Bacterium tumefaciens*). Reported to occur sparingly in nursery stock.

LEAF-CURL (*Exoascus deformans*). Known in only a single orchard in northeastern Boxelder County.

BLIGHT (*Coryneum beijerinckii*). Almost totally absent this year. During some seasons it has been prevalent in the northern counties, damaging the young twigs and marring the fruits. Its range apparently covers the state.

BODY CANKER and DIE-BACK (cause undetermined; winter injury in part). In home orchards throughout all but the most southerly counties and in commercial orchards particularly in Boxelder and Utah counties, peach trees are conspicuously disfigured with body cankers of diverse types, and weakened to extremely low productivity. The almost complete freedom from this condition which prevails in Washington County, together with the known relation of much of this injury to certain particularly severe winters makes it apparent that much if not most of this is winter injury, either directly or indirectly. This has already been studied descriptively by Mr. Abel of the Experiment Station, but it merits further investigation looking to possible prevention.

CHLOROSIS (cause undetermined). Chloroses of two types have been observed affecting the peach. Chlorosis as observed in the northern counties generally affected other woody plants in the immediate vicinity as severely as the peach. Grapes especially usually were more severely affected. In several localities in the southern part of the state peaches showed a different injury which appeared to affect the peach almost solely.

In a number of instances grapes adjoining affected peach trees were entirely free. This chlorosis, characterized by a more golden yellow color than that in the northern counties, leads eventually to death of the tree. Fruits are not affected in size or time of maturity except in the last stages when they may fail to mature. Apparently this is different from any of the known infectious chloroses of the peach; the opinion was expressed by some growers that it is infectious, but clear evidence of this was not seen during the survey. This is the most destructive disease of the peach at Moab, Grand County and throughout Washington County, where it is worse at Toquerville and LaVerkin than at Hurricane and St. George.

POWDERY MILDEW (Podosphaera oxyacanthae). Has been reported from Utah but was not seen during 1927.

PEAR (Pyrus communis)

BLIGHT (Bacillus amylovorus). This is the one destructive disease of the pear in Utah. It has driven out commercial pear culture from all but a few localities and is demanding constant vigilance on the part of the remaining pear growers. Blight occurs wherever pears are found in the state but since commercial pear culture is now largely limited to Utah County it has become chiefly a local problem. Here some orchards were found almost clean and others with every tree affected. Some of the more vigilant and skillful growers are holding their own, but others are losing valuable wood in trees which they save, or losing entire trees. The severity of blight apparently varies widely with irrigation and other cultural practices. In home gardens throughout the state one still finds isolated pear trees, chiefly of the poorer varieties, which are holding up without any particular care to protect them from disease.

CANKER (cause undetermined). A type of canker apparently distinct from that caused by Bacillus amylovorous has been observed by B. L. Richards.

RASPBERRY (Rubus sp.)

CROWN-GALL (Bacterium tumefaciens). Reported occasionally in nursery stock. In one home garden in Logan it has proved very destructive. Its prevalence in commercial plantings in the state is unknown.

CHLOROSIS (cause undetermined). The most widespread and destructive disease of raspberry throughout the state. See page 115.

POWDERY MILDEW (Sphaerotheca humuli). Reported from Utah but not seen during 1927.

STRAWBERRY (*Fragaria* sp.)

BACTERIAL BLIGHT (cause undetermined). A leaf blight which shows the characteristics of a bacterial disease and which appears different from all known diseases of the strawberry was found widely distributed in northern Utah in 1927. It is characterized by small, angular, dark green, watersoaked lesions, first visible from the lower side of the leaf or by transmitted light, but later marked on the upper surface by a reddish or brownish color. The spots enlarge but remain angular, delimited by the veins of the leaf. Sometimes they elongate along the larger veins. The lower surface of these lesions characteristically bears, when wet, a copious milky bacterial slime; when dry, a thin scale of exudate. (Plate V.)

No detailed survey of strawberries was attempted, but this disease was found in eight of the 13 fields or gardens examined, and in four out of five counties: Cache, Weber, Davis, and Utah (not in Uinta). In parts of three of these fields, the disease had reduced the leaf surface markedly. Present indications do not place this as a very destructive disease but it is the most important disease of the strawberry seen in the survey.

LEAF-SPOT (*Mycosphaerella fragariae*). Occurs widely on wild strawberries in northern Utah. Collected sparingly in a single patch of cultivated berries at Logan, Cache County.

TABLE 24. - Summary of losses in fruit crops.

Crop	Disease	Cause	Estimated loss per cent
Apple	Blight	Bacillus amylovorus	0.2
	Chlorosis	Cause undetermined	2.
	Other diseases		1.
	Total		3.2
Cherry	Die-back	Undetermined	2.
Grape	Chlorosis	Undetermined	5.
Pear	Blight	Bacillus amylovorus	8.
Raspberry	Chlorosis	Undetermined	12.

DISEASES OF ORNAMENTAL PLANTS

BOXELDER (*Acer negundo*)

LEAF-SPOT (*Septoria negundinis*). Collected in Logan Canyon, at Logan, and at American Fork. Occurs very sparingly.

BUFFALOBERRY (*Shepherdia argentea*)

LEAF-SPOT (*Cylindrosporium shepherdiae*). Collected only at Vernal, Uinta County. This appears to be the first collection of this fungus on this species of *Shepherdia*.

CARNATION (*Dianthus caryophyllus*)

RUST (*Uromyces caryophyllinus*). Always present and troublesome in the greenhouses.

CHINA-ASTER (*Callistephus chinensis*)

WILT (*Fusarium conglutinans callistephi*). Aster wilt, hitherto not reported from Utah, was found in Iron, Beaver, Utah, Salt Lake, and Davis counties. At Cedar City, seven out of eight gardens examined contained the disease, and several gardeners reported having given up aster culture because of it. In Davis and Salt Lake counties, several commercial florists have abandoned aster culture and home gardeners are turning to other flowers which are more dependable. The maximum severity observed was in a one-fifth acre planting near Salt Lake City where, at blossoming time, 85 per cent of the plants were wilted and many others weakened.

YELLOWS (cause undetermined). First observed in Utah September 9, 1927, at Murray, Salt Lake County. It was seen in four localities in Salt Lake and Davis counties, with a maximum severity of 3 per cent.

CLEMATIS (*Clematis ligusticifolia*)

LEAF-SPOT (*Didymaria clematidis*). Observed only on the native species of clematis. Collected in Duchesne and Cache counties.

LEAF-SPOT (*Cerospora squalidula*). Collected in Duchesne and Cache counties.

RUST (Puccinia clematidis). Widely and sparingly distributed.

DELPHINIUM (Delphinium sp.)

POWDERY MILDEW (Erysiphe polygoni). Collected only at Logan on some of the plants affected with the following disease.

YELLOWS (cause undetermined). In a single garden at Logan almost 50 per cent of the plants of tall perennial delphinium were affected with a disease apparently not described on that plant. Some of the plants became chlorotic in advance of blossoming, but the characteristic feature of the disease was the leafy proliferation of floral parts. All degrees of this transformation were present from slightly greenish flowers to expansive leafy structures which could be recognized as floral organs only by their arrangement on the axis. Carpels, stamens, petals, and sepals were equally affected. On some plants, the severity of injury varied widely from spike to spike. As noted above, several affected plants were overrun with powdery mildew, but many were free from any discernible fungous infection. Delphinium is not known to be susceptible to aster yellows.

GOLDEN GLOW (Rudbeckia laciniata)

POWDERY MILDEW (Erysiphe cichoracearum). Observed in home gardens in Iron, Beaver, and Salt Lake counties.

HOLLYHOCK (Althea rosea)

RUST (Puccinia malvacearum). Collected in 1927 only in Utah County, but known to occur more widely in the past.

HYDRANGEA (Hydrangea sp.)

POWDERY MILDEW (undetermined). Collected only in one commercial greenhouse in Davis County.

IRIS (Iris sp.)

LEAF-SPOT (Didymellina iridis). Abundant in a garden at Logan. Many iris plants were examined elsewhere without finding it.

JUNIPER (Juniperus utahensis)

MISTLETOE (Phoradendron juniperinum). Along the highway from Kanab to Mt. Carmel, Kane County, over 50 per cent of the juniper trees including nearly all the older ones bear conspicuous growths of mistletoe, and many of the remainder are affected less conspicuously. Junipers in local areas on the north slope of the Kaibab Plateau in Arizona are likewise heavily infested. (Plate III, fig. 4)

PEONY (Paeonia sp.)

ROOT-ROT (cause undetermined). A commercial florist in Davis County lost 25 per cent of his half-acre of peony plants from a root-rot of undetermined cause.

PLANE TREE (SYCAMORE) (Platanus spp.)

ANTHRACNOSE (Gnomonia veneta). Less new infection than usual this year. Trees damaged by this disease in past years are in evidence widely through the state, notably in Provo where the American species has been planted extensively.

BODY CANKER (cause undetermined). Body cankers apparently distinct from anthracnose were observed on the European plane tree at Farmington. They appeared different from winter injury which was also present; parasitic origin was indicated especially by progressive development through the summer.

POPLAR (and COTTONWOOD) (Populus spp.)

LEAF-SPOT (Marssonia populi). Collected on narrow-leaf cottonwood (P. angustifolia) at Peterson, Morgan County.

LEAF-SPOT (Septoria musiva). On common cottonwood (P. occidentalis) at Roosevelt, Duchesne County and Green River, Emery County.

LEAF-SPOT (Septoria sp.). A Septoria with elongate, non-septate spores was collected on narrow-leaf cottonwood in the Sevier River canyon, Piute County.

LEAF-SPOT (Sclerotium bifrons). Has been prevalent in the Cache National Forest and perhaps elsewhere. Not seen during the survey.

LEAF AND TWIG BLIGHT (cause undetermined). A blight which bears close resemblance to fire-blight of the pear in its general characteristics has swept through the native stands of narrow-leaf cottonwood in the vicinity of Logan during some past years. It was not seen during 1927.

CANKER (DIE-BACK) (Cytospora chrysosperma). This disease occurs throughout Utah, attacking especially the introduced poplars when they are weakened by age or unfavorable culture or environment. Drouth, alkali, careless pruning and dehorning are among the factors which encourage this disease. Winter injury may be another factor, if indeed it can be separated from the above named. Rarely is a young, vigorous tree attacked by this fungus in advance of severe wounding.

POWDERY MILDEW (Uncinula salicis). Widely but sparingly distributed. Sometimes abundant locally late in the season.

CROWN-GALL (Bacterium tumefaciens). Of rare occurrence in the state.

PRIVET (Ligustrum sp.)

ROOT-KNOT (Heterodera radicicola). Not seen during survey. Reported by B. L. Richards.

LEAF-SPOT (cause undetermined). A leaf-spot, apparently an undescribed bacterial disease, was observed in Cache, Utah, and Beaver counties. In Utah County, chiefly in Provo, where 18 hedges were examined, the disease was found in nine. At its greatest observed severity it caused disfigurement of the hedge through the production of a brownish color; in most instances it occurred in traces only. Not wholly limited to leaves, this infection sometimes spreads down through the succulent tip of growing twigs, but few twigs are killed in this manner. The presence or absence of this disease in other parts of Utah has not been established.

ROSE (Rosa spp.)

CROWN-GALL (Bacterium tumefaciens). Rarely detected in nursery stock.

BLACK-SPOT (Diplocarpon rosae). Most serious disease of greenhouse roses. No adequate control measures. Seldom observed on cultivated roses out-of-doors, but prevalent on native roses in late summer.

POWDERY MILDEW (Sphaerotheca pannosa). Coextensive with rose culture in Utah, but highly variable from year to year. In greenhouses it is often present but yields readily to sulphur treatment. Garden roses, particularly the climbing varieties, are frequently overrun, but control measures are rarely attempted.

RUST (*Phragmidium* sp.). Rare on cultivated roses but abundant on native species.

SNAPDRAGON (*Antirrhinum majus*)

RUST (*Puccinia antirrhini*). Said to be difficult to control in greenhouse culture where plants are started from cuttings but seldom present where only seedling snapdragons are grown. In one home garden at Logan seedlings were found thoroughly infested and plants weakened to less than half their full vigor.

SUNFLOWER (*Helianthus annuus*)

DOWNY MILDEW (*Plasmopara halstedii*). Collected on wild sunflower near Price, Carbon County. Not reported from Utah until 1927. Apparently systemic on some plants.

POWDERY MILDEW (*Erysiphe cichoracearum*). Widespread on the wild sunflower.

STEM-ROT (*Sclerotinia sclerotiorum*). Observed on double-flowered sunflowers in a garden at Logan. Has been seen in Cache County in years past.

WILT (cause undetermined). A wilt disease, apparently undescribed, characterized by fungous invasion of the xylem vessels extending high into the stem, was found on a few plants of double-flowered sunflower at Logan.

RUST (*Puccinia helianthi-mollis*). General on the wild sunflower.

SWEET PEA (*Lathyrus odoratus*)

POWDERY MILDEW (*Erysiphe polygoni*). Occurs widely both in the greenhouse and in gardens. Only slight traces were observed during 1927, but the disease sometimes proves very destructive in gardens late in the summer.

ROOT-ROT (cause undetermined). A decay of roots and basal internode of stem frequently causes heavy losses to home gardeners and commercial growers. The cause has not been investigated. Apparently it is distinct from the Aphanomyces root-rot of the common pea.

ZINNIA (<u>Zinnia elegans</u>)

WILT (cause undetermined). A wilt and basal stem rot comparable to the wilt of china asters occurs on occasional plants very widely throughout the state. Fungous invasion of the xylem vessels does not extend far in advance of the decayed portion. No detailed study has been attempted.

DISEASES COMMON TO SEVERAL PLANTS

DODDER (<u>Cuscuta</u> spp.). Dodder parasitizes numerous plants, both native and cultivated, but is known chiefly as it affects alfalfa. Because of its being distributed with alfalfa seed, it may be found almost everywhere that crop is grown but, fortunately, as increasing attention is being given to clean seed the alfalfa dodder problem is declining until it now is rarely the cause of important losses.

The one area in which dodder was seen to be an outstanding problem was in Duchesne County, notably near Ioka and Mt. Emmons. In one six-acre field of alfalfa, 75 per cent of the area was completely overrun; in many other fields dodder covered 10 or more per cent of the plants. A few fields in other counties contained large infested areas which spoke of no effort at control, but generally infestations were in the nature of scattered foci from which little spread had occurred. (Plate III, fig. 1.)

Other crop plants attacked by dodder were observed during the survey, but in each instance the injury was slight. In several tomato fields young plants had been strangled by dodder soon after being set out. One potato field in Davis County showed numerous conspicuous bright yellow patches of dodder; elsewhere only an occasional potato plant was found overrun. Beets of all kinds, - table, sugar, and stock, - were seen attacked, but no heavy infestation was noted. Carrots, peas, and onions, likewise, were found attacked by dodder, but never to a serious extent.

SULPHUR DIOXIDE INJURY. This is strictly a local problem in Utah in the vicinity of smelting plants that liberate quantities of waste sulphur dioxide gas. Numerous plants, native and introduced, including both ornamentals and crop plants, are susceptible to burning and present characteristic symptoms. Heavy losses are reported annually by growers in the affected territory, probably in excess of actual injuries from this cause, but an adequate study of this problem was clearly impossible during the survey and therefore no details of the chance observations that were made can wisely be presented.

CHLOROSIS (cause undetermined). Because of the large numbers of economic plants affected and the severity of injury to some of them, chlorosis is one of the outstanding plant pathological problems in Utah. Chlorosis is predominantly a disease of woody plants, and as such is, with few specific exceptions, the worst disease of fruit crops and ornamental trees and shrubs in the state. More than most other diseases, it is of direct concern to town and city dwellers, for it frequently mars the beauty of home grounds, city parks, and planted streets. Chlorosis is prevalent in almost every irrigated section of the state, but is subject to wide local variation in frequency and severity. Often only part of a garden plot is affected.

Several crops which suffer notably, including raspberry, grape, peach, and apple, have already been mentioned under the appropriate heads, and it will be impossible to present a complete list of susceptible plants at this time. Such a list would be unsatisfactory at best, for chlorosis appears to result from several different sets of causes, and the plants affected differ in each. It appears that different plants are affected differently by chlorosis induced by different causes, and that susceptibility to chlorosis differs widely with the kind of plant under any given set of conditions.

Chlorosis sometimes is attributable, apparently, to excess of soil alkali. This condition, observed especially in Millard and Duchesne counties, affects nearly all introduced plants in different degrees, and is probably a very different phenomenon from chlorosis induced in poorly drained soils which are less charged with soluble alkalis. Even in well-drained soils, particularly, it appears, those of limestone composition, it sometimes prove very troublesome. Chlorosis in the better agricultural areas of the north-central counties appears to be associated chiefly with these last two conditions. At the other extreme, chlorosis is sometimes severe where the soil is sandy and apparently drained fairly well. At Elsinore, Sevier County, on such soil chlorosis was seen at its maximum prevalence and severity. From survey observations alone it is impossible to say whether or not the fundamental cause of chlorosis may be the same in all these cases, induced in the plant by these different environmental conditions, but the suggestion is that there are several kinds of chlorosis in Utah.

Under the influence of irrigation and faulty drainage, chlorosis is clearly on the increase in some areas. The immediate cause may be poor drainage as such or the accumulation of soil alkalis. Where irrigation and drainage are combining to alleviate the alkali problem, chlorosis is on the decline, but over the state as a whole no important change is perceptible. A searching inquiry into the causes of chlorosis and the means of control is one of the outstanding needs of irrigation agriculture in Utah.

EXPLANATION OF PLATES

III.

Fig. 1. Dodder (Cuscuta sp.) on alfalfa, Cache Junction, Cache County, Utah, July 7, 1927.

Fig. 2. Bacterial canker (Aplanobacter michiganense) in Earliana tomatoes, Provo, Utah County, Utah, August 3, 1927. Only 5.5 per cent of the original plants remained free from the disease at this date.

Fig. 3. Yellows (cause undetermined) of celery, Hewitt Farm, Ogden, Weber County, Utah, Sept. 14, 1927.

Fig. 4. Mistletoe (Phoradendron juniperinum) on the Utah juniper (Juniperus utahensis) near Mt. Carmel, Kane County. August 22, 1927.

IV.

Figs. 1 & 2. Stolon and tuber irregularities associated with potato psyllid-yellows (cause undetermined). Russet Burbank variety. Ephraim, Sanpete County. August 20, 1927.

Fig. 3. Sprouting of new, immature potatoes, associated with potato psyllid-yellows (cause undetermined). Russet Burbank variety. Ephraim, Sanpete County. Sept. 1, 1927.

Fig. 4. New growth of potatoes following the harvest of a crop affected with psyllid-yellows. The young, healthy plants in this photograph arose from the small tubers left in the soil when the first, badly diseased crop was harvested. This early crop of Bliss Triumph yielded approximately 15 per cent of a normal crop of small tubers. Note the dried remains of the vines of this first crop. The new plants, when photographed Sept. 13, 1927, appeared free from psyllid-yellows. Dibble Farm, west of Layton, Davis County.

V.

Fig. 1. Bacterial blight (cause undetermined) of strawberry. Lower surface of leaflet, showing numerous angular, dark green, water-soaked spots, and glistening drops of milky bacterial slime, X 2. Logan, June 14, 1927.

Fig. 2. Bacterial blight (cause undetermined) of strawberry. Lower side of leaf, X 1. Logan, June 14, 1927.

PLATE III

PLATE IV

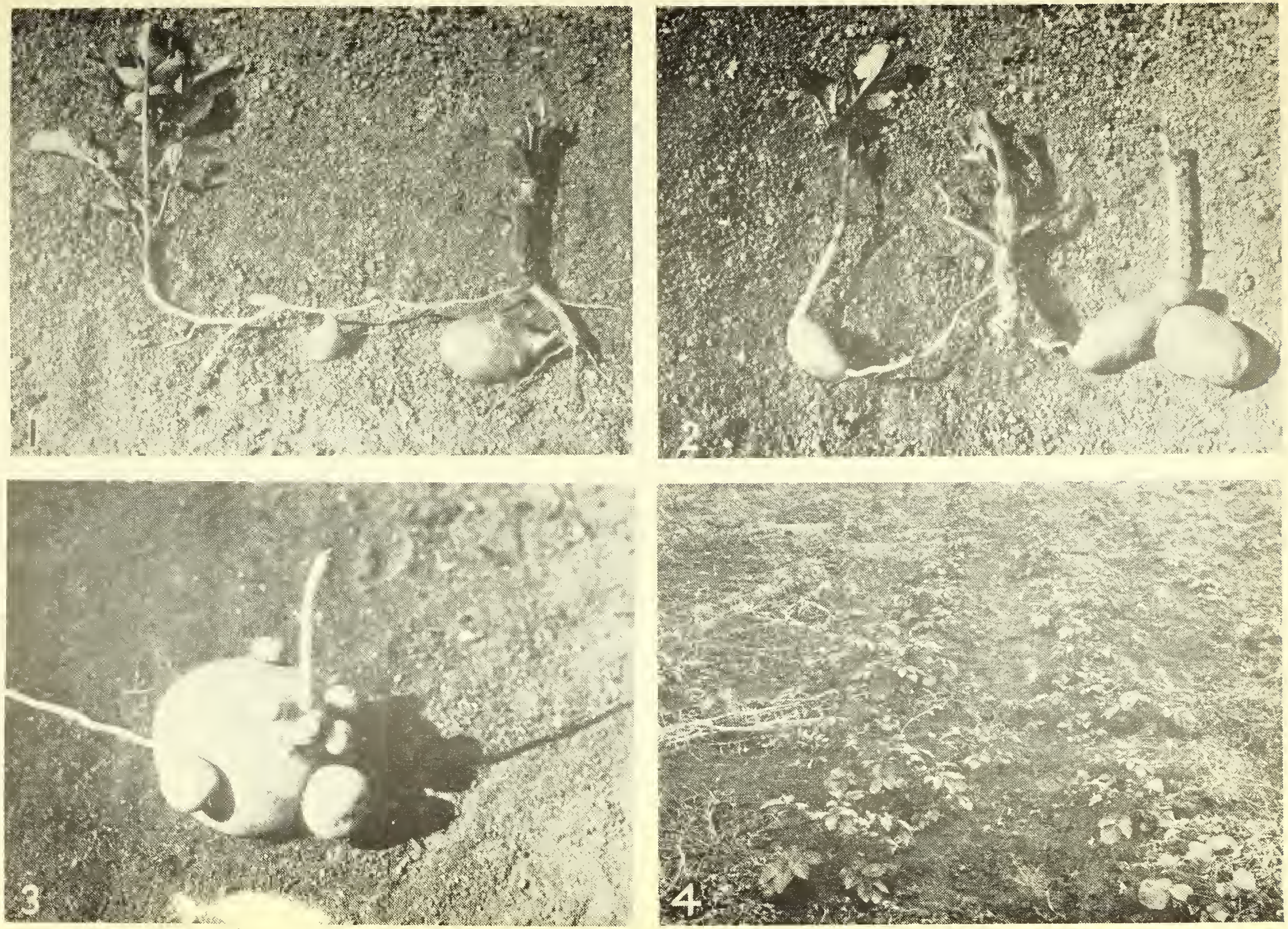

PLATE V

THE
PLANT DISEASE REPORTER
ISSUED BY
THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

Supplement 60

Diseases of Fruit and Nut Crops

In the United States in 1927

June 1, 1928.

BUREAU OF
PLANT INDUSTRY
UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF FRUIT AND NUT CROPS IN THE UNITED STATES IN 1927

Prepared by

C. W. Bennett, Collaborator, Plant Disease Survey, and Assistant Pathologist, Michigan Agricultural Experiment Station.

SECTION ON CITRUS AND SUB-TROPICAL FRUITS

Prepared by

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Plant Disease Reporter
Supplement 60

June 1, 1928

CONTENTS

INTRODUCTION

The chief function of the supplements of the Plant Disease Reporter is to present summaries of plant disease injuries and losses as they occurred in the country during the time covered by the respective reports. For these supplements it is extremely desirable to have reports from the various collaborators as complete as possible in order to present a summary approaching a true representation of conditions. The service which may be rendered in this respect is in direct proportion to the completeness and accuracy of the reports.

The limiting factors at the present time in the presenting of a satisfactory picture of disease conditions is the lack of reports from a sufficiently large number of states and the incompleteness of information on a large number of diseases. For very natural reasons, the diseases which are most severe receive the greatest amount of attention. However, it is just as important to know that a disease caused little or no injury as to know that it was very destructive. This knowledge is important in balancing factors, in permitting generalizations and in obtaining a more accurate conception of the nation-wide importance of a particular disease.

More detailed and accurate information regarding specific diseases should be made available. More data regarding moisture and temperature influences in disease production could be profitably included. In a greater number of cases, the correlation between the development of host and parasite in different states would be interesting. In many instances, dates of fungous development would mean much more if the stages of development of the host plant could also be included. Dates of first observation of occurrence of disease are in many cases obviously much later than the actual time of first occurrence. Information regarding the susceptibility of varieties is extremely valuable. The collection of more data on varietal susceptibility would be well worth while.

It would seem that loss estimates do not in all instances receive the careful consideration which they merit. In a few cases different loss estimates are given in different statements regarding the same disease. These and other inconsistencies in estimating losses have a tendency to decrease confidence in value of estimates presented. The criticism may be made that loss estimates are not accurate and no amount of care can make them so. This is admittedly true, however, careful estimates by those in closest touch with the disease situations in the various states would seem to provide a reasonable indication of losses. At least these estimates constitute the best available information on the subject and as such they have a distinct value.

The references to recent literature included in this summary have been considerably decreased in number as compared with some of those of previous years. The foreign references, unless they seemed to have a special bearing or importance, have been left out.

FRUIT DISEASES OF 1927

DISEASES OF POME FRUITS

APPLE

SCAB CAUSED BY VENTURIA INAEQUALIS (CKE.) ADERH.

In 1927 apple scab was very severe in all or nearly all of the states bordering on the Great Lakes. In general, in this region reports of collaborators indicate that the disease was more destructive than it has been in a number of years. Scab also caused heavy losses in Maine, Kentucky, New Jersey, Tennessee, and North Dakota. In the Southern States and in the Pacific Northwest there was in general less scab than usual. Table 25 shows the importance of scab in 1927 as compared with last year and the average year.

In the northern apple belt, and especially in the Great Lakes region, much of the first infection took place very early in the season, in most cases in the "delayed dormant," "prepink," or "pink" stages of host development.

Apple - Scab

Table 25. Prevalence of apple scab in 1927 as compared with the average year and with 1926, as reported by collaborators.

Prevalence compared with average				Prevalence compared with 1926			
Much more	More	Same	Less	Much more	More	Same	Less
Ky.	Mass.	N. J.	Va.	Pa.	Mass.	Del.	Va.
Ark.	Conn.	Del.	N. C.	Ky.	Conn.	Ga.	N. C.
Ind.	N. Y.°	Md.	Iowa	Tenn.	N. Y.°	Colo.	Mo.
Mich.	Pa.	W. Va.	Mo.	Ark.	N. J.	Wash.	S. D.
Wis.	Tenn.	Ga.	S. D.	Ill.	Md.		Oreg*
N. D.	Ill.	Colo.	Oreg.	Ind.	W. Va.		
Neb.	Kans.	Wash.		Mich.	Iowa		
				Wis.	Kans.		
				Minn.			
				N. D.			
				Neb.			

°Much more to more. *Much less.

Cool weather and prolonged rains were more common than usual over this area during the early spring, leading to a heavy infection from ascospores and later in some cases to a heavier conidial infection. An outstanding feature of this attack was the heavy leaf infection of a type in which the scab fungus grew profusely over the leaf surface. This phase led to considerable defoliation in orchards in several states. The following remarks regarding leaf injury are selected from reports of collaborators:

> Maine: Injury is (September 15) unusually severe causing defoliation and fruit dropping in the more susceptible varieties. (Folsom)
>
> New York (Onondaga Co.): Scab infection is (July 11) severe on the foliage in most sections of the county. (Ward)
> (Greene Co.): Infection is (June 13) severe on the leaves in unsprayed orchards. (A. S. Mills)
>
> West Virginia: While the fruit was kept clean, scab developed later to a considerable extent on leaves, becoming especially severe in sectionswhere fruit had been killed by low temperatures. (Sherwood)
>
> Arkansas: The crop was light and fruit injury was not serious but there was much leaf injury. (Young)
>
> Illinois: Seems to be so severe in many orchards that serious injury is being done to leaves where spraying is practiced. Continuous rains made it impossible to control the disease early in the season. As a result the diffused type of scab has developed over the entire surfaces of the leaves and when the sprays are applied killing of the leaf tissue results. (Anderson)

Apple - Scab

Michigan: There was much injury from leaf infection, Some unsprayed orchards were practically defoliated by the middle of the summer. In many sprayed orchards the reduction in leaf area, due to scab and spray burn which followed, amounted to as much as 50 per cent. (Bennett)

Wisconsin: By far the most striking disease of the season. Many trees are half defoliated now (July 1). (Vaughan)

Minnesota: A diffused type of scab was common on Florence Crab. Some trees were nearly defoliated. (Sect. Pl. Path.)

Idaho: Found only in northern Idaho, usually most severe in Kootenai County. (Hungerford)

Other reports, especially from the Middle West States, indicate heavy infestations. New York reports the heaviest loss since 1922. In Indiana the worst attack of scab in the last five years was experienced, according to Gardner. In Michigan, Bennett states that scab was more destructive this year than during any season of the last ten years. In Wisconsin, Vaughan says that it was the outstanding disease of the year. In Minnesota although late in starting, it "caused more damage than at any time during the last three years" according to the Department of Plant Pathology. States in which scab was of little or no importance include North Carolina, South Carolina, Georgia, Oregon, and Washington. There was a very light infection in North Carolina, according to Poole, who suggests unusually early ascospore discharge and warm spring weather as possible causes, as follows:

"It is interesting to record here that scab was not found on the leaves of any variety this year. One diseased apple each was found on Florence Crab and Winesap. Whether or not the emergence of spores was earlier than the foliage is not known but it seems possible in view of the fact that emergence occurred much earlier in Northern States than in normal seasons. While spraying could have prevented some infection it could not have given such complete control as existed. It may have been a case of unfavorable temperatures for infection since the past spring was more or less warm in comparison with the average season."

In South Carolina there were no reports of scab, and in Oregon Zeller states that there was less than usual. In Washington it was not important in commercial sections.

Estimated losses are presented in table 26.

Table 26. Percentage losses from apple scab as estimated by collaborators, 1927:

Percentage loss	States reporting	Percentage loss	States reporting
20-30	New York	4	North Carolina
20	Michigan, Maine	3	Maryland
15	Wisconsin	2	Connecticut, Delaware, Minnesota, South Carolina
10	Montana		
8	Indiana, Kentucky		
		1.5	Virginia
7.5	New Jersey		
		1	Arkansas
7	Tennessee, North Dakota		
		.8	California
5	Massachusetts, Oklahoma, Iowa	.2	Oregon
		Trace	Missouri, Colorado, Illinois, West Virginia, Mississippi

Ascospore discharge and time of infection

The importance of the proper timing of the early sprays in apple scab control has led to the keeping of more or less complete records of ascospore development and discharge in a number of the more important apple producing states. Rather complete reports have been received from nine states and partial reports, involving in most cases the time of first infection, have been received from a number of others. One of the important features of the behavior of the scab fungus was the early maturing of ascospores in a number of places. In Maine, Illinois, and Wisconsin ascospores were mature several days before there was any evidence of growth in the host, and in Maine and Wisconsin the first ascospore discharge occurred before susceptible host parts were exposed. In North Carolina, Poole states that ascospores "probably emerged too early to seriously affect the crop." Barss, in a letter dated April 23, states:

> "The beginning of ascospore discharge occurs so early under Oregon conditions that spores are in the air every rainy spell long before the winter buds on the trees begin to break. No check is made as a rule on the date of earliest spore maturity. Desiring some cultures the other day (about April 15) leaves were obtained and spores were discharged at once. (Apples are mostly two weeks from bloom yet.)"

Table 27. Data on time of ascospore maturity, discharge and infection, and on host development and time of first appearance of disease, as reported by collaborators, 1927.

Place	Time of observation of first mature ascospores	Time of first ascospore discharge	Stage of host at time of first ascospore discharge	Time of first infection	Stage of host at time of first infection	Time of first observed occurrence of disease
Monmouth Co., Me.	April 17	April 22	Previous to delayed dormant	Probably April 22		May 31
Middlesex Co., Mass.	April 30	May 4-5	Pink	Probably May 4-5	Pink	June 15
New Haven, Conn.	May 3	May 9-10	Early bloom	May 9-10	Early bloom	May 17
Bridgeton, N.J.	March 23*	April 9				May 10
State College, Pa.	April 14	April 21	Early pink to pink	April 21	Early pink to pink	May 13 (1)
Caroline Co., Md.	April 5	April 5	Pre-pink	April 5	Pre-pink	May 3
Winchester, Va.	March 31	April 1-2-3	Pre-pink	May 7-8	Petal fall	May 16
Urbana, Ill.	March 19	March 20-21	Dormant			April 16
Fennville, Mich.	April 1	April 19	Early pre-pink	April 19	Early pre-pink	May 5
Madison, Wis.	March 11	April 5	(2) Buds swelling	April 19-21	Late delayed dormant	May 9
Stungeon Bay, Wis.	April 3	April 16	Early green tip	May 9-10	Medium closed cluster	May 25

*Atlantic Co. (1) Snyder Co. (2) No leaf or sepal parts exposed.

Records of ascospore discharge in Massachusetts over a period of seven years are supplied by Osmun, Doran, and Guba as follows:

1921	- First discharge of ascospores (Middlesex Co.)	- April 26
1922	- " " " " "	- May 2
1923	- " " " " "	- May 2
1924	- " " " " "	- May 3
1925	- " " " " "	- April 30
1926	- " " " " "	- May 3
1927	- Mature spores in asci (Hampshire Co.)	- April 22
1927	- " " " " (Middlesex Co.)	- April 30
1927	- First discharge of ascospores (Hampshire Co.)	- April 23

In table 27 are compiled the data on ascospore maturity, discharge, and infection together with data on host development and time of first observation of disease, as reported by collaborators in states in which records were kept and made available.

Factors in perithecial development

Detailed studies on the factors of importance in perithecial development have been continued at the University of Wisconsin. Wilson (10) states that in 1926 and 1927, "ascospores matured earlier in leaves which were placed on the ground in September than those similarly placed later in the autumn. The delay in maturation did not, however, correspond to the delay in leaf fall, as a delay in leaf fall was followed by a shortening in the time between leaf fall and maturation of ascospores." The most interesting result of Wilson's work, however, has to do with the finding that perithecia seem to be formed only in lesions or near the margins of lesions. Regarding this he states:

> "The type and abundance of leaf lesions appeared to bear a direct relationship to the quantity of perithecia produced. No evidence was found that perithecia were produced at points remote from lesions or that the fungus spread to uninfected leaves and there produced perithecia."

Varietal susceptibility

The severe attack of apple scab over a large proportion of the apple belt of the eastern part of the United States in 1927 afforded unusual opportunities for observation on the behavior of varieties under extremely favorable conditions for infection. Several collaborators have supplied information on this question. Their data are tabulated in table 28. Extreme susceptibility of foliage was noted in the case of the Florence Crab in Minnesota, the McIntosh in Wisconsin, and the Winter Banana in Michigan. It will be noted that there is much difference of opinion regarding the susceptibility of Grimes Golden. Schneiderhan says regarding this variety:

> "Grimes Golden is usually considered to be one of the most scab resistant varieties grown in this section, yet, we have found numerous apples infected by scab. Grimes foliage also is very resistant to scab infection but this year it is heavily infected. This is noteworthy because such

susceptible varieties like Stayman, Roma, and Winesap are only slightly infected. It would seem as an offhand observation, that in abnormally cool, wet seasons, Grimes Golden is particularly disposed to scab infection."

Table 28. Data on varietal susceptibility of apple to scab as compiled from collaborators' reports, 1927.

Varieties very susceptible	Varieties susceptible	Varieties resistant	Varieties very resistant
McIntosh (1)(5) (7)(8)	Rome (1)	Grimes Golden (5)	Grimes Golden (2)
Stayman (1)	Smith Cider (1)	Rhode Island Greening (5)	Northwestern Greening (8)
Paragon (1)	Grimes Golden (1)	Northwestern Greening (5)	
Winesap (2)	Ben Davis (2)		
Rome Beauty (2)	York (2)		
Stayman (2)	Delicious (3)(8)		
Delicious (2)	Winesap group of varieties (3)		
Yates (4)	Wagener (5)		
Snow (5)(6)			
Winter Banana (5)			
Florence Crab (8)			
Virginia Crab (8)			
Red June (9)			

Numerals indicate the collaborator and state from which data were received as follows:

(1) W. H. Martin - New Jersey
(2) F. J. Schneiderhan - Virginia
(3) W. W. Magill - Kentucky
(4) C. H. Alden and O. C. Boyd - Georgia
(5) C. W. Bennett - Michigan
(6) P. W. Miller - Wisconsin
(7) R. E. Vaughan - Wisconsin
(8) Section of Plant Pathology - Minnesota
(9) M. W. Gardner - Indiana

Control

In the Great Lakes region the early sprays, delayed dormant, pre-pink, and pink sprays, were more important than usual. This was also true for several eastern states. In Iowa infection came later and sprays in the calyx and ten days later gave good results according to Archer. Other remarks by collaborators follow:

New York (Ulster Co.): There was serious apple scab infection in many orchards, particularly where the delayed dormant and pink sprays were not thorough or were omitted or where oil was used without a fungicide. In one McIntosh orchard that received oil-lime sulphur in the delayed dormant and three timely dust applications, about 95 per cent of the leaves are (June 13) badly scabbed and about 60 per cent of the fruits are affected. (Boyce)

Maryland: Growers on the eastern shore were warned to spray before trees reached the pink stage, otherwise scab would have been much worse. (Jehle)

Wisconsin: Dusts were not so effective as wet sprays. Most growers used liquid lime-sulphur. Additional sprays between prepink and pink gave increased control. Due to the cool season development was slow. (Vaughan)

Indiana: Sulphur dust failed to control in an experimental orchard. (Gardner)

Hamilton and Keitt (4) report on control of scab by various fungicides applied at different intervals before and after inoculation. The materials used controlled the disease excellently when applied within 24 hours before inoculation, but there was considerable difference in effectiveness when fungicides were applied after inoculation.

Experiments on the fall application of fungicides in relation to control of apple scab were continued in Wisconsin by Keitt and Wilson (6). They report that, "Marked reduction in perithecial development followed the use of calcium arsenate and Paris green, respectively, each in various combinations with other materials. In certain cases the treated leaves developed less than 10 per cent as many perithecia as untreated. Calcium arsenate unless modified by adding appropriate materials caused considerable host injury." Silico-fluorides and chlorophenol mercury are said to have been less effective.

Recent literature

1. Ballou, F. H., and I. P. Lewis. Standard and dilute sprays in apple scab prevention. Amer. Fruit Grow. Mag. 47 (3): 28-29. Mar. 1927.

2. Brown, E. Effect of shade on apple scab. Gard. Chron. III, 81: 305-306. Apr. 30, 1927.

3. Dutton, W. C. Notes on some of the newer spray materials. Quart. Bul. Michigan Agr. Exp. Sta. 9: 117-120. 1927.

4. Hamilton, J. M., and G. W. Keitt. Certain sulphur fungicides in the control of apple scab. (Abstract) Phytopath. 18: 146. 1928.

5. Hockey, J. F. Apple scab. Canada Dept. Agr. Pamph. 82: 7 pp. 1927.

6. Keitt, G. W., and E. E. Wilson. Fall applications of fungicides in relation to apple scab control. (Abstract) Phytopath. 18: 146. 1928.

7. Laubert, R. Altes und Neues über das Apfel- und Birnen-Fusicladium und seine Bekämpfung. Obst. u. Gemüseb. 73: 84-85. Mar. 24, 1927.

8. Martin, W. H., and E. S. Clark. Apple scab studies. New Jersey Exp. Stat. Ann. Rep. 47: 332-334. 1927.

9. Whetzel, H. H. Apple scab. Proc. New Jersey Hort. Soc. 52: 175-184. 1927.

10. Wilson, E. E. Factors important in the development of perithecia of Venturia inaequalis. (Abstract) Phytopath. 18: 145. 1928.

11. Young, H. C., and C. May. The timing of apple scab sprays. Ohio Agr. Exp. Stat. Bul. 403: 28 pp. Mar. 1927.

BLOTCH CAUSED BY PHYLLOSTICTA SOLITARIA ELL. & EV.

The reports on apple blotch, received from 26 states during 1927, indicate a considerable variation in severity of the attacks of this disease in different states. In the Eastern States conditions were apparently unfavorable for abundant development. Infestations lighter than usual were reported from Pennsylvania and Virginia. Schneiderhan attributes the light infestation in Virginia to insufficient moisture for spore emission early in the season and to unusually cool weather during the growing season. The most severe attacks were reported from Illinois, Indiana, Arkansas, and Kansas, all of these states reporting more blotch than usual. In Illinois all of the fruit in some orchards was affected, according to Anderson. In Indiana, Gardner (3) states:

> "Blotch has been a serious disease this year also, due to the rainy season early in the year. Fruit not properly sprayed certainly showed the ravages of this disease."

Young in Arkansas states that although there was more blotch than usual it was difficult to estimate losses on account of the light apple crop. Losses reported are shown in table 29.

The following reports indicate the degree of severity in some of the states which did not have general infestation:

> North Carolina: Very severe on Limbertwig at North Wilkesboro. The heavy setting of fruit on some trees was entirely and severely diseased. (Poole)

> Texas: Fairly prevalent and important. (Taubenhaus)

> Missouri: Blotch was very severe in the southern part of the state but about as usual in the central and northern portions. The loss for the entire state is not high but may

Apple - Blotch

Table 29. Percentage losses from apple blotch as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
20	Oklahoma	1	Maryland, Arkansas, Texas
5	Tennessee, Illinois, Missouri, Kansas	.3	New Jersey
3.5	North Carolina	Trace	Delaware, Wisconsin, Iowa, Virginia, West Virginia
3	Kentucky, Indiana		
2	Mississippi		

reach 15 to 20 per cent in individual orchards where no attempt has been made to control the disease. (Scott)

Isolated occurrences of blotch in sections outside of the area in which this disease is common were reported in two instances. Thomas in New York states:

"On cankered seedlings planted May 1924 there was some spread from old cankers. Only occasional new cankers have been formed and none were found which seemed to have been produced in 1927."

Blotch was also found on Northwestern Greening in Fayette and Calhoun Counties in the northern half of Iowa. Archer points out that the reports extend considerably the known distribution of blotch in that state.

Kohl (4) in Indiana has contributed evidence showing that the cycle of infection is at least two years.

Data on spore emission and periods of infection for 1927 are very meager, comprehensive records being available from only two states. Kohl (4) reported on periods of infection in Indiana as follows:

"By the use of potted trees it was found that infection at Lafayette, Indiana, occurred during 18 out of 27 rain periods between 3 days and 7 weeks after petal fall (May 7). At Mitchell, Indiana, in 1927 infection occurred during 15 out of 17 rain periods between 5 days and 6 weeks after petal fall (April 25)."

Schneiderhan in Virginia compared spore emission records of 1926 with those of 1927 as follows:

Apple - Blotch

"In regard to the blotch spore emissions, I find that in 1926 we recorded 9 between May 19 and July 10, the individual dates of these emissions being May 19, June 5, 12, 13, 15, 23, July 4, 5, and 10. Compared with this record we find that in 1927 there were only 7 emissions between May 10 and June 12, the dates being May 10, 14, 18, 25, and 29, June 3, 4, and 12."

Varietal susceptibility

So far as reports would permit varieties are arranged in table 30 in order of their susceptibility to blotch as classified by collaborators. Some of the information could not readily be tabulated in this way and such reports are given by states as follows:

North Carolina: In the College orchard, blotch was severe on Yates, Rome Beauty, Bonum, Terry, Shockley, San Jacinto, Helm, and Black Ben Davis. The fruit on the San Jacinto was badly infected and rotting. The large limbs on the susceptible varieties were badly blotched, being rough and having a burnt appearance. The Black Ben Davis was an exception, for the limbs and trunk of the tree were healthy, while the younger twigs and limbs were severely blotched. Stayman, Winesap, Delicious, King Crab, Williams, Hudson, Red June, Arkansas, and York Imperial were not attacked, nor were there any signs of old blotch cankers on these trees. All other varieties showed moderate to light infection. (Poole)

New Jersey: Slight infection on Duchess, severe on Smith Cider. (Martin)

Pennsylvania: Only on Smith Cider and Krauser. (Thurston)

Illinois: Very abundant in some orchards on Yellow Transparent, a variety which usually shows no blotch. (Anderson)

Table 30. Comparative susceptibility of apple varieties to blotch as reported by collaborators, 1927.

Very susceptible	Susceptible	Resistant	Very resistant
Northwestern Greening (1)(4)	Rome Beauty (1)	Wealthy (5)	York Imperial (4)
Smith Cider (1)(2)	Ben Davis (1)(4)		Stayman (4)
Limbertwig (4)	Golden Winesap (2)		Winesap (4)
Duchess (5)	Duchess (3)		Rome Beauty (4)
Ben Davis (5)	Maiden Blush (5)		

Numerals indicate states and collaborators from which data were received, as follows:

Apple - Blotch

(1) E. C. Sherwood - West Virginia
(2) M. W. Gardner - Indiana
(3) W. H. Martin - New Jersey
(4) F. J. Schneiderhan - Virginia
(5) H. W. Anderson - Illinois

Recent literature

1. Ballou, F. H., and I. F. Lewis. Spraying for prevention of apple blotch and apple scab. Ohio Agr. Exp. Sta. Bul. 413: 32 pp. Oct. 1927.

2. ------------------------------. Dilute versus standard sprays for apple blotch. Amer. Fruit Grow. Mag. 47 (2): 4, 18, 43. Feb. 1927.

3. Gardner, M. W. Apple blotch canker eradication. Phytopath. 17: 185-188. 1927.

4. Kohl, E. J. The cycle of infection in apple blotch. (Abstract) Phytopath. 18: 145. 1928.

5. Martin, W. H. Apple blotch studies. Ann. Rep. New Jersey Agr. Exp. Sta. 47: 329-332. 1927.

6. Schneiderhan, F. J. Recent developments in the control of fruit diseases. Proc. Virginia State Hort. Soc. 31: 145-157. Feb. 1927.

CEDAR RUST CAUSED BY GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE SCHW.

In 1927 there was apparently about the usual amount of cedar rust in the eastern half of the United States. Five states, Pennsylvania, Virginia, South Dakota, Nebraska, and Kansas, reported more and Minnesota much more than in the average year. Iowa and Indiana reported less, New Jersey, West Virginia, North Carolina and Minnesota reported severe leaf infection.

New Jersey: In Essex County, in one orchard, the apple trees were completely defoliated on the side towards a stand of cedars. (Martin)

West Virginia: Rather serious infection of leaves where cedars were near orchards. Some infection on the fruit. (Sherwood)

Apple - Cedar Rust

North Carolina: Rust was more severe this year than last. In the eastern part of the state, as in the Piedmont, leaf infection was abundant this year. In some cases the fruit was badly diseased. (Poole)

Minnesota: This year Wealthy trees near cedars, especially those to the southwest of cedars, were defoliated completely. (Sect. Pl. Path.)

In Green County, New York, A. S. Mills estimates that a 5 per cent loss was caused in the case of the Wealthy, and in Orange County a 15 per cent loss was caused in some orchards of the same variety, according to Blauvelt. In the Hudson River valley of New York, Thomas and W. D. Mills observed a peculiar pitting and malformation of McIntosh believed to be caused by rust infection. (See Pl. Dis. Reptr. 11 (9): 107-108. 1927). The loss to the McIntosh variety in some orchards from this type of injury amounted to 10 per cent and in a few instances to as much as 50 per cent. Thomas states that this pitting on McIntosh is probably identical with that described in 1924 by Gardner (1) as occurring on Rome Beauty.

Loss estimates are given in table 31.

Table 31. Percentage losses from cedar rust on apple as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
4	Virginia	.5	Maryland, Tennessee, Mississippi
3	North Carolina		
1	Connecticut, South Carolina, Illinois, Minnesota, Arkansas	Trace	Massachusetts, New York, New Jersey, West Virginia, Michigan, Wisconsin, Iowa, Missouri, Kentucky

In Virginia, according to Schneiderhan, cedar rust was favored by cool weather and abundant rainfall early in the season. These conditions were responsible for an extended period of sporidial infection. In relation to liberation of sporidia in 1926 and 1927 Schneiderhan makes the following comparison:

> "In regard to the cedar rust emission, the 1926 record shows that between April 11 and July 4, ten emissions occurred, the dates being April 11 and 31, May 16 and 19, June 5, 12, 13, 15 and 23, July 4. In 1927 we recorded thirteen emissions between April 9 and June 12, the dates of the various emissions being April 9, 21, 29 and 30, May 7, 8, 10, 14, 18, 25 and 29, June 3, 4, and 12."

Apple - Cedar Rust

Poole, in North Carolina, tells of a general and uniform leaf infection on susceptible varieties in an orchard near Raleigh from "cedar apples" a mile away although the cedar trees in question had only from 1 to 5 "cedar apples" each. Regarding infection in other parts of the state he says:

> "There was a heavy emergence of spores about May 6 in the vicinity of Charlotte, Greensboro and Davidson. The emergence of spores began early in the vicinity of Raleigh. Some were escaping the latter part of March and others during April. Infection of apple leaves in the orchard at Raleigh was observed the latter part of April."

Anderson states that there was a general scarcity of "cedar apples" in Illinois due to previous dry seasons.

Varietal susceptibility

A part of the data on varietal resistance is compiled in table 32. The wide differences in classification of some varieties as to resistance, as in the case of Duchess, which is reported as both very resistant and very susceptible, suggests a considerable variation in host or fungus, or both, in different situations.

Table 32. Data on varietal susceptibility of apple to cedar rust as compiled from reports of collaborators, 1927.

Very susceptible	Susceptible	Resistant	Very resistant
Duchess (4)	Wealthy (1)	Brett (7)	Stayman (4)
York Imperial (4)(5)	McIntosh (1)		Grimes Golden (5)
Rome Beauty (4) (5)	Twenty Ounce (1)		Winesap (5)
Winter Banana (5)	Winter Banana (1)(2)		Northwestern Greening (7)
Wealthy (7)(8)	Grimes Golden (2)		Duchess (7)
Bechtel's Flowering Crab (7)(8)	Rome Beauty (3)(6)		Delicious (7)
	Early Ripe (3)		Patten Greening (7)
	Winesap (4)		Golden Delicious
	Delicious (4)		
	Ben Davis (5)		
	Benoni (6)		
	Jonathan (6) (7)		
	Scott Winter (7)		

Numerals indicate states and collaborators from which data was received as follows:

Apple - Cedar Rust

(1) Charles Chupp - New York
(2) W. H. Martin - New Jersey
(3) J. F. Adams - Delaware
(4) F. J. Schneiderhan - Virginia
(5) E. C. Sherwood - West Virginia
(6) M. W. Gardner - Indiana
(7) Section of Plant Pathology - Minnesota
(8) W. A. Archer - Iowa

The following report of conditions in the College orchard was received from Poole of North Carolina:

> "Rust was severe on the leaves of Bonum, King Crab, Summer Banana, Red June, and Shockley. It was found on the fruit of Red June, King Crab, and Shockley. It was not found on Stayman, Winesap, Delicious, Rome Beauty, Yates, Florence Crab, Williams, Hudson, Arkansas, Terry or Black Ben Davis."

Archer states that in Iowa the leaves of the wild crab, Malus ioensis, were severely attacked, hypertrophied twigs also occasionally being produced. Young (3) has recently published on the extreme susceptibility of the variety Ada Red to twig infection in Arkansas. He states that cankers formed on the wood of one year old whips led to the breaking of the stems at or near the point of infection.

Recent literature

1. Gardner, M. W. Indiana plant diseases 1924. Proc. Indiana Acad. Sci. 35: 237-257. 1925.

2. Stakman, E. C. The control of apple rust. Minnesota Hort. 55: 234-238. Oct. 1927.

3. Young, V. H. Varietal susceptibility of Ada Red and certain other apple varieties to cedar rust, with special reference to twig infections. Phytopath. 17: 541-543. 1927.

BLACK ROT CAUSED BY PHYSALOSPORA MALORUM (PK.) SHEAR

Black rot in 1927 was more severe than usual in six states, Connecticut, North Carolina, Michigan, Arkansas, Nebraska, and Kansas, but of these states only North Carolina and Arkansas reported appreciable losses. Dry weather during midsummer held the disease in check in Virginia, West Virginia, Tennessee, and Iowa. Fall rains produced favorable conditions for fruit infection in Virginia, Indiana, and Michigan and considerable rotting of wind-falls and of fruit in storage occurred in these states. Poole in North Carolina reported the abundant occurrence of the perfect stage of the black rot fungus in an orchard at Raleigh during the fall of 1926. Leaf injury was severe in Arkansas where leaf spot was associated with spray injury resulting in considerable defoliation according to Young. It was also severe in Pennsylvania and more prevalent than usual in a number of other states.

Black rot was not reported from Florida, South Carolina, Louisiana, Colorado, Idaho, and Washington, and Zeller states that it was extremely rare in Oregon.

The following statements of collaborators indicate the phases of the disease which were of importance in the different states and some of the factors influencing the prevalence of black rot.

Pennsylvania: Not of importance; less "frog-eye" than for several years. (Thurston)

Virginia: Severe in proportion to the severity of codling moth injury. The abnormally cool weather caused an unusually light codling moth infestation. (Schneiderhan)

West Virginia: Rather heavy infection on leaves but not severe on the fruit. (Sherwood)

North Carolina: The canker form was severe in orchards of young trees in Lee County. The development of the perfect and imperfect stages of the causal fungus on limbs killed by fire blight is a very important aid to the overwintering of the fungus in many orchards in this state. (Poole)

Arkansas: Frog-eye leaf spot was worse than for many years. The crop was very light but the foliage was affected and a high percentage destroyed on some susceptible varieties. Next year's crop will be affected. (Young)

Indiana: Leaf spot severe on Rome Beauty, Jonathan, and Wealthy. It was worse on Rome Beauty than on the other Varieties. (Gardner)

Illinois: Mostly on wormy, injured or fallen fruit. (Stout)

Michigan: The usual number of cankers was present in neglected orchards and in those which had been affected by fire blight. Black rot was more common on stored fruit than it has been for several years. In some storehouses it was almost equal to blue mold in the amount of injury produced. (Bennett)

Wisconsin: Not seen or reported. It was probably present in Racine County as in other years. (Vaughan)

Minnesota: Mostly present as bark cankers. It develops on apples, especially windfalls, when they are kept in warm storage. It frequently causes frog-eye on Hibernal. (Sect. Pl. Path.)

Apple - Black Rot

Iowa: Of slight importance, in part due to the failure of the apple crop. Slight to moderate leaf infection observed generally. In Keokuk County a very severe infection occurred in some varieties. (Archer)

Missouri: Does not seem to be severe in well managed orchards. It is always present in old orchards, particularly the frog-eye phase. Some rotted fruits were brought in this season. (Scott)

Kansas: Considerable leaf infection. (Elmer)

Loss estimates are given in table 33.

Table 33. Percentage losses from black rot of apple as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Oklahoma	.5	Indiana
5	Maryland, Arkansas	Trace	Maine, Massachusetts, New York, New Jersey, Delaware, Minnesota, Iowa, Missouri, Kentucky, Mississippi, West Virginia
2.5	North Carolina		
2	Connecticut, Tennessee		
1	Virginia, Illinois, Michigan		

Several reports of early occurrence of black rot in 1927 were received. These with other data are presented in the accompanying table 34.

Table 34. Dates and places of first observation of black rot on apple as reported by collaborators, 1927.

Date	Place	County	State
April 20	-----	Alcorn	Mississippi
May 10	-----	Calvert	Maryland
May 11	Dover	Kent	Delaware
May 15	New Bedford	Middlesex	New Jersey
May 26	Lafayette	Tippecanoe	Indiana
June 17	Marion	Tolland	Connecticut
June 20	-----	Ulster	New York
July 7	Winchester	Frederick	Virginia
July 11	Hardin	Calhoun	Illinois

The Ben Davis is generally considered to be one of the varieties most susceptible to black rot. It is again reported to be very susceptible by Schneiderhan in Virginia, and Young in Arkansas where its close relative the Gano is said to be equally susceptible. Schneiderhan lists Stayman and Rome Beauty as susceptible and York Imperial as very resistant. Martin in New Jersey observed black rot on Red Astrachan, Rome Beauty, Maiden Blush, Ben Davis, Twenty Ounce, Smith Cider, Winesap, Starr, and Red June.

Poole in North Carolina from observations on black rot made in the College orchard at Raleigh has the following report regarding varietal susceptibility, susceptibility of different host parts, and factors, especially fire blight, which influence occurrence of disease.

> "This disease occurs severely on the twigs of some trees which show no signs of frog-eye, and in some cases where there is no twig infection the leaves are badly infected, possibly from infected twigs on adjacent trees. For example, the Yates variety shows heavy infection of the twigs, but no frog-eye of the leaf. The Florence Crab, York, Helm, and San Jacinto show the same condition. On the other hand, the Shockley and Ben Davis show no twig infection but severe frog-eye. Stayman, Winesap, Delicious, King Crab, Summer Banana, Winter Banana and Hudson were not attacked. In nearly every case these varieties were resistant to fire blight. There is another point here worth mentioning, and that is the source of leaf infection. In every case where this occurred the inoculum came from the infected twigs on trees which were badly blighted. There was a slight infection of apples which had fallen to the ground but only occasionally was an infected apple seen on the tree."

Gardner reports control of the leaf phase of black rot on Duchess in Indiana with the Bordeaux mixture sprays which are used for blotch in that state.

Recent literature

1. Preti, G. Studio interno al cancro del melo ed allo Sphaeropsis malorum. Ann. R. Ist. Sup. Agr. Portici. III, 1: 25-41. 1926.

2. Swartout, H. Blister and black rot cankers. Missouri Agr. Exp. Sta. Bul. 248. 15 p. Mar. 1927.

BITTER ROT CAUSED BY GLOMERELLA CINGULATA (STON.) SPAULD. & SCHRENK

Collaborators' reports indicate that bitter rot was not an especially important disease in 1927. Of the more important apple states in which bitter rot is usually most severe, namely, Virginia, North Carolina, Tennessee, and Maryland, the highest reported losses were 5 per cent in Tennessee and 3.5 per cent in North Carolina. In Virginia, Schneiderhan found that the disease was three weeks later in appearing than in 1926 and was held in check during mid-season by dry weather and low temperatures. In Georgia, the temperature was favorable for rot development but the summer was exceptionally dry, and in Indiana the weather was too cold to be favorable. Loss estimates are given in table 35.

Table 35. Percentage losses from apple bitter rot as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
5	Georgia, Tennessee, Mississippi	.3	Virginia
3.5	North Carolina	Trace	Massachusetts, New Jersey, Delaware, Illinois, Missouri, Kentucky, Arkansas
1.5	Maryland		

On the overwintering of the bitter rot fungus Hurt and Schneiderhan (1) report:

> "The fungus causing bitter rot of apples overwinters on fruit mummies resulting from bitter rot infection or drying up of small apples on twigs killed by fire blight or other causes. Overwintering on twigs was first observed in 1926 and only in the Smokehouse varieties. Mummies are by far the most important means of harboring the fungus and they are seemingly the sole means in the Pippin variety."

Regarding the length of time the bitter rot fungus remains alive in mummies Schneiderhan states:

> "Last year we demonstrated that the bitter rot fungus survived in the mummies for a period of two years. Mummies of the 1924 crop which have been exposed for three years were brought into the laboratory and used for purposes of inoculation. No infection resulted after using the same technique of former years. In this instance, we conclude that the bitter rot fungus did not survive for three years."

The dates which are given for the first appearance of disease are later than usual, which would seem to constitute additional evidence that conditions for bitter rot development were less favorable than in the average year. Data on the date and place of first appearance are presented in talbe 36.

Table 36. Dates and places of first observation of bitter rot on apple as reported by collaborators, 1927.

Date	Place	County	State
July 3	Tunnel Hill	Johnson	Illinois
July 18	Winchester	Frederick	Virginia
August 6	Bridgeton	Cumberland	New Jersey
August 9	Georgetown	Sussex	Delaware
September 14	Milford	New Haven	Connecticut
November 17	Utica	Hinds	Mississippi

No varieties were indicated as being especially resistant, though several are said to be very susceptible. Blauvelt reported considerable injury to the Strawberry variety in Orange County, New York. Varieties which are considered to be very susceptible are Pippin, Smokehouse (Virginia), Ben Davis (Georgia), and Lowell (Illinois). In Georgia the Delicious, Winesap, and Stayman are susceptible but more resistant than Ben Davis and Terry. The varieties Yates and Rome Beauty are said to have a certain amount of resistance. In New Jersey the Maiden Blush is susceptible as is the King David in Delaware.

Control

Hurt and Schneiderhan (1) have found that removal of mummies is an important auxiliary measure in control of bitter rot in Virginia. As a complete control program they recommend the removal of mummies, where conditions warrant, and making two applications of 3-5-50 Bordeaux mixture, one in the five-weeks, and another in the seven-weeks, spray periods.

Recent literature

1. Hurt, R. H., and F. J. Schneiderhan. New methods of bitter rot control. Virginia Agr. Exp. Stat. Bul. 254. 22 pp. 1927.

BLIGHT CAUSED BY BACILLUS AMYLOVORUS (BURR.) TREV.

Blight is subject to variations in severity of attack, perhaps to a greater extent than most other fruit diseases. A severe outbreak one year may be followed the succeeding year by a very mild attack. Reports indicate that blight on apple was at a very low ebb over almost the entire United States during 1927. The loss estimates are apparently lower this year than for any year since estimates have been made with the possible exceptions of 1919 or 1925. The following figures indicate the estimated annual losses for the years 1918 and 1926:

Apple - Blight

1918	1919	1920	1921	1922	1923	1924	1925	1926	Average
1.5%	.69%	1.2%	1%	2.4%	2.71%	1.61%	.5%	1.3%	1.4%

A comparable estimate has not yet been made for 1927 but it seems probable from data available that the 1927 estimate will fall close to, and possibly below, those of 1919 and 1925.

In 1927, eleven states, New Jersey, South Carolina, West Virginia, New York, Pennsylvania, Kentucky, Indiana, Michigan, Iowa, Missouri, Utah, and Idaho reported less blight than usual. Only three states, Virginia, Arkansas, and Kansas indicated more. Losses are given in table 37.

Table 37. Percentage losses from blight on apple as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
6	Mississippi	.5	Connecticut, Delaware, Tennessee
5	North Dakota, Texas		
		.2	Utah
4	Maryland, North Carolina	.1	Oregon
2	Illinois, Minnesota Kansas, Arkansas, Oklahoma	Trace	Massachusetts, New York, Virginia, Iowa, Kentucky, Colorado, Idaho, West Virginia, California
1	South Carolina, Michigan, Wisconsin, Missouri, Montana		

Factors influencing the prevalence of blight

Under most conditions blossom infection is generally considered to be a necessary step for heavy twig infection. Blossom blight was much less common in the majority of states than usual, and to this in most cases is attributed the light blight infection of 1927. A number of factors are mentioned as influencing the amount of blossom and twig blight. Thomas states that "Oozing of hold-over cankers was not common" in New York and Crozier notes that in Wayne County, New York, dry weather up to July 22 checked spread of blight which had developed earlier in the season. Dry weather is considered to have been responsible for the light infestations in Wisconsin and Minnesota. Lack of exudate on hold-over cankers in Missouri is mentioned by Scott.

The role of disseminating insects in 1927 is not clear. Unfavorable weather for insect activity during the blossoming period is mentioned as a possible factor in the light infestation in Missouri and Michigan.

Anderson in Illinois states that in spite of what seemed favorable conditions for infection blossom bli ht did not develop and the twig blight which was observed later in the season was attributed in part to the spread of disease by aphids and flea beetles. Blight did not follow heavy infestation of sucking insects in New York and Michigan. Scott suggests that the light aphid infestation in Missouri may have been responsible in part at least for the scarcity of blight in that state.

Varietal susceptibility

Very little new data were supplied by collaborators on disease resistance. The crab varieties as usual are considered very susceptible. Jonathan, Northwestern Greening, Rhode Island Greening, Maiden Blush, and Willowtwig are other varieties named as very susceptible.

Control

Scott in Missouri states, "The absence of hold-over cankers of blight suggests the possibility of eliminating the disease over quite a large area in this state for several years to come by rigid application of surgical measures to trees with cankered wood." Likewise in a number of other states it would seem that 1928 would offer unusual opportunities for placing blight under control.

After several years of blight investigation in Pennsylvania, Nixon (4) states that in relation to control his results indicate the following:

"1. That where fire blight is troublesome a system of culture or fertilization restricting growth to a conservative or controlled degree may be adopted which will render the trees less susceptible to disease. Any system of culture or fertilization which stimulates excessive growth not only renders the tree more susceptible to disease but renders the attack more severe."

"2. That it is impracticable to attempt to cut out blighted twigs during the growing seasons."

"3. That it is a practical method of control to cut out hold-over cankers during the dormant period thereby removing the immediate sources of infection."

"4. That under no conditions are crab apples of any variety recommended for root stocks."

Recent literature

1. Anderson, H. W. Fire blight of apples and pears. Tree Talk 8 (2): 10-13. 1927.

2. Bryan, M. K. The flagella of Bacillus amylovorus. Phytopath. 17: 405-406. June 1927.

3. McCown, M. Fireblight. Hoosier Hort. 9: 57-62. Apr. 1927.

4. Nixon, E. L. The migration of Bacillus amylovorus in apple tissue and its effect on the host cells. Pennsylvania Agr. Exp. Sta. Bul. 212. 16 pp. Apr. 1927.

CROWN GALL CAUSED BY BACTERIUM TUMEFACIENS EFS. & TOWN.

Crown gall on apple is chiefly observed as a disease of nursery stock. Until recently this disease has undoubtedly been confused with certain types of wound overgrowths and the losses actually caused by this trouble both in the nursery and in the orchard are at present a subject of considerable speculation. Probably for these reasons collaborators are very cautious regarding their estimates of losses due to this disease.

In 1927 reports on crown and root overgrowths were received from 27 states. Loss estimates were made in only five states, Massachusetts, Maryland, Virginia, Michigan, and Missouri. In each instance loss was recorded as a trace.

The following are some of the remarks by collaborators on the prevalence and importance of crown gall. In a number of cases collaborators have evidently not distinguished between true crown gall and wound overgrowths:

Massachusetts: One horticulturist reported crown gall as prevalent in one nursery. (Doran)

Delaware: Common in light soil types and a general problem. (Adams)

Virginia: Unimportant in Virginia. (Schneiderhan)

North Carolina: Several reports were received from mountain growers. (Poole)

Mississippi: Frequently encountered on nursery stock. (Wedgworth)

Arkansas: Loss great in nurseries. Reports of 50 per cent on some varieties were common. Dipping with Semesan appears to decrease the amount of gall. (Young)

Michigan: Important in some nurseries. (Bennett)

Wisconsin: A nursery problem. From 5 to 50 per cent on the nursery stock which has been dug, but due to poor growths not many trees have been removed from the nursery rows so observations have been limited. (Vaughan)

Minnesota: From 3 to 5 per cent of the apple nursery stock discarded on account of gall. One case was reported in which all of the seedlings in a single row were galled. (Sect. Pl. Path.)

Missouri: Crown gall is fairly well under control over the state. Rigid inspection of nurseries has been responsible. Only scattered cases are observed. There is some "wound-gall" or "graft-knot" not caused by Bacterium tumefaciens. (Scott)

The following statement regarding the prevalence of crown gall and overgrowths in Wisconsin is taken from the Biennial Report for 1925-26 of the Wisconsin State Department of Agriculture:

"During both 1925 and 1926 the packing houses of the larger nurseries carrying a large line of fruit trees were visited during the early part of the winter to check up on the sorting out of crown gall. During 1925 approximately 125,000 apple, plum and pear trees were examined. There was less crown gall than usual that year and very little of it was missed by the nurseries during the sorting and less than 10 per cent was thrown out of most varieties by them and all of the trees showed remarkable growth. During 1926, however, the crown gall on apple appeared unusually severe again and some varieties such as Red Wing and Bayfield showed from 50 to 75 per cent affected. No attempt was made to determine how much was actually associated with Bacterium tumefaciens since both were recognized as making the tree equally unsalable when the tree was from one-half to two-thirds girdled by it."

Crown gall was not observed by collaborators in Connecticut, South Carolina, Florida, Louisiana, Illinois, North Dakota, Kansas, Colorado, and Washington.

Riker (3) has reported on the prevalence of wound overgrowth and crown gall in Europe. Patel (2) has recently isolated 15 non-pathogenic strains of Pseudomonas tumefaciens. He reports loss of virulence in the case of one pathogenic strain after it was kept for two years on a common laboratory medium.

Recent literature (See also references under "Non-parasitic diseases.")

1. Patel, M. K. Longevity of Pseudomonas tumefaciens Sm. & Town. in various soils. (Abstract) Phytopath. 18: 129. 1928.

2. ----------- Strains of Pseudomonas tumefaciens Sm. & Town. and their prevalence in various soils. (Abstract) Phytopath. 18: 129-130. 1928.

3. Riker, A. J. Correlation of the wound overgrowths and crown gall of apple in parts of Europe and of the United States. (Abstract) Phytopath. 18: 128. 1928.

4. ------------, W. M. Banfield, and G. W. Keitt. Studies of the history of development of wound overgrowths on apple grafts and of the influence of wrappers on their suppression. (Abstract) Phytopath. 18: 128. 1928.

BLISTER CANKER CAUSED BY NUMMULARIA DISCRETA (SCHW.) TUL.

The data on the general prevalence and importance of blister canker in 1927 are very meager, but as a whole those which are available indicate a decrease in injury caused by this disease and general success in control. Missouri reported a loss of 2 to 5 per cent; Kansas 2 per cent; and Iowa a trace.

The following statements by collaborators have been received:

Delaware: Generally found but not increasing. (Adams)

Iowa: Becoming less important than formerly because very susceptible varieties are more rarely planted. (Archer)

Missouri: Very severe in old orchards. Commercial growers are using available methods to eradicate cankers from their orchards and are having considerable success. Blister canker is widely distributed over the state, being found in nearly all home orchards. (Scott)

Nebraska: Continues to be a severe disease where careful handling of trees is not practiced. (Goss)

Recent literature

1. Swartwout, H. G. Blister and black rot cankers. Missouri Agr. Exp. Sta. Bul. 248. 15 pp. 1927.

SOOTY BLOTCH CAUSED BY GLOEODES POMIGENA (SCHW.) COLBY AND

FLYSPECK CAUSED BY LEPTOTHYRIUM POMI (MONT. & FR.) SACC.

These two diseases, often associated, have a wide distribution but are reported as causing losses in 1927 only in three states. Estimates are Virginia and North Carolina, 2 per cent, and Maryland, 0.6 per cent. In New York, sooty blotch was more common than usual in Green County according to A. S. Mills. Adams in New Jersey reports that it was common in unsprayed orchards.

Apple - Sooty Blotch and Flyspeck

In North Carolina, according to Poole, "This disease was very severe on unsprayed fruit. In the vicinity of North Wilkesboro the Willow Twig variety showed severe infestation during September." Schneiderhan in Virginia lists the York Imperial, Black Twig, and Stayman as very susceptible to blotch and states that "This disease has been increasing in importance since the arsenical residue problem has caused all spray operations to cease about July 1."

FRUIT SPOT CAUSED BY PHOMA POMI PASS.

Records of the occurrence of fruit spot in 1927 were received from only five states, Connecticut, New Jersey, New York, Delaware, and Missouri. Losses are estimated as a trace in New York and 1.3 per cent in New Jersey where Martin observed a 95 per cent infection of the fruit of one orchard. According to Martin:

> "Very little of this disease was apparent this year at the time the fruit was ripe. This is in contrast to 1926 when infection was severe several weeks before the crop was harvested. It is apparent that the time of infection varies greatly from year to year."

Varieties which are reported as susceptible are Baldwin, Jonathan, Grimes Golden, and King David.

During the past year Martin in New Jersey has obtained some very striking results from spray and dust experiments on control of this disease. The accompanying comparative data are taken from a record of results which he has supplied. In the sprayed and dusted blocks four applications, 7-, 17-, and 28-day and summer spray (July 6) were made. Copper seemed to be superior to sulphur and liquid sprays much more effective than dust. Both the copper dust and Bordeaux mixture caused considerable russetting of the fruit. Regarding control Martin states:

> "The present indications are that sulphur will not control this disease. In one orchard which was thoroughly sprayed with commercial lime-sulphur, the growers harvested and stored a perfect crop. However, when the fruit was removed from storage approximately 95 per cent showed infection."

Table 38. Fruit spot control experiments in 1927 in New Jersey as reported by W. H. Martin.

Fungicidal material used	Percentage fruit spot		
	Clean	Slight	Severe
Lime sulphur 1-40	46.7	50.8	2.5
Bordeaux mixture 2-6-50	100	0	0
Kolo dust	30.2	58.2	11.1
Copper dust	37.4	51.3	11.3
Unsprayed	8	71.6	20.4

BITTER PIT, NON-PARASITIC

In general bitter pit apparently caused only a small amount of loss in 1927, in spite of the uneven distribution of rainfall reported in a number of states. The largest loss estimate is 2 per cent, recorded from Virginia and California. In Virginia, Schneiderhan found the York Imperial, Black Twig, and King David varieties very susceptible and Rome Beauty very resistant. In Michigan, according to Bennett, the disease was more serious than usual causing a loss of 1 per cent chiefly on Baldwins and Northern Spy. In Ontario County, New York, according to Bullock it was present especially on Baldwin trees bearing a light crop. Thurston in Pennsylvania states that Baldwin was worse affected than usual but that other varieties had less. In Indiana, a surface type of bitter pit occurred on Rome Beauty and Grimes Golden, according to Gardner. Varieties which are considered susceptible by Martin in New Jersey are Winter Banana and Starks Delicious. Bitter pit was common on cellar-stored apples in Delaware, according to Adams. In Maryland the loss is estimated at 0.5 per cent and smaller losses occurred in Massachusetts, New Jersey, New York, and West Virginia. The disease was not observed in Connecticut, Florida, South Carolina, Louisiana, Arkansas, Wisconsin, Iowa, North Dakota, South Dakota, Colorado, and only two cases were reported in Minnesota.

Recent literature

1. Carne, W. M. A preliminary note on a theory as to the origin of bitter pit in apples. Jour. Dept. Agr. Western Australia II, 4: 382-385. Sept. 1927.

2. Wickens, Geo. W., and W. M. Carne. Bitter pit in apples. Its occurrence in store in relation to dates of picking. Jour. Dept. Agr. Western Australia II, 4: 354-357. Sept. 1927.

SPRAY INJURY

Considerable injury to foliage due in most cases to lime-sulphur applications following severe scab infection was reported from a number of states bordering on the Great Lakes. W. D. Mills observed a case of severe injury due to calcium arsenate in one orchard in New York. He states:

> "The orchard was a sorry sight. Many of the leaves were lost during winds. The grower applied 3 gallons of home-made lime-sulphur plus calcium arsenate (Kolonox) to a 200 gallon tank. Where 1 pound of calcium arsenate plus 3 pounds of lead arsenate, were used in 200 gallons of spray, the orchard looked much better."

Bullock in Ontario County, New York, noted injury due to lead arsenate applied on a hot day. Other reports were received as follows:

> New Jersey: Severe leaf injury and russetting of fruit followed sprays of Bordeaux mixture 2-4-50 and colloidal copper. Serious injury was likewise observed following the use of lime-sulphur 1-40. In one orchard where four rows were sprayed with this mixture in 1926 there was a considerable decrease in the number of blossoms in 1927. Trees sprayed with lime-sulphur 1-40, this year, in south Jersey showed serious burning of the leaves. (Martin)

> Washington: Calyx burns due to arsenic freed by rains and weathering, and after picking due to the washing process, was noted. This was first called "acid burn." (Dept. Pl. Path.)

In Virginia, colloidal lime sulphur caused considerable burning of leaves especially on Rome Beauty trees.

Literature on the removal of spray residue is included in the following list of references:

Recent literature

1. Heald, F., J. R. Neller, F. L. Overley, and H. J. Dana. Arsenical spray residue and its removal from apples. Washington Agr. Exp. Sta. Bul. 213. 55 pp., Mar. 1927.

2. Herman, F. A., and A. Kelsall. The determination of arsenical residues on apple foliage. Scient. Agr. 7: 290-291. Apr. 1927.

3. MacLeod, G. F., D. E. Haley, and R. H. Sudds. A study of arsenical residue on apples in Pennsylvania with respect to efficient spraying practices. Jour. Econ. Entom. 20: 607-614. Aug. 1927.

4. Potts, E. C. Spray tolerance regulations fixed. Better Fruit 21 (9): 7, 19. Mar. 1927.

5. Robinson, R. H., and H. Hartman. A progress report on the removal of spray residue from apples and pears. Oregon Agr. Exp. Sta. Bul. 226. 46 pp. Feb. 1927.

INJURIES DUE TO LOW TEMPERATURE

Some damage was caused by winter injury in New York, Michigan, Iowa, and Wisconsin although in general there was less than during the preceding two years.

Frost injury was general in the upper Mississippi River valley and was of some importance in other sections. The crop was very much reduced in Illinois, Missouri, Iowa, Arkansas, and New Mexico.

More or less unusual injuries were reported from Pennsylvania, and Michigan and ascribed to frost.

Pennsylvania: A heavy frost on April 23-26 and a lighter one May 28 have left traces in various plants of an injury which did not kill the tissues but distorted them, very often, apparently, through the mere formation of ice in the tissues. The earlier apple leaves have been particularly affected, but injuries were also noted in tulips, Japanese maples, Norway maples and boxwood, which were apparently due to ice formation and consequent rupture of the tissues. (McCubbin)

Michigan: Both apples and pears have shown an unusual type of blossom-killing in the southwestern parts of the state. Dead blossom clusters were noted on Wealthy trees, at the time they were in full bloom. The blossom clusters had been dead several days and had apparently been killed in the pink stage. A similar trouble was noted on Bosc pear. In one orchard approximately 90 per cent of the blossom clusters of this variety were dead and in most cases the new growth was killed back to the old wood of the spur. Other varieties were not affected. The injury has been attributed to late frosts. (Bennett)

Recent literature

1. Burkholder, C. L. Inarching against collar rot. Amer. Fruit Grow. Mag. 47 (3): 24. Mar. 1927.

2. Hildreth, A. C. Determination of hardiness in apple varieties and the relation of some factors to cold resistance. Minnesota Agr. Exp. Stat. Techn. Bull. 42. 37 pp. June 1926.

MISCELLANEOUS PARASITIC DISEASES

Cephalothecium roseum Cda., pink rot. This rot was found by Gardner in Indiana to be prevalent on Grimes Golden and Rome Beauty in the orchards of the University of Indiana at Lafayette. In most cases the rot was not following scab. It is suspected that the fungus invaded bitter pit lesions. Total loss is estimated at 0.5 per cent.

Cercospora mali Ell. & Ev., leaf spot. Reported from Texas.

Fumago sp., sooty mold. This mold which grows abundantly on honey-dew was so abundant in Connecticut that some growers contemplated spraying to kill the fungus on the fruit in order to facilitate washing off by rains. (Clinton)

Gloeosporium perennans Zeller & Childs, perennial canker. This disease was reported from Washington and caused considerable loss in Oregon. Zeller states that "This disease is the greatest limiting factor to successful apple orcharding in the Hood River Valley of Oregon. Many orchards are reduced almost to decrepitude by its ravages. Infection is tied up with wooly aphis infestation. Freezing cracks in wooly aphis spongy tissue are infection courts. Control of wooly aphis would largely prevent canker."

Glutinium macrosporium Zeller, canker. This fungus, according to Zeller (8) is a wound parasite and causes a canker of apple limbs. It produces a rot when artificially inoculated into apples.

Hypochnus sp., fruit rot. Butler (2) isolated a species of Hypochnus from fruits from various parts of the United States. It is said to have been more prevalent on fruit on the markets during the past two years than has pink rot.

Myxosporium corticolum Edg., surface bark canker. Observed by Martin in New Jersey on a number of varieties of apples.

Neofabraea malicorticis (Cordley) Jack., anthracnose. Reports of the occurrence of this disease were received from Washington and Oregon. In the latter state anthracnose combined with fruit rot caused by Gloeosporium perennans, produced a loss of 0.6 per cent according to Zeller.

Podosphaera leucotricha (Ell. & Ev.) Salm. and P. oxyacanthae (DC.) DBy., powdery mildew. A disease caused by one or the other or both of the above named organisms was reported from Connecticut, New York, New Jersey, Delaware, Virginia, West Virginia, Minnesota, Pennsylvania, Kansas, Utah, Idaho, California, and Washington. Injury was apparently much less common than usual. No mention was made of severe infestations in any of the states in which the disease occurred. A loss estimated at 0.5 per cent occurred in California.

Apple - Parasitic Diseases

Phymatotricum omnivorum (Shear) Dug, Texas root rot. This disease is said to be very important on the black lands of Texas where it is so severe that apples cannot be grown in some areas.

Phytophthora cactorum (Leb. & Cohn) Schroet., fruit rot. Gardner in Indiana found this disease on the fallen fruit and lower limbs of trees of Grimes Golden and Rome Beauty.

Septobasidium sp., canker. Reported by Neal as quite common in Mississippi.

Sporotrichum malorum Kidd & Beaumont, fruit spot. This fungus or one similar to it was reported by Gardner (4) in Indiana as causing round, slightly sunken, brown lesions on the fruit of the varieties Grimes Golden, Ben Davis and Winesap.

Recent literature

1. Childs, L. Perennial canker mysteries solved. Better Fruit 22 (3): 5-6. Sept. 1927.

2. Butler, L. F. Increasing prevalence of Hypochnus rot of apples. Phytopath. 17: 743-744. Oct. 1927.

3. Fromme, F. D. Studies of black root rot of apple. (Abstract) Phytopath. 18: 145. 1928.

4. Gardner, M. W. Sporotrichum fruit spot of apple. (Abstract) Phytopath. 18: 145. 1928.

5. Hesler, L. R. The perfect stage of Hendersonia mali. Mycologia 19: 222-227. July-Aug. 1927.

6. Nattrass, R. M. The white root rot of fruit trees caused by Rosellinia necatrix (Hart.) Berl. Jour. Bath. & West & South. Co. Soc. VI, 1: 169-175. 1927.

7. Woodward, R. C. Studies on Podosphaera leucotricha (Ell. & Ev.) Salm. Trans. Brit. Mycol. Soc. 12: 173-204. June 1927.

8. Zeller, S. M. A canker of apple and pear trees caused by Glutinium macrosporium n. sp. Jour. Agr. Res. 34: 489-496. Mar. 1, 1927.

Baldwin blotch. A. B. Burrell and W. D. Mills of New York have observed an unusual type of fruit trouble said to be confined so far to the Baldwin variety. They state:

"A peculiar disease, distinct from anything hitherto observed in New York State and possibly elsewhere, has appeared on Baldwin apples this year in western New York. In the basin of affected apples may be seen from one to five very superficial, irregular, dark green or brown blotches. Frequently one such blotch extends from each of the five natural protuberances at the blossom end of the apple, almost, but not quite to a sepal. In a few cases, the five separate blotches have coalesced, forming a ring. In some cases, not more than 8-10 cell layers are involved, and the cuticle is intact except in the later stages. The affected apples are generally but not always, unusually large specimens. The average size of all Baldwin apples in the territory was large this year.

"During a recent trip to Wayne County, eight lots of Baldwin apples were inspected. Of these, seven lots included some fruits exhibiting this peculiar blotch. In one lot about 4 per cent of the apples were affected, while in three other lots, 1 to 2 per cent were affected. No estimate of the percentage was obtained for the remaining three lots. In no case was this blotch observed on any variety other than Baldwin. Three orchards were inspected but no abnormality in the trees which bore the blotched apples was detected. The occurrence of this blossom end blotch appears not to be correlated with any particular soil type or drainage condition.

"The commercially packed fruit exhibited at the Rochester meeting of the New York State Horticultural Society was examined for this disease. Eighteen of the twenty-two barrels of Baldwin apples in the exhibit showed varying amounts of this blotch on the fruit. None of the other varieties in the exhibit were affected. Fruit showing the injury came from the following towns in western New York: Sodus, North Rose, Union Hill, and Ontario, in Wayne County; Morton, in Monroe County; Kendall, and Albion, in Orleans County. Affected fruits have also been sent in from Covert, Seneca County.

"Four things, when taken together, strongly suggest that this disease is of non-parasitic origin. They are, (1) the characteristics of the blotch, (2) the fact that it occurs so consistently in a given position on all affected apples, (3) the fact that it is restricted to variety Baldwin, and (4) the fact that no fungus has been found in association with it. Occasionally the same apple shows both this peculiar blotch and bitter pit, but such is rarely the case. Some similarity in symptoms has been noted between this blotch and drought spot (Stevens disease) which occurs on McIntosh apples in the Champlain Valley."

Chlorosis. Linford in Utah states that this is widely prevalent and one of the most serious menaces of apple culture. Taubenhaus in Texas reports chlorosis due to excess lime as common in limestone regions.

Cork, drought spot, and die-back. Early stages of cork development were observed by Burrell in New York but the disease was of very little importance. He states that die-back was observed commonly in some orchards of McIntosh and Fameuse in Clinton County, New York. Stevens disease, a type of drought spot, is estimated by Burrell to have caused a 4 per cent loss in the Champlain Valley of New York. In that section the disease was found in about the same number of trees as in 1926.

Internal browning and breakdown. In Utah, according to Linford, internal breakdown has been troublesome on stored apples, particularly on large specimens of the Jonathan variety. In Indiana, Grimes Golden was affected. Milbrath reported that internal browning caused an estimated loss of 3 per cent in California.

Jonathan spot. This disease was reported only from New Jersey, Kansas, and California. Estimated losses are 2 per cent in Kansas and 0.5 per cent in California.

King David Spot. Spotting of the King David variety was reported from Missouri and Virginia. It is not clear that the cause is the same in both cases. Scott states that only the King David is affected in Missouri. He estimates the loss at 20 per cent in the case of this particular variety. Schneiderhan, regarding the type of trouble with which he is familiar in Virginia, states:

> "Several instances of King David spot, which is the terminology adopted by some pathologists to denote good old-fashioned spray burn on King David, have come to our attention this week. This variety is particularly susceptible to spray injury and in the instances reported, the difficulty resulted from the application of lime-sulfur in warm weather."

Leaf scorch. Scorching of McIntosh leaves following a hot wind occurred in New York. According to Ludwig in South Carolina a disease similar to drouth injury, preceeded by Physalospora spot, appeared on some trees but there was no drouth period to account for the trouble.

Measles. Specimens were received from South Carolina and Mississippi. It also occurred in Indiana and California but apparently caused no serious injury.

Mosaic. The disease which has been reported as mosaic in New York is apparently becoming more common. Blodgett in New York states that "Trees showing this disease have been located in 18 orchards (1 to 20 trees per orchard) in the following counties: Ontario, Wayne, Monroe, Orleans, Sullivan, and Clinton." Stoddard in Connecticut has found a mosaic-like disease "common, especially on young trees and rapidly growing older trees. This trouble was found in 1926 but has not been reported from this state before."

Apple - Non-Parasitic Diseases

Rosette. According to Burrell, in Clinton County, New York, "Rosette, which was prevalent in 1925, was practically absent in 1926 and was only occasionally encountered in 1927."

Target canker. Roberts (7) has recently described a superficial bark canker which he first found at Arlington Farm, Virginia, in 1922. Specimens have been received by him from Kentucky and West Virginia. The disease has been observed on Jonathan, Delicious, and Grimes Golden varieties of apples and is also known to have occurred on pear trees in Georgia and Colorado. Regarding the cause Roberts states:

> "The relatively small number of cankers on the more vigorous of the Delicious and Jonathan trees, the greater prevalence of cankers on the west and north sides of trees, the frequent restriction of the cankered areas to certain limbs, which may be almost completely covered with them, and the apparent internal origin of the cankers indicate that the disease is of non-parasitic nature."

Recent literature

1. Fisher, D. F., and C. Brooks. Apple water-core theories revised. Better Fruit 22 (6): 5, 21. Dec. 1927.

2. Kidd, F., and C. West. The development of internal breakdown in cold-stored apples. Rep. Food Invest. Bd. Great Britain 1925-26: 45-47. 1927.

3. Melhus, I. E. Crown gall and graft knots of apples. Amer. Fruit Grow. Mag. 47 (3): 4, 41. Mar. 1927.

4. Melhus, I. E., J. H. Muncie, and Vernon C. Fisk. Grafting as a further means of preventing callus knots on apples. (Abstract) Phytopath. 18: 127. 1928.

5. Muncie, J. H., and W. B. Shippy. Overgrowths and hairy root on nursery apple and quince trees. (Abstract) Phytopath. 18: 127. 1928.

6. Riker, A. J., W. M. Banfield, and G. W. Keitt. Studies of the history of development of wound overgrowths on apple grafts and of the influence of wrappers on their suppression. (Abstract) Phytopath. 18: 128. 1928.

7. Roberts, J. W. "Target canker" of apples and pears. Phytopath. 17: 735-738. Oct. 1927.

8. Schneiderhan, F. J. The black walnut (Juglans nigra L.) as a cause of the death of apple trees. Phytopath. 17: 529-540. Aug. 1927.

9. Swingle, C. F. Burrknot formations in relation to the vascular system of the apple stem. Jour. Agr. Res. 34: 533-544. Mar. 15, 1927.

10. Wallace, R. H. The production of intumescences in Transparent apple by ethylene gas as affected by external and internal conditions. Bull. Torr. Club. 54: 499-542. June 1927.

PEAR

BLIGHT CAUSED BY BACILLUS AMYLOVORUS (BURR.) TREV.

In America blight has been one of the chief limiting factors in pear production and large annual losses occur as a matter of course. Loss estimates involving 50 per cent or more of the crop in some states have been made in recent years and comparatively high losses are common. Apparently losses have been much more severe in the southern states and in California than in other parts of the United States. Figure 5 shows graphically and also by means of loss estimate figures, the importance of this disease as estimated by collaborators 1921 to 1927 inclusive. Some of these estimates at first thought seem rather high but, startling as they may appear, it is possible that even these figures do not fully represent the importance of this disease in reducing yields if we take into consideration the fact that pear growing has been practically abandoned in certain areas on account of the ravages of blight.

In 1927 a severe outbreak of blight occurred in California. W. T. Horne states that this disease invaded the Sacramento Valley in the most destructive attack which has been experienced since 1904-5. The southern part of the state, however, was less severely affected. Milbrath states regarding losses in California:

> "I have been making a survey of the number of trees pulled out and the general expenditures in fighting pear blight. The figures appear rather astounding for it now looks that at least $1,000,000 losses and expenditures were sustained by the growers in this state in 1927. About 60,000 trees were pulled after having been killed by the disease."

In other parts of the United States blight on pear as well as on apple was apparently less common than usual. As would probably be expected, the same factors which operated to reduce the disease on apple have apparently served to decrease its prevalence on pear. Not including California, only three states, Delaware, Virginia, and Tennessee, reported more blight than in the average year; while Massachusetts, New Jersey, North Carolina, Florida and Michigan reported less and Kentucky and Missouri much less than usual. It will be observed by

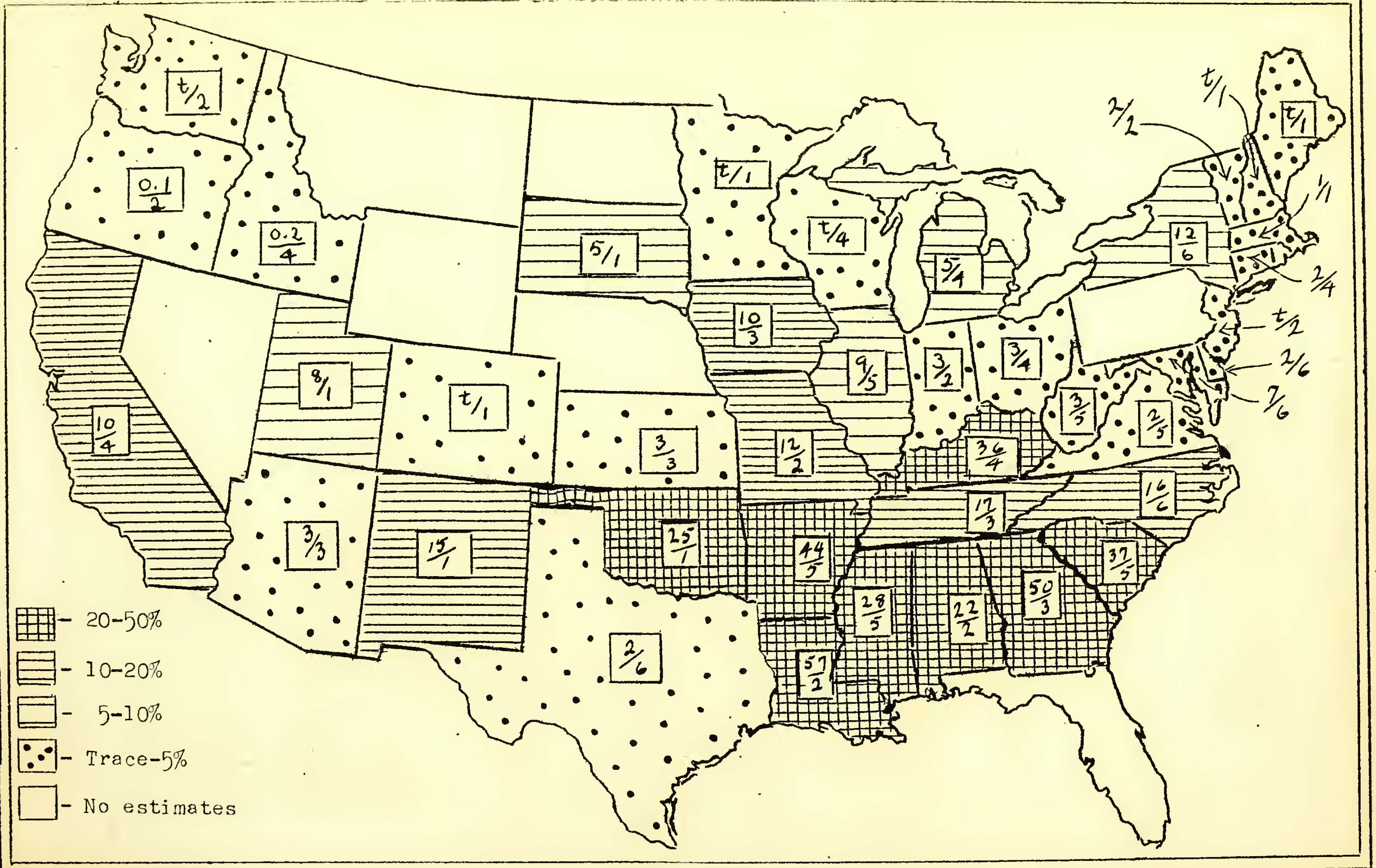

Fig. 5 Average losses from pear blight as estimated by collaborators, 1921 - 1927 inclusive The figure above the line indicates average loss estimate and the figure below the line the number of estimates from which the average was calculated.

referring to table 39 and to figure 5, that loss estimates for the eastern half of the United States were lower than for the average year although estimated losses of as high as 25 per cent of the crop in some states are recorded.

Table 39. Percentage losses from pear blight as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	Oklahoma, Tennessee	3	Michigan
15	Mississippi	2	Virginia, Texas
10	Iowa, Missouri, North Carolina, South Carolina	1.5	Connecticut, Delaware
		1	Massachusetts
8	Maryland, Utah	1-3	New York
6	Illinois	.2	Oregon
4	Kansas, California*	Trace	Wisconsin, Colorado, Idaho

*Milbrath states that this estimate is probably low.

Few reports on varietal resistance were received. Kieffer (Michigan) and the sand pear (Mississippi) are recorded as resistant, and Seckel (Virginia) and Bartlett (Michigan) are susceptible. Archer has prepared the following report from observations made in Iowa:

> "In scion orchards at Shenandoah, moderate loss occurred in Clapp's Favorite and Flemish Beauty; severe loss in Bartlett, Beurré d'Anjou, Duchess, Kieffer, Lincoln, and Worden.
>
> "In the horticultural experimental orchard at Ames considerable varietal susceptibility was noted this year on seedling trees and hybrids as follows:

None	Slight	Moderate	Severe
Chinese	Aebley	Alamo	Emil de Hiyst
Dearborn Sdlg.	Bezi de La Motte	Ames	Flemish Beauty
Fluke	Lawrence	Orlando	Howell
McElroy	Lincoln		Longworth
New Orleans			Worden Seckel
Sheldon			
Walenta #1			

Reimer (4) states:

> "...up to this time no desirable commercial varieties have been found. It is true that during recent years a few have been introduced which do not blight seriously. The most resistant among these are Lincoln, Longworth, German Sugar, Burkett, Kieffer, Old Home, Douglas and Estella. The fruit of these varieties, however, is of such poor quality that with the exception of Kieffer they have not been extensively planted. Kieffer is a hybrid between the Chinese Sand pear and Bartlett and has proved much more resistant to blight than the standard, French varieties. Under certain conditions, however, Kieffer blights vigorously and the fruit is poor in quality."

Day (2) has published on the use of zinc chloride in blight control. The blight bacteria are said to be killed by penetration of this compound from a surface covering rendering the canker harmless as a source of inoculum. In some cases, however, injury is produced in the uninfected bark. The formula for preparing the zinc chloride solution is as follows:

"Solvent:

1 gallon denatured alcohol
1 pint water
3 ounces concentrated hydrochloric acid

Solution:

1 pint above solution
1 pound dry zinc chloride

Mix the solution and the zinc chloride together in an enameled kettle and stir thoroughly until dissolved. Crush all hard lumps with the stirring stick. Keep in bottle well corked."

It is recommended that orchards be inspected once a week during the summer and the surface of each canker painted with the above mixture.

<u>Recent literature</u>

1. Day, L. H. Winter precautions against pear blight. Amer. Fruit Grow. Mag. 47:(2): 9, 43. Feb. 1927.

2. --------- Zinc chloride stays canker blight. Better Fruit. 22 (3): 9, 21. Sept., 1927.

3. --------- Additional advice on the use of zinc chloride for pear blight cankers. Blue Anchor 4 (11): 22-25. Nov. 1927.

4. Reimer, F. C. Blight resistance in pears. Fruit Belt 25 (3): 7, 24. March, 1927.

5. Thomas, H. E. Kieffer pear seedlings and fire blight resistance. Bull. Torr. Bot. Club 54: 583-585. Oct. 1927.

SCAB CAUSED BY VENTURIA PYRINA ADERH.

If the reports of the collaborators of the Plant Disease Survey during the last five years may be taken as being representative of the facts over the country as a whole, scab on pear is not a destructive disease except possibly in parts of the Pacific Coast States. The 1927 reports seem to bear out this conclusion. Even in states which suffered a heavy infection of apple scab and in which conditions for pear scab infection and development were apparently very favorable, the disease caused little damage. With the exception of a single state, Oklahoma, and the single variety, Flemish Beauty, no heavy infestations are reported. Estimated losses are, Oklahoma 20 per cent; Wisconsin 2 per cent; Maryland, Massachusetts and California 1 per cent; New York 0.5 to 1 per cent; Connecticut and Michigan 0.5 per cent; and Maine and Virginia a trace. In fourteen states pear scab was not observed nor was it even recorded as unimportant. Probably the disease did as much damage in California as anywhere.

Recent literature:

1. Milbrath, D. G., and C. E. Scott. Some diseases of the pear. Mo. Bul. Dept. Agr. Calif. 16: 445-452. 1927.

LEAF BLIGHT CAUSED BY FABRAEA MACULATA (LEV.) ATK.

In some orchards in Illinois and Maryland considerable loss was observed to be due to leaf blight. Severe fruit infection was noted in each state and 2 per cent storage loss is estimated for Maryland. Total loss estimates are Maryland 5 per cent; Oklahoma 2 per cent; Connecticut and Tennessee 1 per cent; and Massachusetts, Delaware, Illinois, Michigan and Iowa a trace.

Tennessee: Severe on Japanese varieties. (McClintock).

South Carolina: Some exotic varieties on the station farm became defoliated. Kieffer and some other varieties in another location, but near badly affected quinces, were free from this disease. (Ludwig)

Iowa: Found only in nursery rows. Observations in September indicated considerable varietal differences in susceptibility as follows:

No infection. Patten, Keiffer, Duchess Dwarf, Bartlett. Infection but no defoliation. Wilder 5 per cent; Garber 10 per cent; French 5 per cent; Clapp's Dwarf 5 per cent. Infection with defoliation. Flemish Beauty, 10 per cent and variety with name unknown, 60 per cent defoliated. (Archer)

MISCELLANEOUS DISEASES AND INJURIES

Bacterium tumefaciens EFS. and Town., crown gall. Reported from Mississippi and Michigan. A 10 per cent infection was observed in one lot of 200 nursery trees in the latter state.

Mycosphaerella sentina (Fr.) Schroet., leaf spot. An unusually severe infection was observed by Schneiderhan in Virginia. By June 9, 80 per cent of the leaves of some trees near Opequon were infected, some leaves having as many as fifty lesions. Severe local infestation and defoliation was reported from Kansas.

Nummularia discreta (Schw.) Tul., blister canker. Reported by Archer as occurring in one nursery in Iowa.

Physalospora malorum (Pk.) Shear, black rot. New York, Massachusetts.

Phytophthora cactorum (Leb. and Cohn) Schroet., rot. A species of Phytopthora believed to be P. cactorum was observed in Columbia County, New York. A slight to moderate infection in a single tree followed excessive rainfall according to Thomas. This disease was also reported from Massachusetts.

Sclerotinia cinerea (Bon.)Schroet., blossom blight. Reported from Washington.

Sphaerotheca humuli (DC.) Burr. Bender in Connecticut found a powdery mildew on pear and tentatively identified it as the above.

Bitter pit. This disease was reported from Washington. A similar trouble caused considerable loss to the Beurre d' Anjou crop in California according to Milbrath and Scott (3).

> "A peculiar condition on the fruit of Beurre d'Anjou has been rapidly increasing. The surface is rough through numerous elevations and depressions, the elevations having a wartlike appearance. Internal tissues directly under depressions are hard, white and dry, most frequently in the shape of a cone with apex pointed toward core.
>
> "In 1926, much of the d'Anjou fruit which showed raised and correspondingly depressed areas of the surface, was affected with a peculiar form of internal browning in place of the white, hard and dry tissues noted before.

In addition to the location of browned masses of tissue directly under the skin, similar masses were scattered throughout the interior of the pear."

Black end rot. In Washington, a single report of occurrence of this disease was received. Heppner (1,2) states that this disease appears in nearly every Bartlett pear growing section in California.

Chlorosis (excess of lime). Common on the black lands of Texas according to Taubenhaus. Crawford states that chlorosis is very severe in some parts of New Mexico.

Heat canker. Oregon: Fourteen per cent injury in one lot of seedlings of Chinese stock (*Pyrus ussuriensis*). *Pestalozzia hartigii* Tubeuf was associated with the cankers which appeared just above the soil line. (Zeller)

Target canker. (undet.) According to Thomas, specimens of this disease were received from Wayne County, New Jersey.

Recent literature:

1. Heppner, M. J. Study of Bartlett pear black-end undertaken in California. Science n.s. 65: 280-281. Mar. 18, 1927.

2. Heppner, M. J. Bartlett pear black-end rot investigations. Blue Anchor 4 (2): 8, 30. Feb. 1927.

3. Milbrath, D. G., and C. E. Scott. Some diseases of the pear. Mo. Bul. Dept. Agr. Calif. 16: 445-452. Aug. 1927.

QUINCE

Bacillus amylovorus (Burr.) Trev., blight. The losses reported in 1927 are, Maryland 5 per cent; New York 3 to 5 per cent; Michigan 1 per cent; and Tennessee a trace. Thurston in Pennsylvania states that due to blight, the crop in one five acre orchard was not marketable.

Fabraea maculata (Lev.) Atk., leaf blight. McClintock states that this disease is severe in Tennessee every season and practically defoliates all varieties of quinces. Regarding this disease in Iowa Archer states, "In nursery rows this year there was severe defoliation on all of the varieties grown as follows: Angers and Meech, 95 per cent, Orange 85 per cent, and Osthern 55 per cent."

Glomerella cingulata (Ston.) Spauld. and Schrenk, bitter rot. One report from Connecticut.

Gymnosporangium germinale (Schw.) Kern., rust. Serious injury was produced in one planting in Orange County, New York, according to Blauvelt.

Phoma pomi Pass., fruit spot. Stoddard states that a slight amount of injury was caused in Connecticut by this disease.

Physalospora malorum (Pk.) Shear, black rot. Reported from Connecticut.

Recent literature:

1. Wormald, H. A leaf blotch of quince trees. Ann. Rep. East Malling Res. Stat. 13 (Suppl.): 87-88. Mar. 1927. Sclerotinia cydoniae

D I S E A S E S O F S T O N E F R U I T S

P E A C H

BROWN ROT CAUSED BY SCLEROTINIA FRUCTICOLA (WINT.) REHM (S. Americana (Wormald) Norton & Ezekiel)

Conditions were favorable in 1927 for development of brown rot in greater than average amounts, in Delaware, Maryland, Pennsylvania, Illinois, Northern Georgia, and Missouri, while in New York, Michigan, and Arkansas less rot than usual occurred. Blossom blight was common in New York, Indiana, and Illinois and was severe in some parts of North Carolina and New Jersey. In the last named state practically all of the blossoms in some orchards were affected according to Martin. In New Jersey, Illinois, Indiana, and North Carolina considerable twig injury was caused by infection through blossoms and fruits.

The oriental peach moth is said to have been a serious factor in brown rot development in Pennsylvania, Maryland, and Virginia. Schneiderhan states that for the first time the Piedmont section of Virginia reports a direct correlation between oriental peach moth injury and brown rot occurrence. The curculio was an important factor in rot occurrence in Maryland, but according to Anderson this insect was less common in Illinois than usual and apparently did not markedly increase losses in that state.

The following statements regarding brown rot were received from collaborators:

Pennsylvania: Especially severe following injury from oriental peach moth. This was one of the worst years for brown rot development which we have noted. This is especially true for the northeastern part of the state. (Thurston and Nixon).

Maryland: In the eastern part of the state brown rot was very severe. Early infection followed oriental peach moth and curculio injury. This made later control difficult. (Jehle)

Peach - Brown rot

Table 40. Percentage losses from rot on peach as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
20	Missouri	4	Indiana
15	Maryland, Mississippi	3	Massachusetts, Connecticut, Delaware, South Carolina, Arkansas
12	Kentucky		
10	Oklahoma, Tennessee	2	Virginia
		1	West Virginia, Michigan, Oregon.
8	New Jersey		
7	Kansas	Trace-3	New York
6	North Carolina		

West Virginia: Dry midseason weather was unfavorable for development of disease. (Sherwood)

Kentucky: There was a drought in late summer and many of the late peaches cracked and rotted. (Valleau)

Tennessee: Severe only on a few early varieties. The small crop of late fruit was, in the better orchards, protected by spray. (McClintock)

North Carolina: This disease caused severe loss this year. Blossom infection was severe followed by favorable weather for heavy loss of fruit. Twig and limb blight from infected fruits was severe everywhere especially on unsprayed trees. (Poole)

Arkansas: Very little seen in commercial plantings. (Young).

Michigan: This disease was exceptionally rare this season. Even the early maturing varieties were not severely affected. (Bennett)

Missouri: All unsprayed plantings showed considerable brown rot this year. There was very little fruit in home orchards which did not have some brown rot. (Scott)

Peach - Brown rot

Apothecia developed in abundance in some parts of Pennsylvania according to Thurston and Nixon. Kirby also observed mature apothecia April 12th in Montgomery County, Pennsylvania. Pierce found mature apothecia in the Vincennes section of Indiana, March 22, which was twenty-three days earlier than the date of their first appearance in the same orchard in 1926.

In the majority of the larger peach producing states, brown rot was apparently satisfactorily controlled by the application of the standard sprays and dusts. Omission of certain sprays, especially the pink, permitted rot development in some cases.

Wormald (6) has published some interesting data concerning the distribution of the brown-rot fungi. His summary is as follows:

> "The present distribution of the common brown-rot fungi, so far as has been ascertained from the literature on the subject and a study of strains collected by the writer, is as follows:
>
> "*Sclerotinia fructigena*: Europe, Japan, Manchuria.
>
> "*Sclerotinia cinerea* f. *pruni*: Europe, the Pacific coast of North America, Manchuria, and (according to Takahashi) a form of *S. cinerea* occurs on various species of *Prunus* in Japan.
>
> "*Sclerotinia cinerea* f. *mali*: Great Britain and Ireland (and probably the Continent).
>
> "*Sclerotinia americana*: the United States, British North America, Australia, and New Zealand."

Recent literature:

1. Fish, S. Brown rot of peaches. Journ. Dept. Agr. Victoria. 25: 409-411. July 1927.

2. Roberts, J. W. and J. C. Dunegan. Peach brown rot and scab. U. S. Dept. Agr. Farm. Bull. 1527. 14 P. Apr. 1927.

3. Roberts, J. W., and J. C. Dunegan. Critical remarks on certain species of Sclerotinia and Monilia associated with diseases of fruits. Mycologia 19: 195-206. July - Aug. 1927

4. Snapp, O. I., C. H. Alden, J. W. Roberts, J. C. Dunegan, and J. H. Pressley. Experiments on the control of the plum curculio, brown rot, and scab, attacking the peach in Georgia. U. S. Dept. Agr. Bull. 1482. 32 P. April, 1927.

5. Tesche, W. C. Bordeaux-oil for brown rot. Pacific Rur. Press. 114: 294. Sept. 17, 1927.

6. Wormald, H. Further studies of the brown-rot fungi. II. A contribution to our knowledge of the distribution of the species of Sclerotinia causing brown-rot. Ann. Bot. 41: 287-299. Apr. 1927.

LEAF CURL CAUSED BY EXOASCUS DEFORMANS (BERK.) FCKl.

Leaf curl was unusually prevalent in 1927 over a wide range of states and was especially common throughout the states of the middle west and neighboring regions. Estimated percentage losses to the peach crop of the United States as compiled by the Plant Disease Survey since and including 1918 are:

1918	1919	1920	1921	1922	1923	1924	1925	1926	Aver.
0.4	2.21	3.0	0.6	1.6	1.2	1.47	0.5	0.6	1.2+

The estimated percentage loss in 1927 will probably approach that of the epiphytotic year of 1920. In 1927 reports of the occurrence of leaf curl were received from 32 states. Twelve of these reported more than usual and four much more than in the average year. Included in this group are the following peach producing states: California, Arkansas, New York, New Jersey, Michigan, and Ohio. Only four states, Connecticut, Delaware, Maryland, and Washington reported less than in the average year. Loss estimates for 1927 are given in table 41.

Table 41. Percentage losses from leaf curl on peach as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
7	Kentucky	1.5	Illinois
5	Michigan, New York Tennessee	1	New Jersey, Maryland, Indiana, Missouri, Mississippi.
3	Arkansas, California	.5	Oregon
2.5	North Carolina	Trace	Iowa, Colorado, Idaho.
2	Massachusetts, Virginia, Oklahoma, South Carolina,		

Instances of severe infection were recorded in Pennsylvania and Michigan where certain unsprayed orchards were completely defoliated.

Collaborators who mention control measures state without exception that leaf curl was satisfactorily controlled by the standard application of lime-sulphur, and Bordeaux mixture. A more general use of dormant oil sprays without the addition of a fungicide was responsible for considerable curl in Arkansas according to Young. Magill in Kentucky states that Bordeaux mixture and oil emulsion were satisfactory in control. In Illinois, according to Anderson, sprays of oil emulsion-copper sulphate (4 pounds copper sulphate to 50 gallons of oil emulsion) have in practically all cases controlled the disease, while oil emulsion-Bordeaux has given only moderate control. He also states that lime-sulphur applied in the fall gave control in all cases observed. Gardner states that in Indiana "Scalecide" did not control.

SCAB CAUSED BY CLADOSPORIUM CARPOPHILUM THUEM.

An abundant development of scab is reported to have occurred in 1927 in Missouri, North Carolina, and Illinois. Over the remaining part of the United States it caused about the usual amount of loss. Poole in North Carolina states: "This has been a very favorable season for peach scab throughout the state. The late fruit was completely blackened on some trees. The new wood was severely infested on seedling varieties." An infection of 52 per cent of the fruit occurred in one orchard in Illinois according to Anderson. Loss estimates are given in table 42.

Table 42. Percentage losses from scab of peach as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Missouri	.4	Virginia
3	North Carolina	Trace	Massachusetts, New York West Virginia Michigan California
2	Delaware, Maryland, Kentucky, Oklahoma.		
1	South Carolina, Tennessee. Mississippi, Arkansas		

It is well known that, as a general rule, late maturing varieties of peaches are injured more by scab than are those varieties which mature earlier in the season. Thurston notes that white varieties grown in Pennsylvania are especially susceptible. Poole in North Carolina states that the Elberta, Carmen, and Belle of Georgia varieties were injured only in a few instances.

Reports indicate that scab was readily controlled by the standard spray applications.

Recent literature:

1. Roberts, J. W. and J. C. Dunegan. Peach brown rot and scab. U. S. Dept. Agr. Farm. Bull. 1527. 14 P. Apr. 1927.

BACTERIAL SPOT CAUSED BY BACTERIUM PRUNI EFS.

In past seasons symptoms of different phases of the bacterial spot disease have probably not, in all cases, been clearly recognized and differentiated from other types of troubles such as nonparasitic leaf spot and different kinds of spray injury. Spray injury especially is quite likely to be confused with bacterial spot since symptoms are somewhat similar and in the case of each trouble severe symptoms occur more commonly on weak and poorly nourished trees.

Peach - Bacterial spot

In 1927, bacterial spot was reported from the majority of the peach producing states. Losses in yield as estimated by collaborators are: Kentucky, Kansas, and North Carolina, 4 per cent; Indiana, 2 per cent; Texas, 1 per cent; Mississippi, 1 to 2 per cent; Maryland 0.5 per cent; and Michigan, New York, and Iowa, a trace. In addition a 5 per cent loss in grade in Illinois and a 2 per cent loss in North Carolina are reported.

The following remarks indicate the degree of severity of attacks in some of the states having the heaviest reported infestations:

> New Jersey: In one orchard in Hunterdon County, approximately 25 per cent of the leaves dropped as a result of black spot attacks. (Martin)
>
> North Carolina: Severe again this year on the fruit of the Hale and Elberta varieties. More cull fruit results from this trouble in commercial districts than from any other disease. Heavy losses result from year to year. (Fant)
>
> Arkansas: Caused severe defoliation and poor coloring and weakening of trees in all parts of the state. Losses are difficult to estimate. This was the worst attack ever experienced in the state. (Young)
>
> Indiana: Early in the season, black spot caused severe defoliation. (Gardner)

Anderson states that in Illinois there was the worst outbreak ever experienced. He reports fruit infection general and records 100 per cent on the fruit in one orchard. The disease was apparently of little importance in New York, Virginia, Missouri and Michigan.

Anderson (2) reports the isolation of a bacteriophage for B. pruni from soil beneath infected peach trees.

During the past few years, sodium silico-fluoride has been tried in the control of bacterial spot in Illinois. Anderson (4) states that this material controlled the disease in 1925 and 1926 in experimental orchards. In 1926 a certain amount of leaf injury was produced and the fruit on sprayed trees was smaller than normal, had a high color, and ripened prematurely. In Ohio (1) sodium silico-fluoride with and without sulphur failed to control bacterial spot during the season 1926.

Recent literature:

1. Anon. Ohio Agr. Exp. Stat. Bul. 402:37. 1927.

2. Anderson, H. W. Bacteriophage of Bacterium pruni. (Abstract) Phytopath 18:144. 1928.

3. Anderson, H. W. Spraying for control of bacterial spot of peach. Trans. Ill. State Hort. Soc. 60: 147-154. 1927.

4. Anderson, H. W. The effect of sodium silico-fluoride sprays on the peach and on the control of bacterial spot. Sci.n.s. 65: 16-18. 1927.

YELLOWS (CAUSE UNDETERMINED)

The distribution of yellows in the United States, up to and including 1926 as indicated in Fig. 6 which was prepared by W. A. Archer, is based on data which Archer assembled from reports of collaborators and from data on file in the Office of Fruit Diseases. To this map has been added the two new locations of Habersham County, Georgia, and Mason County, Michigan, reported in 1927.

In connection with Fig. 6 some of the following explanatory notes regarding reports of occurrence of yellows in some of the more doubtful states bordering on the main yellows belt, are of interest:

Arkansas: Reported from Boone and Fulton Counties by J. L. Hewitt in 1910. In 1920 the Office of Fruit Diseases received specimens from Howard County. In 1918 and in succeeding years, however, J. A. Elliot, H. R. Rosen, and others of the Arkansas Experiment Stations indicate that the disease did not exist. H. R. Rosen in 1924 made the following statement:

"A recent trip was made to the most important peach section of the state, including the counties of Sevier, Howard, Pike, Little River, and Hempstead with the particular object of determining whether rosette was present. The main reason for the survey at this time was the receipt of some diseased peach twigs from Mr. R. A. McKnight of DeQueen, which showed symptoms suggesting peach yellows or rosette. ... A careful inspection of many orchards in the counties listed failed to show a single case of yellows. ...This is not the first time that peach yellows or rosette has been suspected as being present in Arkansas, and like all of the other cases which have come under my observations, when they were carefully investigated they were invariably found to be erroneous. ...So far as the writer knows, there is no record of yellows being present in this state, which is based on any investigation of Arkansas orchards."

Kansas: Melchers in 1919 reported occurrence but gave no data on locality. In 1921 Melchers states that no diseased trees were seen but that the disease had been reported several years before by Kellerman.

Missouri: Yellows was reported by F. M. Rolfs in 1908, 1909, and 1910. In 1913, however, Haseman states that the inspection of the State Board of Agriculture did not reveal yellows. G. M. Reed in 1917 indicated an "occasional occurrence."

Illinois: In a letter to the Plant Disease Survey in 1925, Anderson stated that he has given the matter of occurrence of yellows in Illinois considerable attention since 1917 and has not observed a single affected tree during that period.

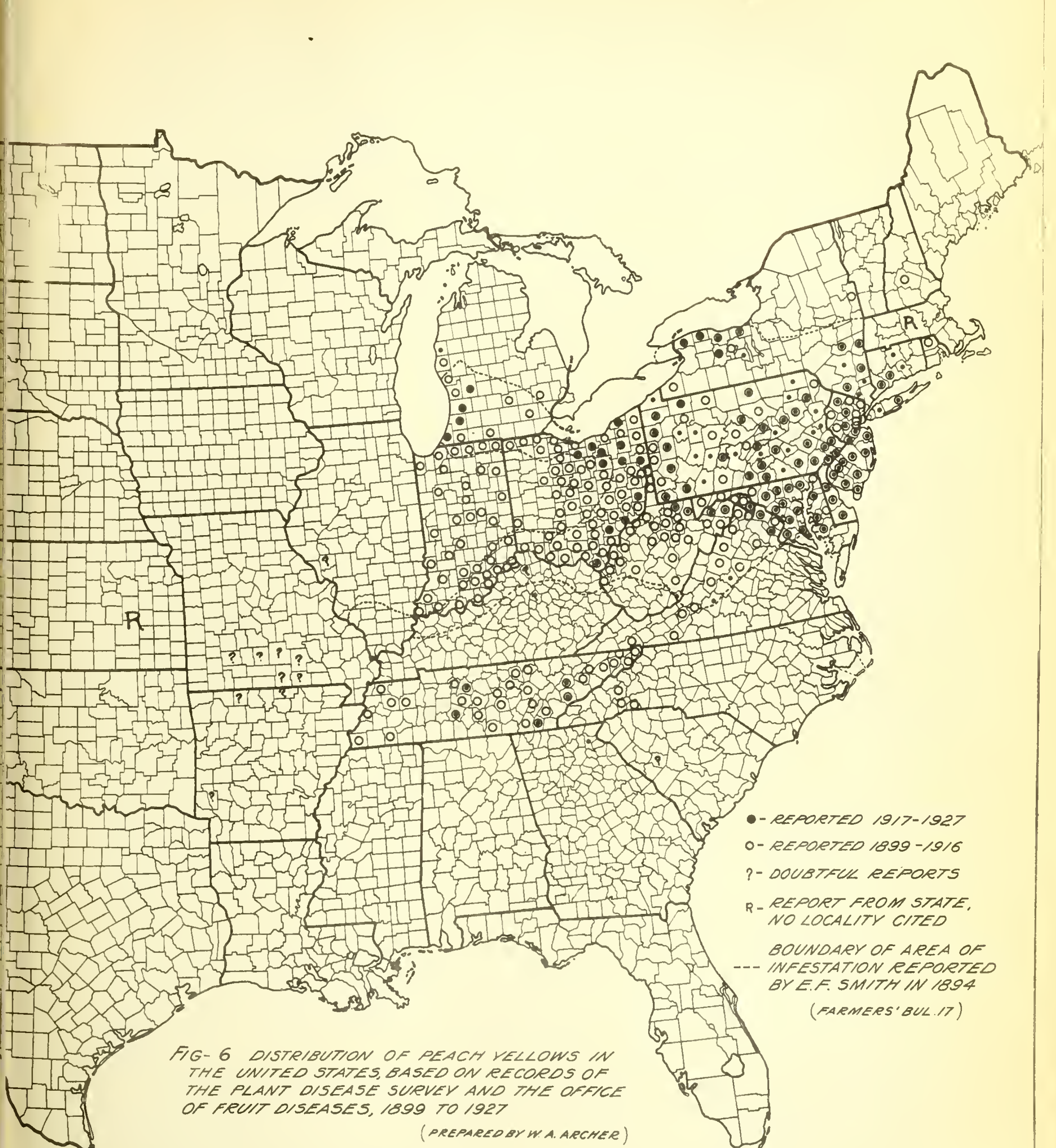

FIG- 6 DISTRIBUTION OF PEACH YELLOWS IN THE UNITED STATES, BASED ON RECORDS OF THE PLANT DISEASE SURVEY AND THE OFFICE OF FRUIT DISEASES, 1899 TO 1927

(PREPARED BY W. A. ARCHER)

Indiana: Yellows was reported in Indiana as present in considerable amounts between 1904 and 1908 and it was reported as common in 1915. In a letter to the Plant Disease Survey in 1925 Gardner stated that he felt confident that the disease was not to be found in the state at that time.

South Carolina: Evidence of occurrence of yellows in South Carolina consists of a doubtful report received by the Plant Disease Survey in 1913.

In 1927 yellows was reported from New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Georgia, and Michigan. McClintock in Tennessee states that trees having certain symptoms of yellows occurred on the University Farm at Knoxville. Loss estimates in the states reporting yellows are Maryland, 2 per cent; New Jersey, 1.5 per cent; Massachusetts and Michigan 1 per cent; New York, trace to .5 per cent; and Virginia, a trace.

In New York the disease was present in seven counties according to Chupp. He states that some growers in the western part of the state believe it is becoming more common. In New Jersey, Martin found yellows generally distributed but not severe. In Delaware it is generally observed but not increasing in prevalence according to Adams. Schneiderhan states that no diseased trees were observed in Virginia, but that the disease is known to be present. Regarding yellows in Michigan, Bennett states that typical yellows trees were found in Berrien, Allegan, Kent, and Mason Counties, but that a large share of the injury involved in the loss estimate from that state is caused by a trouble having certain symptoms of both yellows and little peach but not exactly typical of either of these diseases. The first authentic report of the occurrence of yellows in Georgia was received during 1927. (See Plant Disease Reporter 9: 90. 1927).

Yellows was found still to be widely distributed in Pennsylvania, although the number of diseased trees is being decreased. Table 43 showing the prevalence of yellows in 1927 and the number of diseased trees removed in peach producing counties in Pennsylvania during the year, was submitted by W. A. McCubbin.

Progress in control was reported from three states. According to Blauvelt there is very little yellows in commercial orchards in Orange County, New York, presumably because growers remove infected trees at once. Bennett (2) attributes the scarcity of typical yellows trees in Michigan to the general practice of removal of infected trees as soon as symptoms appear. Martin in New Jersey, states that an eradication campaign conducted in the vicinity of Hammonton the past several years is apparently meeting with some success. The control campaign in Pennsylvania has been watched with interest. The percentage of yellows in the state has been gradually reduced over a period of seven years by a systematic inspection and eradication program. The results of this campaign as tabulated by McCubbin follow.

Peach - Yellows

Table 43. Data on yellows distribution in 1927 in Pennsylvania, arranged by counties.

County	Orchards Inspected	Trees Inspected	Trees Marked	Per cent Yellows
Adams	61	78,472	140	.178
Berks	54	147,397	329	.223
Bucks	44	41,253	120	.290
Cumberland	33	51,343	167	.325
Chester	33	25,052	57	.227
Dauphin	26	26,790	74	.276
Delaware	14	10,067	31	.307
Franklin	69	238,310	467	.195
Lancaster	27	37,845	100	.264
Lebanon	14	25,965	145	.558
Lehigh	9	31,950	41	.128
Montgomery	23	35,169	61	.173
York	40	52,420	114	.217
13 Counties	447	802,033	1,846	.230

Table 44. Summary of records of peach yellows inspection and eradication records in Pennsylvania covering the years 1921 - 1927.

Year	No. of Trees	Trees Marked	Per Cent Yellows
1921	287,466	17,376	4.45
1922	442,507	11,052	2.50
1923	482,614	10,698	2.21
1924	674,012	6,064	.89
1925	655,493	2,326	.35
1926	624,743	2,524	.40
1927	802,033	1,846	.23
Total, 7 Yrs.	3,968,868	51,886	1.30

Recent literature:

1. Anon. The Valley peach "yellows" problem. Pacific Rural Press 114: 595. Nov. 26, 1927.

2. Bennett, C. W. Peach yellows and little peach situation in Michigan. Ann. Rep. State Hort. Soc. Mich. 56: 187-196. 1926.

3. McCubbin, W. A. Peach yellows and little peach. Bull. Pennsylvania Dept. Agr. 10 (3): 16. Feb. 1927.

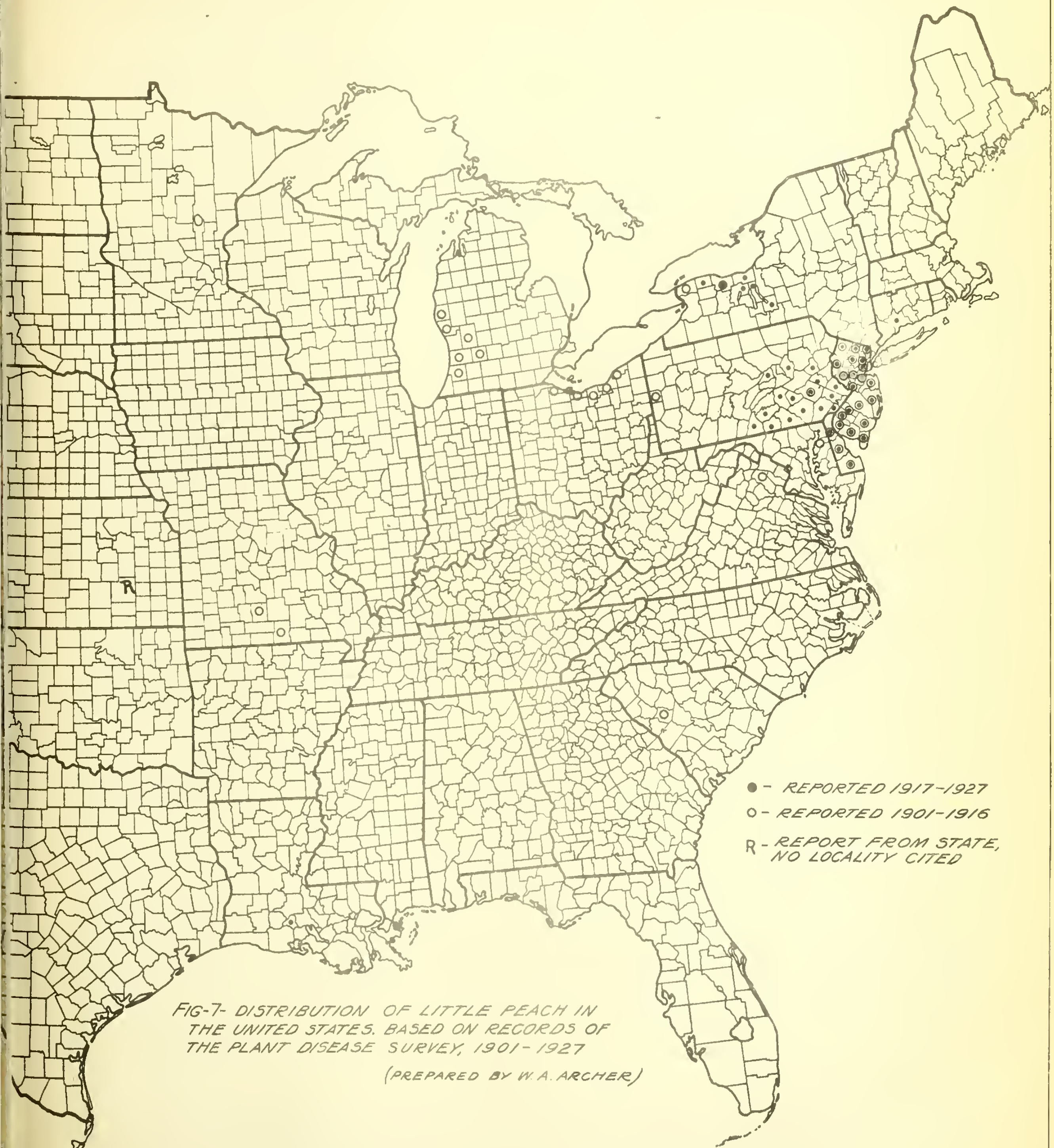

FIG-7- DISTRIBUTION OF LITTLE PEACH IN THE UNITED STATES. BASED ON RECORDS OF THE PLANT DISEASE SURVEY, 1901-1927

(PREPARED BY W. A. ARCHER)

LITTLE PEACH (CAUSE UNDETERMINED)

The distribution* of little peach in the United States as indicated in Fig. 7 is based on collaborators' reports to the Plant Disease Survey. Some of the data received are too general in nature to permit marking definite areas on the map. These data together with various explanatory remarks follow:

Connecticut: One report from New Haven County in 1921 and 1926 by Clinton.

Kansas: Reported to be present in 1919 by Melchers but no data or locality given.

Maryland: The report from Kent County in 1909 may be dubious because J. B. S. Norton states that no specimens were seen. There is no further record of the disease until 1925 when Temple and Jehle report its presence. However, they do not cite localities.

Michigan: In 1903 and 1905, M. B. Waite indicated that little peach was spreading rapidly. In 1911, E. A. Bessey considered the disease to be common in Allegan and Barry Counties; in 1913 and 1914 he reported it to be destructive in Allegan and Oceana Counties respectively. Bennett in 1926 reports it chiefly in the west central part of the state.

Missouri: Reported in 1910 by F. M. Rolfs from Wright and Howell counties.

Ohio: Reported from five northern counties in 1911 by A. D. Selby. In 1912 and 1918, however, he gives a negative report: as does R. C. Thomas in 1921 and H. C. Young in 1924, 1925 and 1926.

South Carolina: Recorded in Saluda County in 1913 by F. M. Rolfs. Reported not present by C. A. Ludwig in 1921, 1924 and 1926.

Virginia: Reported present in Fauquier County in 1910 by H. S. Reed. Reported absent in 1926 by F. J. Schneiderhan.

In 1927 little peach was reported from New York, New Jersey, and Maryland. Losses were indicated as a trace in New York and Maryland. The disease is considered of slight importance in Maryland and New Jersey. It was not observed in Connecticut, Virginia, Kentucky, and Tennessee.

Recent literature:

(See peach yellows)

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*The distribution map shown in Fig. 7 and the statements regarding the geographical distribution of little peach were prepared by W. A. Archer in 1926.

ROSETTE (CAUSE UNDETERMINED)

The distribution of rosette in the United States from 1902 to 1927, as indicated in Fig. 8 is based on reports of collaborators to the Plant Disease Survey and on data in the Office of Fruit Diseases.

Each symbol used in the map indicates at least one specific report of rosette in the county marked by the symbol. In a few cases the reports have not been specific enough to be represented on the map. These, together with other explanatory notes, follow:

Arkansas: Reported from Baxter County in 1907 by H. P. Gould to Office of Fruit Diseases. Rosen, in 1924, in a letter to the Plant Disease Survey considers existing reports of the disease in the state to be erroneous. (See statement under peach yellows, p. 166)

Florida: The recent record in Walton county was taken from the annual report, 1923-24, on a plant disease survey by G. F. Weber. The infection was said to be scarce. The other occurrence in Alachua County was based on specimens received by the Office of Fruit Diseases during 1910 and 1911.

Kansas: The single record in Kansas in 1923 is based merely on a county agent's report.

Missouri: The earlier records were reported 1903 to 1910 by Paul Evans, W. M. Scott, and F. M. Rolfs. The more recent record (1913) in Newton County is based on a report by H. P. Gould and W. F. Fletcher, to the Office of Fruit Diseases. The disease was not abundant in commercial orchards. In 1926 when W. A. Archer made a survey no infection was found in the state.

Mississippi: The report in Forest County in 1924 by D. C. Neal, was the first record of the disease in the state.

Oklahoma: The two doubtful records are based on a unsigned collaborator's report received in 1906.

Tennessee: M. B. Waite records the disease in 1907 from Franklin County and S. H. Essary records it in 1913 from Shelby, Monroe, and Knox Counties and in 1917 from Henderson County. In addition there is a report from Hesler in 1920 stating that several cases were found in the center of the State.

West Virginia: The area marked is based on a report by Sheldon in 1920 who found two typical cases in a small home planting in Morgantown.

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*The distribution map shown in Fig. 8 and the statements regarding geographical distribution of rosette were prepared by W. A. Archer, in 19[illegible]. The 1927 records of occurrence of rosette in McCracken County, Kentucky, and Madison County, Tennessee, have been added to the map prepared by Archer.

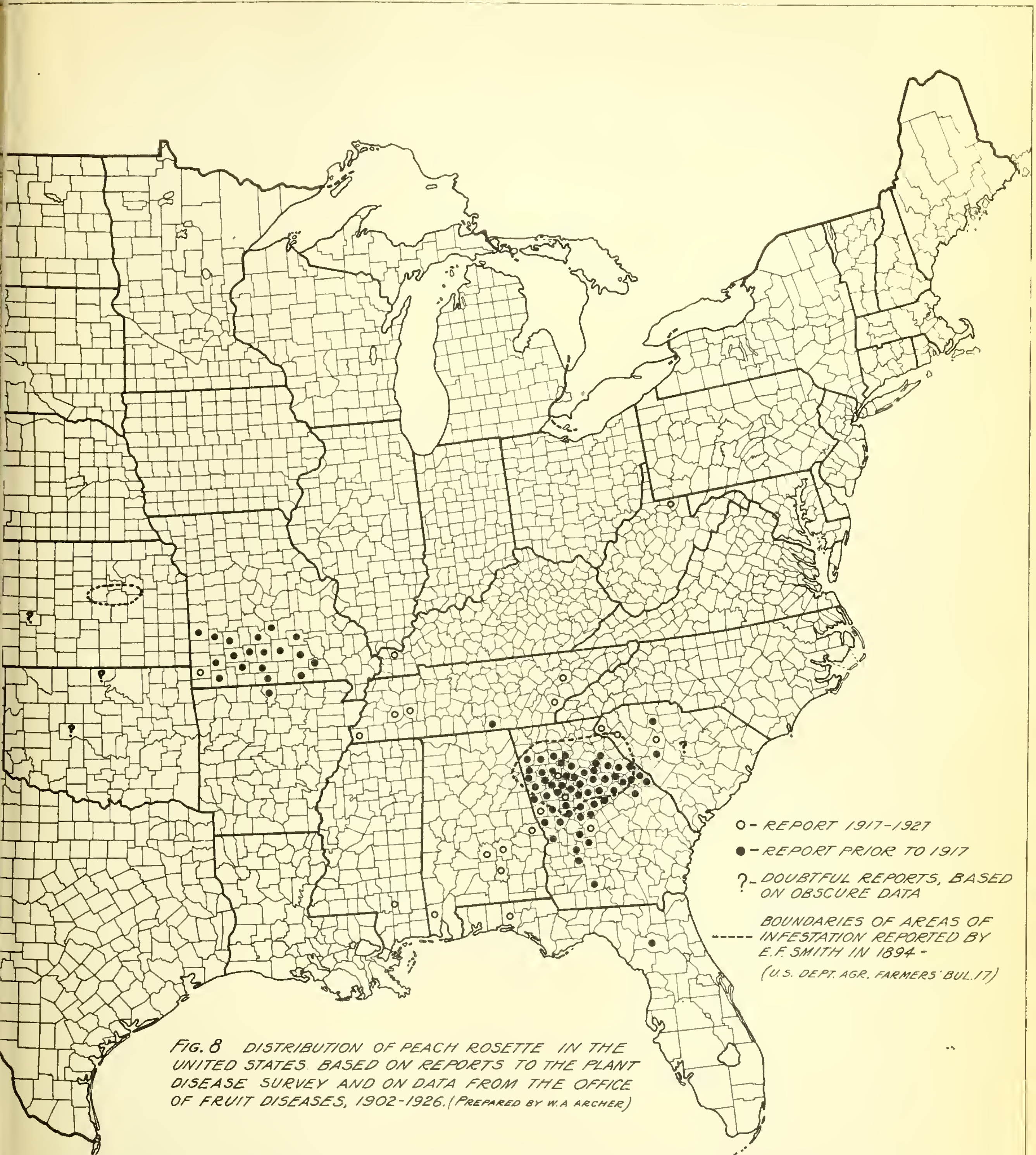

FIG. 8 DISTRIBUTION OF PEACH ROSETTE IN THE UNITED STATES BASED ON REPORTS TO THE PLANT DISEASE SURVEY AND ON DATA FROM THE OFFICE OF FRUIT DISEASES, 1902-1926. (PREPARED BY W. A ARCHER)

In 1927 rosette was reported from the three states of Mississippi, Tennessee, and Kentucky. The Kentucky report constitutes the first record of the occurrence of rosette in that state. In no case was the disease found to be serious. Wedgworth in Mississippi states that it is, as a rule, a minor disease. In Tennessee, according to McClintock, rosette apparently spread to one commercial orchard from wild host plants, which were not determined. In Kentucky, only one orchard involving six diseased trees was found by Valleau, although he states that the disease may have occurred on another orchard near Paducah.

The disease was not reported to the Survey from Georgia or South Carolina in 1927.

Recent literature:

(See peach yellows)

INJURIES DUE TO LOW TEMPERATURES.

In 1927, as usual in the case of peach, spring frosts took a heavy toll of the peach crop. Comprehensive records as to losses are not available but reports indicate injury in the majority of peach producing states. Buds were killed by low winter temperatures in South Carolina, northern Illinois, New Mexico and Oregon, a 40 per cent loss occurring in the last named state.

In a number of states more than the usual amount of winter injury to trees was reported. A considerable number of trees was killed in New York. Young in Arkansas associates a considerable amount of winter injury in that state with poor drainage. Hesler found that winter-injured trees were generally distributed over the peach districts of Ohio. In the southern and central parts of Illinois large numbers of trees died according to Anderson. In California Horne states that: "Many thousands of trees, especially young trees, died. Many of these were in the less favorable locations with regard to soil quality and drainage."

Recent literature:

1. Abell, T. H. Some observations on winter injury in Utah peach orchards, December 1924. Utah. Agr. Exp. Sta. Bull. 202. 28 p. June, 1927.

MISCELLANEOUS DISEASES AND INJURIES

Armillaria mellea (Vahl) Quel., root-rot. Traces of injury reported from Texas. According to Milbrath, this rot is general in California.

Bacterium cerasi Griffin, gummosis. Reported from California.

Bacterium tumefaciens EFS. and Town., crown gall. Minor losses due to crown gall were reported from Utah and Arizona. Considerable injury in some instances is said to have occurred in Mississippi and Texas.

Peach - Miscellaneous Diseases.

Caconema radicicola (Greef) Cobb., root-knot. Reported from Mississippi, Texas, and California. In California the loss is estimated at 0.5 per cent and in some orchards the loss amounted to the entire crop. The loss in Mississippi was said to be 5 per cent.

Coniothyrium Sp., blight. Texas.

Coryneum beijerinckii Oud., blight. In California an estimated loss of 5 per cent was produced. Reports of occurrence were received from Maryland, Ohio, Michigan, California, Utah, Idaho, and Washington. Linford states that the disease was almost totally absent in Utah, in 1927.

Cytospora leucostoma (Pers.) Sacc., canker. Specimens received from New Jersey.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

Rhizopus nigricans Ehr., black mold rot. Adams in Delaware states that this rot followed oriental peach moth injury.

Sphaerotheca pannosa (Wallr.) Lév., powdery mildew. Reported from New York, Connecticut, Texas, and California. In California, the gray spots which were first produced on the fruit in some cases turned dark and the surface of the infected fruits cracked. A powdery mildew, name not given, was reported by Heald as prevalent in the Yakima district of Washington.

Tranzschelia punctata (Pers.) Arth., rust. Injury due to rust occurred in the widely scattered states of North Carolina, South Carolina, Mississippi, Texas, and California. In South Carolina, it was quite general and severe. Poole in North Carolina states that it appeared late in the season throughout the sand hill regions, on Elberta, Hale, and Belle of Georgia. In California, the disease caused an estimated loss of 0.5 per cent loss chiefly through fruit blemishes.

Chlorosis (undet.) Linford states that chlorosis of two distinct types seriously affects peaches in Utah. Chlorosis, due to excess lime, occurred in Texas, according to Taubenhaus.

Fruit gumming (undet.) Gumming of fruits, often involving the cracking of pits, caused an estimated loss of 2 per cent in California. Horne suggests frost injury as a possible cause.

Root rot (undet.) Reported from Mississippi and thought to be induced by poor drainage.

Spray injury. Martin observed injury in New Jersey. He states that with the reduction of the amount of lead arsenate used to 1 pound to 50 gallons of dry mix, there has resulted a considerable reduction in the amount of spray injury. There are orchards each year, however, where the injury is serious due to the use of excessive amounts of arsenate of lead. In one cas a 70-10-20 dust is reported to have caused burning of the twigs.

White spot (marcel) (non-par.) California: opaque, white, somewhat depressed areas show in fruit, these become dirty white in canning. Very local but may be severe. Associated with large size of fruit (Horne & Goldsworthy).

Recent literature:

1. Ezekiel, W. N. Two fungi on Sclerotinia apothecia. Phytopath. 17: 791-792. Nov. 1927.

2. Homma, Yasu. A canker disease of Prunus mume and P. persica caused by a species of Camarosporium. Bot. Mag. Tokyo 41: 541-546. Sept. 1927.

3. Johnstone, H. W. The canning peach basket and rust. Calif. Cult. 9: 30. July 9, 1927.

4. Samuel, Geoffrey. On the shot-hole disease caused by Clasterosporium carpophilum and on the "shot hole" effect. Ann. Bot. 41: 375-404. Apr. 1927.

P L U M

BROWN ROT CAUSED BY SCLEROTINIA FRUCTICOLA (WINT.) REHM

In 1927 brown rot was very destructive in Illinois, Minnesota, and Missouri. In each of these states, practically the entire crop was lost in some of the most severely affected orchards. In Illinois, in addition to the loss shown in Table 45, Anderson and Stout estimate a 25 per cent loss due to rot in transit and on the market. Over other parts of the United States, from which reports were received, brown rot produced about the usual amount of loss, except in West Virginia and Michigan where damage was estimated at less than the usual amount.

Table 45. Percentage losses from brown rot on plum as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	Illinois, Minnesota	4	Connecticut, Virginia
20	Missouri	1	Delaware, Michigan
10	Tennessee, Oklahoma, Oregon	Trace-.5	New York
5	Massachusetts, North Carolina, Wisconsin, Iowa.	Trace	North Dakota
7	Maryland		

In Missouri, Scott lists the Burbank and Green Gage varieties as very susceptible. Archer in Iowa states that, "In one orchard observations over a number of years indicate that Hansen varieties are very susceptible while Japanese hybrids developed by the Gardner nursery are very resistant." Stoddard in Connecticut found brown rot on Prunus cerasifera var. Pissartii for the first time in that state.

BLACK KNOT CAUSED BY PLOWRIGHTIA MORBOSA (SCHW.) SACC.

On some varieties of plums, black knot is recognized as a destructive disease on trees where no attempts at control are made. The general use of control measures in commercial districts has almost eliminated this trouble as a factor in commercial plum and cherry production although it is still an important disease in neglected plantings. In 1927 black knot was reported from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, West Virginia, Tennessee, North Carolina, Mississippi, Illinois, and Michigan. Loss estimates of 1 per cent in Maryland and 0.5 per cent in Tennessee were reported. The disease is more or less common on wild plums and cherries in a number of eastern and middle western states.

In Iowa, Archer found the Wahnita variety of plum susceptible, a number of trees being practically killed by the disease.

POCKETS CAUSED BY EXOASCUS PRUNI FCKL. AND E. COMMUNIS SADEB.

Plum pocket was common in 1927 in Fremont County, Iowa, according to Archer. An unusually abundant development of this disease occurred in North Dakota where Brentzel estimated the loss at 10 per cent of the crop. In Texas a 5 per cent loss is estimated by Taubenhaus. The disease was common on wild plums in Nebraska, North Dakota, and Iowa.

MISCELLANEOUS DISEASES

Bacterium cerasi Griffin, bacterial gummosis. Severe locally in California causing an estimated loss of 2 per cent.

Bacterium pruni EFS., bacterial spot. Leaf infection was found by Adams to have occurred in Delaware by May 13. Traces of injury were produced in Maryland, according to Jehle, and Poole states that this disease was widespread in North Carolina on both wild and cultivated plums. In Mississippi, Neal found the disease more common on trees growing in sandy soils having little organic matter. Reports of occurrence were also received from Texas, Michigan, Iowa, and Kansas.

Bacterium tumefaciens EFS. and Town., crown gall. Observed on plums in Maryland, Michigan and Oregon.

Coccomyces prunophorae Hig., leaf spot. Traces of injury were caused in New York and an estimated loss of 2 per cent occurred in Minnesota. The disease was also observed in Iowa.

Exoascus mirabilis Atk., hypertrophy. Archer in Iowa states that this trouble occurred commonly near Randolph, Fremont County in wild plum thickets.

Fomes fulvus Fr., brown heart rot. Archer found this disease in Iowa on Japanese hybrids in a nursery and on the wild goose plum in a home orchard. This is the first report of the occurrence of brown heart rot in this state.

Phyllosticta spp., shot hole, blotch, leaf spot. Taubenhaus in Texas reported a species of Phyllosticta which caused a blotch of plum leaves. Two species of Phyllosticta were collected by Archer in Iowa. He identified one as P. virginiana (Ell. and Hals.) Seaver and states that the other conforms closely to the descriptions of P. prunicola Sacc.

Podosphaera oxyacanthae (DC.) D By., powdery mildew. Archer in Iowa states that this disease was common on water sprouts in shady locations but caused little or no loss.

Tranzschelia punctata (Pers.) Arth., rust. Louisiana, Texas, Kansas, and Iowa.

Valsa leucostoma (Pers.) Fr., die-back. Traces of injury occurred in three counties in Texas according to Taubenhaus.

Recent literature:

1. Amos, J., R. G. Hatton and A. D. Mackenzie. The incidence of "die back" disease in plum trees. Ann. Rept. East Malling Res. Sta. 13 (II Suppl.): 33-37. Mar. 1927.

2. Kieffer, D. L. Prune die-back and potash. Pacific Rural Press. 113: 621. May 7, 1927.

CHERRY

BROWN ROT CAUSED BY SCLEROTINIA FRUCTICOLA (WINT.) REHM.

Collaborators' reports for 1927 indicate that brown rot on cherries was probably no more serious than usual. Except for sweet cherries, most varieties of which are known to be more susceptible to rot than sour kinds, few instances of severe loss were recorded. In the important cherry states of New York, Michigan, Wisconsin, and California, losses were small as shown in table 46.

Table 46. Percentage losses from brown rot on cherry as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Oklahoma	1	Maryland, Michigan
5	Massachusetts, Oregon	.5	Delaware
3	Virginia	Trace-.5	New York
2	North Carolina, Tennessee	Trace	Wisconsin, Kentucky, Arkansas, California
1.5	Connecticut		

In Wayne and Wyoming Counties, New York, blossom blight was serious in some cases on the English Morello. In Orange County, New York, some invasion of the fruit followed curculio punctures according to Blauvelt. In Virginia, Poole states that where cherries were allowed to remain on the trees too long before picking, rot was severe.

Recent literature:

See peach brown rot.

LEAF SPOT CAUSED BY COCCOMYCES HIEMALIS HIG.

Conditions were apparently very favorable for leaf spot development in a large part of the upper Mississippi River Valley. Considerable leaf spot occurred also in Maryland, New York, and northern Michigan. The most severe outbreak apparently occurred in Missouri where, according to Scott, sprays were not very effective in control due to excessive rainfall. He states that leaf spot resulted in almost complete failure of the cherry crop. The following are comments from collaborators in some of the states in which leaf spot was relatively common.

New York: Most of the injury due to this year's defoliation will show in the next few years. (Chupp.)

Kentucky: Cherry trees all over the state were almost completely defoliated relatively early in the season. (Valleau)

Arkansas: Severe shot-hole and defoliation common on unsprayed trees. Spraying not so effective as usual. (Young)

Illinois: Very extensive defoliation of trees throughout the state. (Anderson and Stout)

Cherry - Leaf spot

Indiana: Numerous cases of complete defoliation before fruit was picked. (Gardner, Dietz, and Pierce)

Iowa: Severe infection and defoliation occurred in many places over the state. (Archer)

Kansas: Cherry trees practically defoliated. (Elmer)

Gardner in Indiana found pedicel infection which resulted in drying of fruits. In Michigan, according to Bennett, fruit infection was severe in some orchards near Hart. He states that in some orchards, 5 per cent of the fruit was malformed by attacks of this disease.
Loss estimates are given in Table 47.

Table 47. Percentage losses from leaf spot on cherry as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
50	Missouri	1	Delaware, Virginia Wisconsin
20	Oklahoma	.5	Montana
10	Maryland	4	Michigan
5	Iowa, Arkansas	.2	Oregon
2-5	New York	Trace	Massachusetts, Mississippi.

MISCELLANEOUS DISEASES AND INJURIES

Armillaria mellea (Vahl) Quel., root rot. Wedgworth reported that this disease occurred in Chickasaw County, Mississippi.

Bacterium cerasi Griffin, bacterial gummosis. Traces of injury in California. Reported also in Washington.

Bacterium pruni EFS., bacterial spot. The Rocky Mountain dwarf cherry as well as cultivated cherries in Iowa were affected according to Archer.

Coryneum beijerinckii Oud., blight. Reported from Washington.

Exoascus cerasi (Fckl.) Sadeb., witches'-broom. Occurred on wild cherry, Prunus serotina, at Blacksburg, Virginia.

Cherry - Miscellaneous diseases

Plowrightia morbosa (Schw.) Sacc., black knot. Reported from New York, Pennsylvania, West Virginia, and North Carolina. Poole in North Carolina states that it is prevalent in many parts of the state on wild cherries and was reported as causing severe damage to new plantings of cultivated sour cherries.

Podosphaera oxyacanthae (DC.) D By., powdery mildew. Reported from New York, Delaware, Michigan, Wisconsin, Iowa, Kansas, Colorado. It was an important disease in Iowa on nursery stock.

Body canker (undet.) A trouble causing death of both old and young trees produced considerable injury in Utah according to Linford. Winter injury is suspected as one of the contributing causes.

Winter injury. Severe in parts of Ohio and Iowa. In the latter state, according to Archer, many trees died during the seasons of 1926 and 1927 as a result of an early fall freeze in 1925.

Recent literature:

1. Anon. A new cherry disease. Calif. Cult. 68:475. Apr. 16, 1927.

2. Faes, H., and M. Staehelin. Les champignons et les insectes ennemis du cerisier. Ann. Agr. Suisse 28: 1-27. 1927.

A P R I C O T

Bacillus amylovorus (Burr.) Trev., fire blight. According to Taubenhaus this disease occurred on apricots in Texas.

Bacterium pruni EFS., bacterial spot. Specimens collected at Shenandoah, Iowa, by Archer.

Cladosporium carpophilum Thuem., scab. Quite prevalent in Texas.

Coryneum beijerinckii, Oud., blight. In California, according to Milbrath, Coryneum blight was worse in 1927 than in 1926 and caused an estimated loss of 5 per cent. In Idaho it was not important in orchards which received the lime-sulphur dormant spray for scale.

Sclerotinia spp., brown rot. An estimated loss of 8 per cent occurred in California according to Milbrath. The disease was also severe in Kansas causing losses estimated at 10 per cent of the crop.

Sclerotinia sclerotiorum (Lib.) Mass., green rot. This disease was important in California causing a 3 per cent loss.

Tranzschelia punctata (Pers.) Arth., rust. Localized attacks occurred in California. The loss for the state was estimated as 0.5 per cent.

Recent literature:

1. Fish, S., and A. A. Hammond. "Shot-hole" of apricots. Progress report on control experiments carried out during 1926 in the Goulburn Valley. Jour. Dept. Agr. Victoria 25: 403-408. July 1927.

2. Rudolph, B. A. Monilia blossom blight (brown rot). Pacific Rural Press 113: 241. Feb. 19, 1927.

3. Smith, R. E. Green rot of the apricot. Pacific Rural Press 113: 622. May 7, 1927.

DISEASES OF SMALL FRUITS

GRAPE

BLACK ROT CAUSED BY GUIGNARDIA BIDWELLII (ELL.) VIALA & RAVAZ

In general in 1927, black rot was less destructive in the large commercial grape areas than in sections having smaller and more widely separated plantings. It was reported as severe in Virginia, Tennessee, Illinois, and locally in South Carolina, with losses of 50 per cent of the crop in some vineyards in South Carolina and Illinois. The average amount of black rot was reported from Tennessee, Virginia, North Carolina, and Louisiana; more from Massachusetts, Connecticut, New York, Kentucky, Illinois, Kansas, and Mississippi; less from Delaware, Maryland, West Virginia, South Carolina, Florida, Arkansas, and Wisconsin; and much less from Michigan and Iowa.

Table 48. Percentage losses from black rot of grape as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Tennessee, Illinois Oklahoma.	2	Massachusetts, South Carolina
		1.5	Delaware
9	Virginia		
		1	Arkansas, Wisconsin, Kansas.
8	Maryland		
5	North Carolina, Mississippi.	Trace	West Virginia, New York, Iowa, Missouri, Michigan.
6	Kentucky	3	Texas

Grape - Block rot

Some of the following statements by collaborators indicate that conditions in a number of states were favorable for abundant black rot development in unsprayed vineyards. The available information seems to indicate that definite annual spray programs have been responsible, in the larger grape sections, for the reduction of this disease to a mere trace in many instances.

Pennsylvania: Generally prevalent but not of much importance except in small garden plantings. (Thurston).

Delaware: Improved spraying program reducing general prevalence. (Adams)

Tennessee: Generally present on unsprayed vines. Held in check with 3-4-50 Bordeaux. (McClintock).

North Carolina: Heavy loss on unsprayed grapes. (Poole).

South Carolina: Generally over the state. From 1 to 5 per cent loss in commercial vineyards. Home vineyards from 10 to 50 per cent loss. (Moore)

Ohio: Not serious in most commercial vineyards, which are mainly located within a few miles of Lake Erie. Often causes considerable damage in backyard plantings, especially in the central and northern parts of the state. Loss in 1927 probably did not exceed 1 per cent. (Wilcox)

Michigan: Very rare in commercial vineyards but more or less common on unsprayed vines. In the commercial grape sections, regular spray programs are believed to be responsible for the reduction of this disease, during the last few years, to a position of minor importance. (Bennett)

Missouri: Present in many small home vineyards but fairly well under control in commercial vineyards. (Scott)

DOWNY MILDEW CAUSED BY PLASMOPARA VITICOLA (BERK. & CURT.) BERL. & DE TONI

Weather conditions were favorable for a rather unusual development f downy mildew in some of the New England states. It was also common in sc vineyards in Arkansas, Missouri, and Illinois. Much more than the usual amount was reported from Massachusetts, Delaware, and Arkansas. Connecticut and Missouri reported more; Indiana, New Jersey, Tennessee, Florida, Illinois, and Indiana the same, and Michigan, Wisconsin, Minnesota, and I less than the average year. In Massachusetts, Davis estimates the loss i some sprayed vineyards at 5 per cent and reports an 80 per cent infection in some of the unsprayed plantings. Other loss estimates are, Illinois, 3 p cent; Louisiana, Texas, and Missouri, 2 per cent; and Maryland and Tennes 1 per cent.

Grape - Downy mildew.

In New Jersey the Niagara, Champagne, Agawam and Worden varieties are considered to be susceptible.

New York: Ontario Co. Especially abundant on leaves of Delaware and Catawba in the vicinity of Naples. (Bullock).

Orange Co. Quite prevalent near picking time. Delaware and Concords most commonly affected. Mostly on the leaves. (Blauvelt).

Tennessee: Present each season more or less. (McClintock).

North Carolina: Widespread but not severe. Common in vineyards in the mountain section. (Fant).

Texas: For the first time this year serious on cultivated grapes. Two per cent loss. (Taubenhaus).

Arkansas: Very common on some of the noncommercial varieties scattered over state. Of no importance on Concord. (Young)

Ohio: Negligible even on wild grapes and Catawba vineyards on the shore of Lake Erie. (Wilcox).

Illinois: Not as much as expected considering the weather conditions. (Anderson).

Missouri: More severe than usual on unsprayed vineyards. Season was quite favorable with a moderately cool summer and much moisture. (Scott).

Quinn (1) has reported regarding the introduction and prevalence of downy mildew in Australia.

Recent literature:

1. Quinn, D. G. Downy mildew. (Plasmopara viticola). Jour. Dept. Agr. South Australia 30: 726-735. Feb. 15, 1927.

POWDERY MILDEW CAUSED BY UNCINULA NECATOR (SCHW.) BURR.

Only a few reports of the occurrence of powdery mildew in 1927 were received. In New York, Mills reported damage in damp locations and Bullock also in New York considers Niagara and Concord the most susceptible varieties of those observed. Archer found powdery mildew in only one location in Iowa. In Arizona the disease was severe on Thompson Seedless where dusting had been neglected. (Arizona News Letter). In Utah it was a serious factor in home gardens and small vineyards but was less severe than usual according to Linford.

The disease was generally distributed in California, according to Milbrath, and caused a loss estimated as 0.5 per cent of the crop.

Recent literature:

1. Bonnet, L. O. Mildew and sulphuring. Calif. Grape Grow. 8 (4): 12-13. April 1, 1927.

2. Johnstone, H. W. Sulphur control for grape mildew. Calif. Cult. 68: 618-619. May 21, 1927.

ANTHRACNOSE CAUSED BY SPHACELOMA AMPELINUM D BY.

An unusual outbreak of anthracnose occurred in Arkansas where wet weather favored early development. V. H. Young states that the varieties Catawba, Ellen Scott, and H. W. Munson are susceptible while Concord is resistant. Anthracnose was also reported from Maryland, North Carolina, Florida, Mississippi, and Iowa. It was not observed in Massachusetts, South Carolina, Louisiana, Illinois, Michigan, Wisconsin, and Minnesota.

MISCELLANEOUS DISEASES AND INJURIES.

Bacterium tumefaciens EFS. & Town., crown gall. Reported from Maryland, Michigan, Wisconsin, Kansas, Utah, Oregon, and Washington. A 25 per cent infection occurred in one vineyard in Utah.

Botrytis sp., rot. Reported from Delaware.

Cryptosporella viticola (Reddick) Shear, dead arm. Coleman (2) states that some grape growers of the Niagara Penninsula of Ontario consider this the most serious disease with which they have to contend. One vineyard in New York was seriously affected. In Michigan one twenty-acre vineyard had 15 per cent of the plants affected, and diseased vines in small numbers were found in many vineyards in Van Buren and Berrien Counties.

Melanconium fuligineum (Scrib. & Viala)Cav., bitter rot. Reported for Delaware, New Jersey, and Florida. No injury recorded.

Phymatotrichum omnivorum (Shear) Dug. Texas root rot. Fairly prevalent in Texas.

Chlorosis due to excess of lime. Taubenhaus reports this as common in Texas. He states that it is controlled by iron sulphate. Linford reported a severe form of chlorosis (cause undetermined) as occurring in a number of vineyards in Utah. He states:

Grape - Miscellaneous Diseases

"A serious limiting factor, restricting grape culture to soils and localities where it occurs least destructively and reducing the vigor and yield of many home garden and some commercial plantings. Much less frequent in the southern counties than in the northern."

Frost Injury. Reported from Arkansas and Illinois; no estimates of loss available.

Little Leaf, undet. Present in certain localities in California and caused an estimated loss of 0.5 per cent of the crop in that state.

Shelling, undet. Two vineyards in Van Buren County, Michigan, lost 10 per cent of the fruit before picking time according to Bennett. A small amount of shelling occurred in other vineyards in the same county.

Spanish Measles, undet. Reported as generally distributed in California and caused an estimated loss of 1 per cent of the crop.

Winter Injury. In New York, Chupp reported the formation of galls, similar to crown gall, on winter injured plants. In Ohio Wilcox reported that "Winter killing was serious where vineyards were not well drained. The fall of 1926 was extremely wet and the excess water injured the roots. The damage was 5 per cent or more."

Recent literature:

1. Bonnet, L. O. Treatment of black measles. Calif. Grape Grow. 8 (2): 4-5. Feb. 1, 1927.

2. Coleman, L.C. The dead arm disease of grapes in Ontario. A preliminary study. Scient. Agr. 8: 281-315. Jan. 1928.

3. Coleman, L. C. Dead arm of grapes. Rept. Canada Exp. Farms (Rept. Dom. Bot.) 1926: 72-75. 1927.

4. Eyer, J. R. and W. A. McCubbin, Grape insects and diseases. Bull. Pa. Dept. Agr. 9 (16). 27 p. 1927.

5. Lieske, R. Untersuchungen über die als Mauke oder Grind bezeichnete Erkrankung der Weinreben. Arb. Biol. Reichsanst. Land- u. Forstwirtsch., 15: 261-270. 1927.

6. Moreau, L., and E. Vinet. Innovations dans la lutte contre les parasites de la vigne. Rev. Vitic. 67: 261-269. Oct. 27, 1927.

7. Palmer, E. F., and J. R. van Haarlem. The grape in Ontario. Bull. Ontario Dept. Agr. 328. 52 p. June 1927.
   Grape diseases by L. C. Coleman, pp. 49-52.

8. Rose, D. H. Decay of California grapes in the vineyards, in transit and on the market. Blue Anchor 4 (10): 1, 19-21. Oct. 1927.

9. Viala, P. Recherches sur quelques formes de dépérissements de la vigne. Compt. Rend. Acad. Agr. France. 13: 88-90. Jan. 19, 1927.

10. Viala, P., and F. Marsais. La sclériase des raisins, due au Sordaria uvicola. Compt. Rend. Acad. Sci. Paris 184: 1504-1506. June 20, 1927.

STRAWBERRY

LEAF SPOT CAUSED BY MYCOSPHAERELLA FRAGARIAE (TUL.) LIND.

Leaf spot was reported in 1927 from twenty-nine states. It was most abundant in Massachusetts, Connecticut, Illinois, and Louisiana, but in general caused little loss to the strawberry crop. Illinois reported the heaviest infestation involving an estimated loss of 1 per cent. In three states the disease is considered very important in the average year, in nine of moderate importance, and in ten of slight importance. In the four states reporting more leaf spot than in the average year, the loss was estimated at less than 1 per cent.

In Ontario, Berkeley (1) states that in most seasons the following varieties should show considerable resistance: Parson, Portio, Pocomoke, Lavinia, Splendid, and William Belt. In Delaware William Belt is very susceptible; in Tennessee Klondike is very susceptible and Gandy susceptible. In Florida Missionary is resistant: in Illinois, Premier and Aroma are resistant and Klondike, Gandy, Judith, and Dunlap susceptible. In Utah leaf spot is very common on wild strawberry, but appears to be of no importance on cultivated varieties.

Recent literature:

1. Berkeley, G. H. Strawberry diseases. Bull. Dept. Agr. Canada (Ottawa) n. s. 80: 50-53. 1927.

2. Neal, D. C. Strawberry leaf-spot and its control. Quart. Bull. State Plant Bd. Mississippi 6 (4): 23-24. Jan. 1927.

BLACK ROOT, CAUSE UNDETERMINED

In 1927 strawberry root rots were reported from several states. Black root seemed to be the predominating type. The geographical distribution of this trouble is indicated by reports of its occurrence in the widely separated states of Tennessee, Florida, Michigan, Wisconsin, and Washington. It is also reported from Ontario. Root rot (cause undet.) was reported from New Jersey and root rot, "caused by various parasites on weakened plants," was reported by Chupp in New York. In Texas and Michigan losses due to black root were estimated at 1 per cent. Strong in Michigan writes:

> "Black root causes considerable damage to strawberries. In some areas in Michigan the culture of the strawberry is about to be given up because of the disease. The short life of plantations is due in large part to black root and, with the present system of the cultivation of the strawberry in which patches are maintained for two to four years, it is safe to say that black root is causing a loss from 10 to 25 per cent of the crop, year in and year out because of the poor stands which are to be found in the older fields."

Soil fungi are suggested by collaborators as causes, with winter injury and stunting due to a variety of factors as predisposing influences. Berkeley (1) in Ontario, states that black root is more severe where strawberries follow strawberries year after year. He attributes some of this type of damage to winter injury but suggests that in some cases soil fungi are probably important causal agents. Strong reports (letter) as follows on the cause of black root in Michigan:

> "Black root has been reported from many sections for several years, and the disease has been attributed to a number of factors. It seems probable that any one or more of a number of organisms can produce the various symptoms which have been included in the descriptions of this disease. Study of Michigan material involving hundreds of isolations has placed chief responsibility upon two organisms, one possessing a Gloeosporium type and the other a Coniothyrium type of fruiting body. Inoculations with these organisms have produced the symptoms of this disease. Work looking to the definite determination of these organisms is now in progress. Each of these organisms has been found widely distributed in Michigan on both wild and cultivated strawberries, indicating wide natural occurrence of the pathogens. Isolations have also been made from North Carolina and Utah material."

Strawberry - Black root

Recent literature:

1. Berkeley, G. H. Strawberry diseases. Bull. Dept. Agr. Canada (Ottawa) n. s. 80: 50-53. 1927.

2. Wardlaw, C. W. Note on the occurrence of Pythium proliferum, de Bary, on the roots of the strawberry. Ann. Bot. 41: 817-818. Oct. 1927.

3. --------- The strawberry disease in Lanarkshire. Ann. Appl. Biol. 14: 197-201. 1927.

VIRUS AND VIRUS-LIKE DISEASES

Diseases suspected of being of a virus type were reported from several states and from Ontario. In general these diseases have caused little loss but they continue to be of increasing interest to plant pathologists. Symptoms as described vary considerably but fall roughly into three classes.

Mosaic. Gardner reported a mosaic (or yellows) disease on strawberries in Indiana and Taylor found a similar trouble on some unknown strawberry varieties in Erie County, New York. Berkeley (1) in Ontario reported a disease which affects the Eaton variety and causes the production of characteristic mosaic-like, yellowish mottling. In no case has it been determined whether the troubles mentioned above are true mosaics.

Yellows. Guba reported that a disease of a yellows type caused a 10 per cent loss in some fields in Massachusetts. A yellows disease occurred in Illinois according to Anderson but symptoms seemed to be somewhat different from other yellows diseases which have been reported.

Witches' Broom. In 1927 a disease called "witches' broom" was reported from Oregon and Washington. It is considered of slight economic importance. The maximum infection in any one field was 3 per cent in Oregon. Zeller (2) in Oregon states regarding this disease:

> "Witches' broom of strawberry is characterized by a dwarfing of the whole plant, spindleness of the petioles and an arching downward of the margins of the leaflets which are lighter in color than the normal plants. Witches' broom has been found in Western Oregon only, but may have a wider distribution. Varieties have not been tested for resistance or susceptibility, but Marshall, Nick Ohmer, Oregon, and Ettersburg varieties have been found affected. Viriliferous leaf lice (Myzus fragaefolii) transmit the disease."

Strawberry - Virus and virus-like Diseases

Recent literature:

1. Berkeley, G. H. Strawberry diseases. Canada (Ottawa) Dept. Agr. Bull. n. s. 80: 50-53. 1927.

2. Zeller, S. M. Preliminary studies on witches broom of strawberry. Phytopath. 17: 329-335. 1927.

MISCELLANEOUS DISEASES AND INJURIES

Armillaria mellea (Vahl) Quel., root rot. Reported from Oregon and Washington.

Botrytis sp. In Minnesota, Botrytis rot was more common in 1927 than in 1926 according to the Department of Plant Pathology. Late in the season it was severe in some parts of Washington on ever-bearing varieties. Brooks in Florida reported it as more abundant than tan rot.

Caconema radicicola (Greef) cobb, root-knot. In Florida dry weather induced an earlier development of knots than usual.

Cercospora vexans C. Massal., leaf spot. Chupp reported this fungus, with a specimen, from New York on wild strawberry (Fragaria virginiana). Apparently it has not been collected in the state previously. It has been reported from Wisconsin by Davis (2,) p.421 on F. virginiana and F. vesca.

Colletotrichum sp., anthracnose. This newly reported disease was mentioned again by Brooks from Florida as causing injury on the Missionary variety. Runners and young plants are susceptible but the disease is less often found on the older parts.

Dendrophoma obscurans (Ell. & Ev.) H. W. Anderson, angular spot. Occurred in Illinois, Michigan, and Florida. Brooks in Florida reported control with Bordeaux mixture. The disease was not observed in Maryland, South Carolina, and Minnesota.

Diplocarpon earliana (Ell. & Ev.) Wolf. This disease was rather common in Arkansas on the Klondike variety and caused considerable damage locally. In Florida it was observed by Brooks in the spring on old fruiting plants but was more destructive during the summer in young plantings. It was also reported from Delaware, North Carolina, Indiana, Michigan, and Louisiana.

Fuligo vagans Pers., and other slime molds. Elmer states that many reports of the occurrence of slime mold on strawberries were received from the eastern part of Kansas. Slime molds were also reported as occurring on strawberries in Mississippi and New Jersey.

Strawberry - Miscellaneous Diseases.

Fusarium sp., root rot. Brooks states that in Florida a root rot, believed to be caused by a species of Fusarium, was more common than usual probably due to a very dry season.

Pezizella lythri (Desm.) Shear & Dodge, tan brown-rot. Brooks states that this was the leading rot in Florida strawberry fields during November and December 1926 and the first half of January 1927.

Phytophthora cactorum (Leb. & Cohn) Schroet., leather rot. Scott reported a 5 per cent loss in Missouri. He states that leather rot was a great menace to strawberry growers and shippers in south and northwest Missouri this year. Over 200 carlots shipped to out of state destinations were damaged by this and other rots. Some of the losses were as high as 75 per cent. Minor losses were reported from Maryland and Virginia.

Rhizoctonia sp., hard brown-rot. This rot caused minor losses in Florida and Louisiana.

Rhizopus nigricans Ehr., leak. Mississippi and Florida.

Sclerotinia sclerotiorum (Lib.) Mass., crown rot. Appeared in Louisiana during cool, damp weather.

Sphaerotheca humuli (DC.) Burr., powdery mildew. Occurred as a very minor disease in New York, Delaware, Tennessee, Florida, Michigan, Missouri, and Colorado. It was not observed in 15 other states which reported.

Tylenchus dipsaci (Kuehn) Bast., stem nematode. McKay in Oregon reports that this disease caused nearly total destruction of some patches along the Pacific coast.

Bacterial leaf spot (undet. bacterium). A new bacterial disease of strawberry was reported by Linford in Utah. (See Pl. Dis. Rep. 11: 109, 1927).

Wilt (undet.) According to Zeller this disease in Washington has caused an almost total loss of plants in some large fields.

Recent literature:

1. Brooks, A. M. Treatment of strawberry diseases, seasonable suggestions on crop troubles. Florida Grow. 35 (17): 27-28. Oct. 1927.

2. Davis, J. J. Notes on parasitic fungi in Wisconsin, VIII. Trans. Wis. Acad. Sci. 20: 413-431. Feb. 1922.

RASPBERRY

ANTHRACNOSE CAUSED BY PLECTODISCELLA VENETA (SPEG.) BURKH.

During the season of 1927 considerable loss was caused by this disease in Arkansas, Illinois, Indiana, and Maryland. Missouri and Kansas reported more than usual, North Dakota the same, and Iowa and Michigan, less.

> Ohio: Another serious and very general infection of black raspberries occurred in the summer, at a height on the canes of about 2 feet. This infection probably did not greatly affect the 1927 crop, but stunted the laterals on young shoots, and killed or badly injured many buds, so it will undoubtedly reduce the fruit crop of 1928. Propagation of black caps was cut down in many fields by stunting of the laterals. During the past nine years this late infection has occurred commonly and has apparently done much more damage than the early spring infection. In fields which received a late dormant fungicidal spray the anthracnose was much reduced. The damage is difficult to estimate but is probably 5 per cent or more. (Wilcox).

> Indiana: Infection apparently occurred over a larger period than usual. Much of the loss from this season's epidemic will occur next year. (Gardner).

> Michigan: Infection during May was unusually heavy but due to dry weather, little infection occurred during June, July and August. Fall rains caused much spotting of cane tips of black raspberries. The young plants when dug in 1928 will have considerable anthracnose on the old canes which gave rise to the new "tip." (Bennett)

> Iowa: Considerable loss was observed in Harrison County. Many inquiries and specimens were received from other localities. (Archer)

> Missouri: Quite severe this season. Many canes were killed. (Scott)

> Kansas: General but not severe. (Elmer.)

In general both moisture and temperature were favorable for early development of anthracnose in the states which lead in raspberry production, namely, New York, Michigan, Illinois, Indiana, Ohio, Wisconsin, and Minnesota. However, conditions in Michigan, Wisconsin, and Minnesota were not favorable for spread during the summer. Secondary infection was abundant in Ohio, according to Cooley, and Wilcox in the same state reports that late summer and fall infection was very abundant. Conditions of moisture and temperature were favorable for anthracnose development in Indiana and Illinois during a considerable portion of the season. Drought checked development of disease in Iowa and losses were less than usual.

Varietal Susceptibility

As a general rule, red varieties of raspberries are considered to be so resistant to anthracnose that control measures are not necessary. Purple or hybrid varieties are somewhat more susceptibile and black varieties as a general thing are quite susceptible and commonly severely injured.

Some of the information on varietal resistance available from 1927 reports is tabulated in Table 49. It will be noted that there is reasonable agreement among those reporting as to the susceptibility of the more common varieties. Some apparent variations to the ordinary way of reacting toward anthracnose were reported for some varieties. Gardner in Indiana states that red varieties were more severely affected than usual. He also states that Plum Farmer showed considerable resistance. Wilcox in Ohio noted a severe attack of anthracnose on Erskine Park, a red variety which is generally credited with considerable resistance.

Table 49. Data on varietal susceptibility of raspberries to anthracnose as compiled from reports of collaborators, 1927.

Very Susceptible	Susceptible	Resistant	Very Resistant
Cumberland (B)(2)(3)(4)	Columbian (P)(1)	Ranere (R)(1)	Cuthbert (R) (1)
Gregg (B) (2)	Cumberland (B) (1)	Cuthbert (R)(2)	Latham (R) (1)
Kansas (B) (2)	Plum Farmer(B) (1) (2) (4)	Latham (R)(2)	King (R) (1)
Honeysweet (B)(4)	Hoosier (B)(1)	King (R) (2)	June (R) (4)
	Kansas (B) (1)	Cardinal (P)(2)	Royal Purple (P) (4)
	Honeysweet (B) (1) (2)	Plum Farmer(B) (3)	Quillan (B) (4)
	Erskine Park (R): (1)		
	Haymaker (P) (2)		
	Gregg (B) (4)		

R - Red variety. P - Purple or hybrid variety. B - Black variety. Numerals indicate the collaborator and state from which the data were received as follows:

1. R. B. Wilcox - Ohio
2. C. W. Bennett - Michigan
3. M. W. Gardner - Indiana
4. A. S. Colby - Illinois

The Quillan, grown more extensively in Illinois than in other states, seems to be more resistant to anthracnose than any other black variety of common occurrence.

Control:

The recommendations of pathologists and horticulturists for anthracnose control have been modified considerably in the last decade. This change has been brought about chiefly by two factors, (1) the more general recognition of the resistance of red and purple varieties, and (2) the extreme susceptibility of raspberry foliage to injury from spray. Spray injury of various types due to commercial lime-sulphur, self-boiled lime-sulphur, and Bordeaux mixture have been reported from time to time. The fruiting canes, in two fields of black raspberries in Michigan, were almost completely defoliated by after-blossom sprays of lime-sulphur in 1927. According to Bennett (2) certain types of sprays, under some conditions produce a mottling of leaves without killing any of the leaf area. As a general rule older leaves are more subject to injury from sprays than are young leaves. It has been noted that leaves of fruiting canes may be severely burned while leaves of turions of the same plant are not so badly injured.

For the most part, pathologists are recommending two sprays, a delayed dormant and one two or three weeks later, for the control of anthracnose. The second spray in some cases is recommended with certain reservations. Michigan and Illinois and probably other states recommend the removal from black raspberry tips of all parts of the old cane before planting. In tests made in Michigan on plants set in 1926 less than 5 per cent as much anthracnose occurred on plants from tips completely buried as was found on plants from tips to which the old cane parts were left attached, according to Bennett.

Anthracnose control on black raspberries will probably not be entirely satisfactory until some spray less injurious than those now commonly employed, is found for summer use. In some cases reports indicate that the early spring sprays in 1927 were very beneficial. Haenseler in New Jersey reports on a spray experiment conducted on black raspberries in Camden County as follows:

Unsprayed - 60 per cent canes had 1 to 5 lesions.
Colloidal lime-sulphur
 1-20, two applications - 14 per cent canes had 1 to 5 lesions.
 1-10 dormant, and 1-20 summer - 3.3 per cent canes had 1 to 5 lesions.

He states that Bordeaux mixture is as effective as colloidal lime-sulphur as a summer spray. Bennett in Michigan reports that a delayed dormant was very effective in controlling the early infection and in keeping the lower portions of the new canes relatively free from disease. In Indiana, where conditions for disease development were probably more favorable, Gardner states that a dormant spray failed to control.

Recent literature:

1. Bennett, C. W. Some symptoms of raspberry diseases. Fruit and Gard. 25 (7): 5, 10-11. July, 1927.

2. Beyer, C. A. Diseases of raspberries and their control. Amer. Fruit Grow. Mag. 47 (2): 7, 28. Feb. 1927.

MOSAIC (VIRUS)

There seems to be general agreement among those investigating virus diseases of raspberries that there is a wide range of mosaic or mosaic-like symptoms to be found on raspberry plants. However, there is considerable variation in the interpretation of the significance of different types of symptoms. Three types of mosaic are described by Dodge and Wilcox (6). Bennett (1) has also described three mosaics under the names, "red raspberry mosaic," "mild mosaic," and "yellow mosaic," with the suggestion that in the case of red raspberry mosaic there is probably more than one virus involved. Symptoms of these three types are evidently the same as or very similar to those described by Dodge and Wilcox. Rankin (8) is inclined to attribute mosaic to a single virus. He suggests that some of the milder forms of mottling which occur in New York may be due to other factors such as red spider.

Very little data are available on the relative importance of mosaic in 1927 as compared with the average year. Massachusetts reported much more and Connecticut more than usual. In Minnesota there was less and in Wisconsin and Michigan the same as the average year. In states reporting losses from both anthracnose and mosaic the loss from mosaic was larger than from anthracnose. However, in some states, notably Illinois, Indiana and Arkansas, reporting heavy losses from anthracnose, no mosaic loss estimates are available.

Table 150. Percentage losses from mosaic of raspberries as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
23	Massachusetts	5	Ohio, Wisconsin
10	Michigan, Minnesota	Trace	Delaware, Maryland
			Iowa, Missouri

Regarding the importance of mosaic in 1927 collaborators report as follows:

> Massachusetts: Very severe on reds. Several gardens total failures. On reds this is a most severe disease. (Davis)
>
> Connecticut: Twenty-four reports were received, all but one being on red varieties. (Bender and Clinton)
>
> New York: Orange County - Most of the old plantings were killed by mosaic. New plantings of such varieties as Latham, Ranere, and Herbert are being set out. Latham seems most desirable. (Chupp)

Raspberry - Mosaic

Ohio: All varieties susceptible with the possible exception of La France. Conspicuous red raspberry mosaic rare on Latham and St. Regis, fairly common on Cuthbert. On blackcaps, red raspberry mosaic is not common except where these are grown close to reds. Yellow mosaic is extremely rare. Mild mosaic is uncommon except in the southern part of the state. The damage to raspberries was probably 5 per cent although the total infection with mild mosaic will exceed this.

Michigan: It is estimated that 10 per cent of the King plants in the state have red raspberry mosaic. Yellow mosaic has recently been found on dewberry and King red raspberry but is believed to be more or less rare. Mild mosaic is very common on blacks and purples and in some cases, on red varieties. In some fields of the red varieties, King and Latham, all of the plants are infected with mild mosaic. The disease, however, causes no appreciable damage to reds and symptoms are difficult to see except on leaves produced when the temperature is very low. (Bennett)

Kansas: Common on red raspberries both in the field and in nurseries. (Elmer)

Iowa: The losses are evident only in an indirect manner. Mosaic infected plants may live for an indefinite number of years, but such plants are more subject to winter killing and other unfavorable conditions. (Archer)

Rankin (8) states "The true infectious mosaic of raspberries is the most important and, commercially speaking, the only important disease of red and purple raspberries in New York." Mosaic is not important in Oregon according to Zeller. Loss estimates for 1927 are given in Table 50.

Varietal susceptibility:

It seems to be the general opinion among collaborators who have reported on the subject of varietal susceptibility during 1927, that nearly all raspberry varieties are susceptible to mosaic to a greater or lesser degree. The everbearing varieties are credited with the greatest amount of resistance and the black varieties with the least. Red varieties seem to vary considerably in their resistance.

Rankin (8) has emphasized the importance of a distinction in the case of raspberry, between disease resistant and disease-escaping varieties and has introduced the term "klendusity" to mean disease-escaping. Of the more important red varieties he considers Golden Queen, Marlboro, and Cayuga not "klendusic"; Cuthbert, June, Loudon, Newman, and Ontario slightly "klendusic;" Eaton, Herbert, King, Latham, and Ranere, highly "klendusic;" and La France, Ohta, Sunbeam, Turner, and Van Fleet either immune or "klendusity" absolute. Regarding rate of spread, klendusity and resistance, he further states:

Raspberry - Mosaic

"The rate of spread of mosaic in the varieties Cuthbert and Marlboro is found to be slightly more rapid in western New York than it is in Ontario, Canada. In the lower Hudson River Valley mosaic usually spreads very rapidly in these varieties. The rate of spread of mosaic was measured in 28 named varieties of red raspberries at Geneva. It was found possible to divide the varieties into four classes as to relative klendusity (disease-escaping) and into five classes as to relative susceptibility. Klendusity and susceptibility are not correlated factors. Cuthbert, June and Ontario are only slightly klendusic and moderately susceptible. Herbert and Latham are the important varieties which exhibit a high degree of klendusity to mosaic. The former is very susceptible and the latter is more resistant than other standard varieties, except Ranere. Several less desirable varieties were found to be either immune or very klendusic. Black raspberry varieties are more susceptible to mosaic than red varieties. The injury is more serious to black raspberries and the plants soon die. The incidence of mosaic in black raspberries is high when they are grown near red raspberries containing mosaic. Varieties of black raspberries exhibit marked differences in klendusity."

Reports on varietal resistance are in some cases conflicting, probably partially due to failure to distinguish between susceptibility to infection and susceptibility to injury after infection. In New Jersey the variety Ranere (St. Regis) was reported as apparently immune, while Welch was severely attacked. In Ohio, Wilcox considers all varieties susceptible with the possible exception of La France. In Connecticut, Bender and Clinton report Cuthbert as very susceptible. In Indiana, according to Gardner, all red varieties and the black variety Honeysweet are susceptible. In Michigan, Bennett states that black varieties are very susceptible to injury after infection but often escape infection because aphids prefer other varieties on which to feed. King and Latham are considered more susceptible to infection than Cuthbert but more resistant to disease after infection.

Other data on varietal susceptibility are recorded in Table 51.

Raspberry - Mosaic

Table 51. Data on varietal susceptibility to mosaic as compiled from collaborators' reports.

Very Susceptible	Susceptible	Resistant	Very Resistant
Golden Queen (R) (1)	Cuthbert (R) (1) (2) (3)	Latham (R)(1)(3)	Erskine Pk. (R) (1) (3)
Herbert (R) (1)	King (R) (1) (2)	St. Regis (Ranere) (R)(1)(2)	Sunbeam(R)(1)(3)
Cumberland (B)(1)(3)	Marlboro (R) (1)	Erskine Park (R)(2)	Ohta (R)(1)(3)
Honeysweet (B)(1) (3)	Plum Farmer (B) (1) (2)	King (R) (3)	St. Regis (Ranere) (R) (3)
Gregg (B) (3)	Hoosier (B) (1) (2)		
Kansas (B) (3)	Kansas (B) (1) (2)		
Plum Farmer (B) (3)	Columbian (P)(1)(2)		
	Latham (R) (2)		
	Golden Queen (R) (2) (3)		
	Marlboro (R) (2)		
	Haymaker (P) (2)		
	Cardinal (P) (2)		
	Cumberland (B) (2)		
	June (R) (4)		

R - Red variety. P- Purple variety. B - Black variety.
Numerals indicate the collaborator and state from which the data were received as follows:

1. W. H. Rankin, New York
2. R. B. Wilcox, Ohio
3. C. W. Bennett, Michigan
4. A. S. Colby, Illinois

Control: In several states, notably New York, Illinois, Indiana, Michigan, Wisconsin, and Minnesota, a state inspection service is in operation involving the inspection and roguing of raspberry patches from which stock for new plantings is to be taken. Progress in control has been reported as a result of the use of this measure and, also from roguing, which has been primarily experimental. Rankin (8) in New York states:

> "Control of mosaic by roguing in Cuthbert, Herbert, June, and Ontario was successful at Geneva, the annual amount of mosaic being less than 2 per cent. Cuthbert, June, and Ontario stock from the same sources showed an average of 10 to 30 per cent mosaic after growing for one season in rogued plats in the lower Hudson River Valley. In a planting of over 35 varieties of red and purple raspberries at Geneva rogued for five seasons, the average annual amount of mosaic was reduced from 30 to about 4 per cent. Twenty-four of the varieties were free from mosaic in the fifth season.(1926).

"Mosaic-free stock and roguing of standard varieties are recommended as practicable methods of avoiding loss from mosaic in western, central, and northern New York. The more klendusic and resistant varieties, such as Herbert, Latham, and Ranere, may be successful in the lower Hudson River Valley. Precautions against dispersing aphids in roguing and cultivating are emphasized. The success of these methods of avoiding loss from mosaic depends upon the experience of growers. More desirable dessert and canning varieties which are not subject to mosaic are needed as an ideal solution of the mosaic problem."

In Michigan, according to Bennett, the 1927 plantings which were observed and which were set from inspected plants had less than 2 per cent mosaic. In Minnesota, according to the Section of Plant Pathology, "The percentage of this disease has been appreciably reduced in propagative planting. Some of these plantings have been apparently free from mosaic for the past two years. Ruggles and Winter (10) have published on the results of three years' experience on the control of mosaic in Minnesota. The following table 52 showing the reduction in mosaic in 1924 to 1926, due to roguing, is taken from their report.

Table 52. Total Latham plantings rogued 1924 to 1926.

	Number of plantings	Approximate number of acres	Total hills rogued	Av. per cent of mosaic
Rogued in 1924				
Not previously rogued	48	34	-	-
Rogued in 1925				
Previously rogued	99	87	8,272	4.0
Not previously rogued	23	12	4,865	15.4
Rogued in 1926				
Previously rogued	126	120	3,639	1.4
Not previously rogued	10	7	1,145	8.5

In Michigan, Bennett states:

"Rogying by means of a burner was tried on an experimental basis during the past season. The type of burner used consumes kerosene and throws a flame about twenty inches long. Approximately 50 acres of black raspberries were rogued. It was found that about 50 plants could be burned per hour. Evidence seems to indicate that in Michigan the great majority of mosaic infection takes place after the middle of June. If this is true, burning diseased plants early in the season should prove to be a very effective control measure."

Recent literature

1. Bennett, C. W. Virus diseases of raspberries. Michigan Agr. Exp. Stat. Techn. Bull. 80. 38p.May, 1927.

2. Bennett, C. W. Some symptoms of raspberry diseases. Fruit & Gard. 25 (7): 5, 10-11. July, 1927.

3. Berkeley, G. H. Raspberry mosaic. Canad. Hort. 50: 173-174. July, 1927.

4. Boyer, C. A. Diseases of raspberries and their control. Amer. Fruit Grow. Mag. 47 (2): 7, 28. Feb. 1927.

5. Chambers, E. L. The red raspberry mosaic situation in Wisconsin. Wisconsin Hort. 17: 84-85, 89-90. Feb. 1927.

6. Dodge, B. O. and R. B. Wilcox. Diseases of raspberries and blackberries. U. S. Dept. Agric. Farmers' Bull. 1488. 32 pp. 1926.

7. Elmer, O. H. Virus diseases of raspberries. Rep. Iowa State. Hort. Soc. 61: (1926) 211-213. 1927.

8. Rankin, W. H. Mosaic of raspberries. New York (Geneva) State Agr. Exp. Sta. Bull. 543. 60 p. Mar. 1927

9. Rankin, W. H. Symptoms of mosaic in raspberries. Canad. Hort. 50: (9) 217. Sept. 1927.

10. Ruggles, A. G. and J. D. Winter. Results of three years' experience in the control of mosaic in red raspberries in nurseries. Jour. Econ. Entom. 20: 478-483. June, 1927.

CURL (VIRUS)

In the states from which reports were received in 1927, there was on the average less curl present than in any one of the three preceeding years. In some of the states growing the highest raspberry acreages, namely, New York, Michigan, Illinois, Ohio, Oregon, Minnesota, Indiana, and Washington, this disease is not indicated as very important in the average year. Loss estimates for 1927 are: Ohio, 1 to 2 per cent, Michigan 1 per cent, and Minnesota a trace. The disease was reported from New York, Indiana, and Wisconsin but no loss estimates were given. In Washington it is said to be very important in the Spokane valley and also present in the Puyallup section. Rankin (2) states that, "Leaf-curl, although an important virus disease of red raspberries in many sections, is rarely found in New York." No curl was observed in Oregon.

Raspberry - Curl

Collaborator's reports indicate that curl is much less important than mosaic.

The factors which have been suggested as important in accounting for this small amount of injury are the following:

1. Curl symptoms are readily recognized by the average grower and diseased plants are removed.

2. Only a limited number of varieties is susceptible to severe curl infection.

3. *Aphis rubiphila*, believed to be the chief agent of dissemination of curl, is a small, slow-moving insect and is not so readily dispersed as some of the other species of aphids which feed on raspberries.

Although total losses are low, curl is not in all cases a minor disease, but in some plantings is very severe. Wilcox states that, "Leaf curl is not common in Ohio but when it does occur it frequently ruins an entire field in three or four years." In Michigan, infestations ranging from 10 to 80 per cent of the plants in individual fields are reported.

There is considerable lack of agreement among collaborators regarding varietal susceptibility although Cuthbert and Cumberland are usually considered to be susceptible. In Wisconsin, Vaughan states that curl is not severe on Latham, but that Marlboro, King, and Cuthbert are quite susceptible. Wilcox in Ohio states that, "Leaf curl occurs on both reds and blacks. Of the black-caps, Plum Farmer and Kansas appear immune, Cumberland and Hoosier very susceptible." He states that the disease is common on the red varieties Cuthbert and Marlboro. In Michigan Latham is considered susceptible and King very resistant or practically immune.

The variations in apparent resistance which exist may be due in part to the occurrence of different types of curl virus. Smith (3) was unable to infect black varieties from red varieties which had curl. Similar results were obtained by Bennett (1) who states:

> "Curl is readily transmitted from one susceptible black variety to another and has been transmitted from the black variety Cumberland to the red variety Cuthbert. The percentage of infection in the case of inoculations from blacks to reds, however, was not so high as when the transfers were from reds to reds or from blacks to blacks. Transfers of curl from red to blacks has never been obtained, though large number of aphids have been used and repeated inoculations have been made.

"Field observations would also indicate that curl does not readily pass from red to black raspberries. In several instances, rows of Cuthbert plants having a high percentage of curl are known to have grown alongside of rows of Cumberland plants for a number of years with the appearance of no evidence of curl in the black variety."

Other data on varietal susceptibility are recorded in Table 53.

Table 53. Data on varietal susceptibility of raspberries to curl as compiled from collaborators' reports, 1927.

Very Susceptible	Susceptible	Resistant	Very Resistant	Believed to be immune
Cuthbert (R) (1) (2) (3)	Latham (R) (1)	Brighton (R) (1)	Columbian(P) (1)	Erskine Park(R) (1)
Golden Queen (R) (1) (2)	Marlboro (R) (1)	Latham(R)(2)	Kansas(B)(1)	Sunbeam(R)(1)
Haymaker (P) (1)	Viking(R)(1)	King (R) (2)	Erskine Park (R) (2)	La France(R)(1)
Cumberland (B) (1)	Gregg (B) (1)		St. Regis Ranere(R)(2)	Ohta (R) (1)
Marlboro (R) (2)				St.Regis(R)(1)
				June (R) (1)
				Cardinal(P)(1)
				Plum Farmer (B) (1) (2)
				Kansas (B) (2)

R - Red variety. P - Purple variety. B - Black variety

Numerals indicate the collaborator and state from which the data were received as follows:

1. C. W. Bennett, Michigan 2. R. B. Wilcox, Ohio
3. W. H. Rankin, New York

Literature cited:

1. Bennett, C. W. Virus diseases of raspberries. Mich. Agric. Exp. Sta. Tech. Bull. 80. 38 p. 1927.

2. Rankin, W. H. Mosaic of raspberries. New York Agric. Exp. Sta. Bull. 543. 60 p. 1927.

3 Smith, F. T. The relation of insects to the transmission of raspberry leaf curl. Jour. Econ. Entom. 18: 509-513. 1925

STREAK, CAUSE UNDETERMINED

During the year very little additional information regarding the distribution, prevalence, economic importance, and method of spread of this disease has become available. As yet no definite experimental evidence of transmission of streak by insects or other agencies has been produced though it is generally assumed on the basis of type of increase under field conditions that it is spread by sucking insects, probably aphids.

In 1927 streak was reported from New York, Ohio, Illinois, Michigan, and Oregon. Losses of 3 per cent in Ohio and 2 per cent in Illinois are reported. The other states mentioned merely indicated the occurrence of streak with no estimates of loss. The following remarks by collaborators indicate that streak is probably of less importance than curl, and caused less damage in 1927 than in the average year; and in some cases is being successfully controlled:

> New York: It is difficult to find definite streak. Indications of streak occasionally accompany "red raspberry mosaic" and "mild mosaic." - Double infection? (Rankin)
>
> Ohio: The raspberry acreage has been much reduced in recent years in the worst infected districts, due partially to disease but more to growth of cities. Of plantings made in new territory, many have been set with clean stock. (Wilcox)
>
> Illinois: Nursery inspectors report that the disease is not so prevalent as when first found in the state. (Anderson)
>
> Oregon: Known to be present in one planting of Cumberland. (Zeller)

Wilcox considers that red varieties are probably immune to streak. He says that streak has been found on unnamed hybrids but is very rare in the more common purple varieties such as Haymaker and Columbian. Hoosier and Honey Sweet he classifies as very susceptible and Plum Farmer and Kansas as somewhat more resistant.

TIP-BLIGHT CAUSED BY GLOMERELLA CINGULATA (STON.) SPAULDING AND SCHRENK

During the year Dodge (1) has published on a hitherto undescribed "Gloeosporium disease of raspberry" which has been found in Maryland, Ohio, Kentucky, Michigan, and other states. This trouble is known to have been of considerable importance in some plantings of black raspberries but its general economic importance has not been determined. This disease is described by Dodge as follows:

> "On the Columbian variety it first causes a blackening or necrosis of the leaf stalks and tips of young shoots. Later the leaves collapse and the tip ends of the shoots turn purple or blue, the discoloration proceeding from the tip downward. The lower part of the young cane may remain green for some time. The whole turion may finally die or the disease

may be confined to a single lateral. On account of the fact that the young canes, when badly infected, turn blue or purple, the disease is likely to be confused during the summer season with raspberry wilts which are known as blue-stem. In the case of the raspberry wilts, the blue discoloration appears just at the base and works upward while in the Gloeosporium blight the blueing of the shoot begins at the tips and works downward."

Regarding the cause, Dodge states:

"According to Shear, the strains of Gloeosporium isolated from raspberries, cannot be distinguished morphologically from those commonly found on apples and referred to Glomerella cingulata or Gloeosporium cingulatum.

"Cross inoculation with the chromogenic strain from raspberry and with a nonchromogenic strain from apple demonstrated the pathogenicity of the three strains on both hosts."

Other interesting relations of this trouble remain to be determined. One important consideration is the relation which this disease may have to apple bitter rot. Will the causal organism overwinter on raspberry and cross to apple the following spring? What is the significance of the finding of abundant development of this fungus on raspberries in the vicinity of apple orchards in Michigan and other northern states where bitter rot on apple is very rarely observed?

Literature cited:

1. Dodge, B. O. Gloeosporium blight of raspberry. Phytopath. 17: 769-774. 1927.

CANE BLIGHT CAUSED BY LEPTOSPHAERIA CONIOTHYRIUM (FCKL.) SACC.

Cane blight is not generally considered one of the more important diseases of raspberry although occasionally considerable losses are attributed to it. In some cases there is a question as to how much loss has been due to cane blight and how much to other causes. Since the effects of winter injury have been better recognized there has been a tendency to attribute more loss to this cause and less to cane blight. The cane blight fungus is reported as commonly occurring on winter injured canes and frequently the primary cause of injury is obscure.

Reports from fourteen states in 1927 indicate that collaborators consider this disease of very little importance.

New Jersey: Severe in one spot 50 by 15 feet on red raspberries under irrigation. (Haenseler)

Michigan: Little injury observed, fungus often present on winter injured canes. (Bennett)

Wisconsin: Widely distributed, not especially serious. (Vaughan)

Iowa: Occurs quite abundantly following winter injury. This year it appeared later in the fall than common. (Archer)

Oregon: Has been found only on winter injured black caps; seldom seen in the Northwest. (Zeller)

ORANGE RUST CAUSED BY GYMNOCONIA INTERSTITIALIS (SCHL.) LAGH. AND KUNKELIA NITENS (SCHW.) ARTH.

Orange rust on raspberries has a wide distribution as indicated by reports of occurrence in Massachusetts, New York, Delaware, Virginia, West Virginia, Michigan, Wisconsin, Minnesota, and Iowa. However, records indicate even a wider and more general occurrence on blackberry. Although this disease is unquestionably one of the minor problems of raspberry it is capable of doing serious injury under conditions favorable for its spread. The area of most abundant occurrence is probably southwestern Michigan. In Berrien and Van Buren Counties of that state, approximately 4,000 acres of raspberries are grown besides a considerable acreage of blackberries and dewberries. Wild brambles are common over this area and these are commonly infected with rust. Under such conditions orange rust sometimes becomes a serious factor in local plantings although in general the disease is not considered to be a menace. In 1927 in Michigan, Bennett reported a 63 per cent infestation in one three acre field of Cumberland raspberries and fields in which 5 per cent or more of the plants are affected are said to be common in certain sections. Some conception of the relative importance of orange rust can be obtained from the following reports by collaborators:

New York: Nearly altogether limited to wild plants, for in the cultivated plots the diseased plants are rogued. (Chupp)

West Virginia: Very important in the state but no data available on losses (Sherwood)

Arkansas: Not seen on raspberry but very important on blackberry. (Young)

Wisconsin: Abundant on wild and cultivated blackberry and wild black raspberry. Not found on red raspberry nor on cultivated black raspberry. (Vaughan)

Minnesota: A single case was reported on wild black raspberry. (Section of Plant Pathology)

Iowa: Four reports were received of infection on cultivated plants; wild raspberries are affected generally. (Archer)

All red varieties of raspberries are considered to be immune to orange rust, and purple varieties, if not immune, are extremely resistant. According to Bennett the black varieties which are most seriously affected in Michigan are Cumberland and Gregg. Plum Farmer and Kansas seem to be slightly more resistant.

CROWN GALL CAUSED BY BACTERIUM TUMEFACIENS EFS. AND TOWN.

In 1927, twenty-one states reported on crown gall on raspberries. In two states, Illinois and Michigan, it is considered a very important disease. In Minnesota, Connecticut, and New Jersey, it is said to be of moderate importance, and in Massachusetts, Maryland, New York, Florida, Indiana, Wisconsin, Iowa, Kansas, and Oregon of slight importance. Estimated losses are, Michigan 3 per cent, Minnesota 2 per cent, New York 0.2 per cent, Iowa and Maryland a trace. Chupp in New York reports that in one lot of nursery stock of the Columbian variety, 30 per cent of the plants had galls.

Massachusetts: Of slight importance; rarely observed. (Davis)

New York: Very severe in one patch of Columbians where a heavy coating of manure had been put on the fall before. (Taylor)

Michigan: Very common on plnatings growing on the light sandy soil of the southwestern part of the state. More often found on the roots of reds and on the fruiting canes of blacks. On black and purple varieties galls are sometimes so numerous around the crown of the plants, that no new canes are produced and the affected plants die after fruiting. (Bennett)

Utah: Reported occasionally in nursery stock. In one home garden in Logan it has proved very destructive. Its prevalence in commercial plantings in the state is unknown. (Linford)

Recent literature:

1. Banfield, W. M. Studies on the life history of the crown gall organism. (Abstract) Phytopath. 18; 128-129, 1928.

POWDERY MILDEW CAUSED BY SPHAEROTHECA HUMULI (DC.) WINT.

With the increased popularity of the Latham variety of red raspberry, powdery mildew is rapidly assuming a place of major importance as a raspberry disease. The Latham is the only variety reported as seriously injured in 1927, though the purple variety Cardinal and the black variety Munger are said to be very susceptible. In Michigan, King is attacked but the disease is chiefly important on this variety because of confusion of symptoms of mildew with mosaic. In Minnesota, where the Latham variety is grown almost exclusively the loss for 1927 was estimated at 5 per cent.

Massachusetts: Moderately severe on the variety Latham. Not present on the other varieties. (Doran)

Connecticut: One report on this host; new to the State. (Bender)

Ner Jersey: 90 to 100 per cent infection on cane tips in one plantation near Hammond. (Haenseler)

Michigan: Caused a 20 per cent reduction in size of new canes of the Latham variety. The Cardinal is also very susceptible. Mildew occurred also on Cumberland, Plum Farmer, King, and wild red raspberries, but has caused no direct injury on these varieties. (Bennett)

Minnesota: Causes a general stunting in Latham especially in low areas and where rows are permitted to widen out. (Section of Plant Pathology)

Oregon: Limited to Munger of our three commercial varieties. Usually over 90 per cent of the plants of this variety are affected in the Williamette Valley. (Zeller)

Utah: Reported only from Castle Dole, Emery County, where in one planting it has been injurious for several years. (Linford)

OTHER DISEASES AND INJURIES

Armillaria mellea (Vahl) Quel., root-rot. Puyallup, Washington.

Ascospora rubi (Westend.) Zeller, canespot. Again reported from Oregon by Zeller. A 25 per cent infection was observed in one field. The Cuthbert variety is susceptible.

Botrytis sp., gray mold. Reported from New Jersey and Connecticut, in the latter state causing moderate injury on berries which were over-ripe when picked.

Cercospora rubi Sacc., leaf-spot. New York, on the variety Herbert.

Kuehneola uredinis (Lk.) Arth., yellow rust. Reported from Danville, Virginia, and Knoxville, Tennessee.

Mycosphaerella rubi Roark, leaf spot. In Ohio, Cooley reports that leaf-spot appeared early, being first noted June 15. The infection was abundant and widespread but caused only a slight loss. In Kansas it was general and severe on both red and black raspberries. In Michigan, the King variety is rather susceptible to this trouble but very little loss is caused. Other reports were received from Connecticut, New Jersey, South Carolina, and Iowa.

Mycosphaerella rubina (Pk) Jacz, Spur-blight seems to cause more injury in the western states than in the eastern. In Wisconsin, according to Vaughan, the disease may be associated with winter injury since it was most abundant in the vicinity of Bayfield where winter injury was severe. In Colorado it was very common and destroyed many fruiting canes. Fruit was small and ripened prematurely. The most severe loss was reported by Zeller in Oregon where a 40 per cent reduction in yield was reported in some fields. Two applications of 3-3-50 Bordeaux mixture gave control.

Phragmidium imitans Arth., leaf rust. Reported from Washington and Oregon. Zeller (4) states that it developed to serious proportions though it is difficult to estimate the damage. He states that the infection of second-year or fruiting canes near the ground is the most serious phase of the disease, since the resulting lesions produce brittleness and diminish sap conducting tissues.

Pucciniastrum americanum (Farl.) Arth., rust. Specimen received from Dunn County, Wisconsin, and identified by B. O. Dodge

Verticillum albo-atrum Reinke and Berth., wilt. In New Jersey, Verticillium was isolated from black raspberry plants set in the spring of 1927 in soil where egg-plants had had a 100 per cent Verticillium wilt infestation the previous year. Giddings states that wilt was unusually severe in West Virginia. This is attributed in part to the wet fall of 1926. In Michigan a ten acre field of Cumberlands set in 1926 had 40 per cent of the plants killed before the end of the 1927 season.

Chlorosis (cause undetermined). A type of chlorosis of unknown cause was said by Linford to be the most widespread and destructive disease of raspberry throughout Utah. Loss is estimated at 2 per cent.

Frost injury. No severe injury was reported. Frost markings consisting of white dots and lines parallel to the main veins of the leaves were common in Michigan.

Fruit mold. Rankin reported a 50 per cent loss of fruit in Ontario County, New York, due to molding of berries following "plant bug" injury.

Wind whipping. Death of young canes of black raspberries due to swaying in the wind, resulting in the breaking of the bark at the point of union with the crown, caused damage in Michigan and Iowa. A 1 per cent loss is estimated for Iowa.

Winter Injury. A loss estimated at 12 per cent occurred in Iowa according to Archer. He states:

> "Practically every raspberry grower experienced considerable loss this season from winter injury. The injury was manifested in marginal burning of leaves, blasting of blossoms, or quite frequently the sudden death of an entire cane while in full fruit. In addition the situation was often complicated by over-loading. That is to say, the injured plants which bore a heavy crop of fruit could not stand the added load under conditions of drought which occurred throughout the season in 1927. This is the second consecutive year of severe winter injury. Winter injury in the past two years has been the largest factor contributing to losses. In truth, losses from this source are often high."

Recent literature:

1. Bennett, C. W. Some symptoms of raspberry diseases. Fruit and Gard. 25 (7): 5, 10-11. July, 1927.

2. Boyer, C. A. Diseases of raspberries and their control. Amer. Fruit Grow. Mag. 47 (2): 7, 28. 1927.

3. Melhus, I. E. and O. H. Elmer. Raspberry diseases in Iowa. Iowa Agr. Exp. Sta. Circ. 105. 15 pp. June, 1927.

4. Zeller, S. M. The yellow rust of raspberry caused by *Phragmidium imitans*. Jour. Agr. Res. 34: 857-863. 1927.

5. - - - - - - - Contributions to our knowledge of Oregon fungi. II. Mycological notes for 1925. Mycologia 19: 130-143. 1927.

B L A C K B E R R Y

ORANGE RUST CAUSED BY GYMNOCONIA INTERSTITIALIS (SCHL.) LAGH. AND KUNKELIA NITENS (SCHW.) ARTH.

Reports of collaborators do not indicate that orange rust was especially destructive in 1927. Estimated losses are Michigan 1 per cent, New York, Texas, Iowa and Mississippi, a trace. In New York Chupp states that most of the rust is on wild plants. Cultivated plantings are watched and diseased plants removed before the rust spreads. According to the Department of Plant Pathology, much the same thing is true in New Jersey. The Russell variety is said to be resistant. In Michigan, wild blackberries, dewberries and raspberries are affected and in some commercial plantings as many as 10 per cent of the plants are rusted. In Arkansas, V. H. Young states that orange rust is very common and destructive. Indiana and Wisconsin report the presence of rust. Wilcox in Ohio states that, "Eldorado, the main commercial variety is very resistant, but where Blower, Erie, or Early Harvest were grown, rust was common." He estimates the loss at less than 1 per cent.

ANTHRACNOSE CAUSED BY PLECTODISCELLA VENETA (SPEG.) BURKH.

Anthracnose is not usually considered to be a very destructive disease on blackberries. In 1927, although not especially serious, it caused more damage in some states than usual. Archer in Iowa states that in an average year this disease is relatively unimportant, but that in 1927 it occurred generally in scattered plantings. Gardner in Indiana and Bennett in Michigan report a heavy infection on the young canes and on the fruiting spurs, leaf petioles and leaves. This disease is also reported from New Jersey but no loss estimates are given.

MOSAIC, DWARF, AND CURL (VIRUS)

Mosaic: Reports of mosaic on blackberries were received from New York, New Jersey, Indiana and Michigan. In New York the loss is estimated by Chupp as a trace to 1 per cent. Taylor, also in New York, states that mosaic was very severe on the new variety Giant and affected plants had little vitality. Haenseler states that mosaic was "General in all parts of South Jersey on Russell." In Michigan according to Bennett, "With the exception of streak, the known virus diseases which attack raspberries also attack certain varieties of blackberry. One planting of the new variety Alfred, growing close to mosaic Latham raspberries, had 5 per cent mosaic. Symptoms were less severe than on raspberry. In general, however, mosaic is not common on blackberry. This is believed to be due to the fact that the common blackberry varieties do not seem to serve as very acceptable food plants for the species of aphid which is known to transmit mosaic."

Dwarf: Zeller (1) in Oregon described under the name of dwarf a disease of the virus type which has been under observation since 1918. He states:

> "Some growers of Phenomenal berries have reported as many as 100 per cent of the plants affected by the third year in plantings which have not been rogued. One planting of loganberries with 19 per cent of diseased plants in the third year has been found. As a rule, however, the loss through dwarf to the loganberry industry in the Pacific Coast States is very slight, but many individual growers have experienced high enough percentages to make total eradications necessary."

Dwarf has been transmitted by means of the aphid Capitophorus tetrarhodus.

Curl: In Michigan according to Bennett, curl was found on wild blackberry, indentified as Rubus allegheniensis, and on the Lucretia blackberry. By means of Aphis rubiphila, curl was transmitted from Cuthbert raspberry to Lucretia blackberry and back to raspberry.

Recent literature:

1. Dwarf of blackberries. Phytopath. 17: 629-648. Sept. 1927.

MISCELLANEOUS DISEASES AND INJURIES

Bacterium tumefaciens EFS and Town., crown gall. Massachusetts, New York, Michigan, and Texas reported crown gall on blackberry in 1927. Loss estimates are Michigan 2 per cent, Texas 1 per cent, New York, a trace. In one four-acre field in Michigan, 50 per cent of the plants were seriously affected.

Cercospora rubi Sacc., blotch. Specimens received from Hidalgo County, Texas, determined by B. O. Dodge.

Fusisporium rubi Wint., double blossom. Reported from New Jersey on the variety Black Diamond.

Kuehneola uredinis (Lk) Arth., yellow rust. New Jersey, Tennessee, Arkansas. In New Jersey "Varieties which are most susceptible to anthracnose are also very susceptible to yellow rust." (Dept. Plant Path.)

Leptosphaeria coniothyrium (Fckl.) Sacc., cane blight. A planting of one-fourth acre in Monmouth County, New Jersey was severely damaged

Mycosphaerella rubi Roark, leaf-spot. Estimated losses are, Kansas 2 per cent, Texas 1 per cent, Iowa a trace. Zeller in Oregon states that the Oregon Evergreen variety is immune, Himalaya resistant, Mammoth susceptible, and Kittatinny very susceptible. Leaf spot was severe in one planting in New Jersey and was found in Missouri in several wild patches.

Sphaerotheca humuli (DC) Burr, mildew. Bender reported this disease from Connecticut. This is said to be the first record of its occurrence on blackberry in the state.

Winter injury Archer reports a 5 per cent loss to blackberries in Iowa. He states:

> "Evidences of winter injury on blackberry occurred throughout the state in the form of leaf burn followed often by death of the plant before or during full fruit. During the past two winters, weather conditions have been severe, that is no snow with fairly low temperatures. These low temperatures injured the wood of plants which had failed to mature due to excessive moisture late in the fall."

DEWBERRY

Collybia dryophila Fr., root rot. This new disease is reported by Poole (1) from North Carolina.

Fusisporium rubi Wint., double blossom. Reported from New Jersey and Alabama.

Gymnoconia interstitialis (Schl.) Lagh. and Kunkelia nitens (Schw.) Arth., orange rust. Common in New York and Michigan on wild dewberries but of little importance on cultivated varieties. In Michigan the short cycle form is by far the more common.

Mycosphaerella rubi Roark, leaf spot. Reported from New York, South Carolina, Indiana, Michigan, Texas, and Washington. In New Jersey, an unnamed wild variety proved to be much more resistant than the variety Lucretia.

Mosaic undetermined. In Michigan, Bennett states, "The Lucretia dewberry is susceptible to both yellow mosaic and red raspberry mosaic. These diseases however, are only occasionally found in commercial fields and no appreciable loss has been produced. Mosaic is very common on wild dewberries in the southern part of the state."

Recent literature:

1. Poole, R. F. A root rot of Lucretia dewberry caused by a variety of Collybia dryophila Fr. Jour. Agr. Res. 35: 453-464. Sept.1, 1927.
2. Poole, R. F. A variety of Collybia dryophila parasitic on dewberry. Jour. Elisha Mitchell Sci. Soc. 43: 101-104. Dec. 1927.

LOGANBERRY

Bacterium tumefaciens EFS. and Town., crown gall. Reported from Washington.

Dwarf, undetermined. An infection amounting to 16 per cent of the plants in one field in Oregon was reported by Zeller.

CURRANT

Botryosphaeria ribis Gross. and Dug., cane blight. Reported from New Jersey.

Botrytis cinerea Auct., die back. In New Jersey, a fungus of the B. cinerea type was reported as causing a leaf-spot. Haenseler states: "About 10 per cent of the leaves of plants on an experimental plot at New Brunswick were infected. Generally there was only one spot, 1 to 2 centimeters in diameter, on each leaf." The Botrytis was isolated and the disease reproduced from inoculation.

Cercospora angulata Wint., leaf-spot. Archer found this disease to be common in Iowa. He says, "This leaf spot has a general distribution over the state and caused severe defoliation. All currants were totally defoliated by the latter part of September. The cause is not always Cercospora angulata since two other fungi, Mycosphaerella grossulariae and Pseudopeziza ribis, also cause defoliation."

Mycosphaerella grossulariae (Fr.) Lindau, leaf spot. Reported from New York, Indiana, Michigan, Iowa, and Washington. In Indiana this leaf-spot is said to have caused less damage than anthracnose.

Pseudopeziza ribis Kleb., anthracnose. In Connecticut, Bender states that anthracnose was more common and injurious than in the average year. In Indiana, Gardner observed severe defoliation during June, and says that the variety London Market has considerable resistance. Other reports of occurrence were received from New Jersey, New York, Michigan, Iowa and Washington.

Recent literature:

1. Amos, J. and Hatton R. G. Reversion of black currants. I. Jour. Pomol. & Hort. Sci. 6: 167-183. Sept. 1927.

2. Vasil'evsky, N. I. . . . Über die Beziehung der Septoria-arten auf Ribes nigrum and R. grossularia. Bolezni Rast. (Morbi Plant.) 16: 61-70. 1927.

3. Hoggan, Isme A. The parasitism of Plowrightia ribesia on the currant. Trans. Brit. Mycol. Soc. 12: 27-44. Mar. 1927.

G O O S E B E R R Y

Botrytis sp., die back. Van Hook (4) has recently published on a Botrytis disease found on gooseberry first near Bloomington, Indiana, more than eight years ago. It is said to cause a die-back of young growing shoots and to produce a "witches' broom" effect. The disease has occurred each season since its first discovery.

Mycosphaerella grossulariae (Fr.) Lindau, leaf spot. Gardner in Indiana states that this disease was more severe on gooseberry than on currant. Archer in Iowa says regarding this disease:

> "In 1927 the disease was first observed, June 15, in nursery rows at Shenandoah, where it occurred only on lower leaves. During July, in the nursery, infection spread to all the leaves. Defoliation started in August and was quite severe during September. Defoliation occurred on one and two-year old plants as follows: Red Jacket 90 per cent, Downing 80 per cent, Houghton 60 per cent. A spray schedule reduced the infection on Downing and Pearl to 5 per cent with no defoliation."

Gooseberry

Pseudopeziza ribis Kleb., anthracnose. In New Jersey severe on a few bushes. In Indiana, there was more anthracnose than usual resulting in defoliation. In Iowa, Archer reports the disease as common throughout the state on wild gooseberries.

Sphaerotheca mors-uvae (Schw.) Berk. & Curt., mildew. Reported from Indiana, Colorado, and Utah. It is said to have been severe locally in all three states. The loss in Iowa was estimated as a trace.

Recent literature:

1. Ericson, A. L. Wieder ein Mittel gegen Stachelbeermehltau. (Another remedy for gooseberry mildew.) Obst.-und Gemüsebau, 73: 94. 1927.

2. Muskett, A. E. and E. Turner. The control of American gooseberry mildew in northern Ireland. Jour. Min. Agr. North Ireland. 1927.

3. Wattrass, R. M. Further experiments on the control of American gooseberry mildew. Jour. Min. Agric. 33: 1017-1022. 1927.

4. Van Hook, J. M. A Botrytis disease of Ribes odorata Wendl. Proc. Ind. Acad. Sci. 36: 253-255. 1927.

CRANBERRY

False-blossom, undetermined. W. E. Stevens reports that in Plymouth County, Massachusetts, false blossom has increased at least ten times within the last three years. Spaeth and Kraybill (3) have conducted biochemical tests on plants affected by this trouble. They find that plants having false-blossom are higher in free reducing sugars, sucrose, starch, acid-hydrolizable substances and dry matter and lower in moisture, than healthy plants. They suggest that the trouble is caused by a virus.

Recent literature:

1. Brown, W. S. The cranberry in Oregon. Oregon Agr. Exp. Sta., Bull. 225: 31 p. 1927.

2. Driggers, B. F. A comparison of dusts and spray to control fungous diseases of the cranberry. New Jersey Agr. Exp. Sta. Bull. 450: 16p. April 1927.

3. Spaeth, C. P. and H. R. Kraybill. A biochemical study of the false-blossom disease of the cranberry. Jour. Agr. Res. 34: 35-47. Jan. 1927.

4. Stevens, N. E. Four years experience in forecasting the keeping quality of the cranberry crop in Wareham and Carver. Ann. Rep. New England. Cranberry Sales Co., 1927: 27-37. 1927.

5. Stevens, N. E. and H. F. Bain, Storage rots of cranberries in the 1926 crop. Phytopath. 17: 649-655. Sept. 1927.

MULBERRY

Bacterium mori (Boyer & Lambert) emend. EFS., blight. Specimens were received from H. H. Wedgworth in Mississippi. Scott in Missouri reports that it was found to be quite severe in one nursery, young trees showing 25 per cent or more infection. He also observed the disease on older trees in scattered locations over the state.

Pleospora maculans (Bereng.) Allesch., leaf-spot. North and South Carolina.

Sclerotinia carunculoides Siegler & Jenkins, popcorn disease. Mississippi.

Sclerotinia sp., canker, Texas.

DISEASES OF SUBTROPICAL FRUITS

Prepared by H. R. Fulton

CITRUS FRUITS

I. DISEASES CAUSED BY OR ATTRIBUTED TO PARASITES

CANKER CAUSED BY BACTERIUM CITRI (HASSE) JEHLE

In Florida 85 infected trees found in November on two properties near Fort Lauderdale were destroyed. This is the first serious infection found in Florida since 1923, although five infected trees were discovered in 1925 and two in 1926. In Alabama one infected grove tree was found in June. In Mississippi no canker has been found since 1922. In Louisiana there still remain a considerable number of scattered infections in dooryard plantings. In Texas there remains but one known infested property. (Kellerman)

BLAST CAUSED BY BACTERIUM CITRIPUTEALE C. O. SM. (B. CITRAREFACIENS LEE)

Fawcett reports for California, moderate damage from this disease, and greater prevalence then usual. It occurs locally and affects navel oranges most, although all types of citrus are susceptible.

SCAB CAUSED BY SPHACELOMA FAWCETTI JENKINS (SPOROTRICHUM CITRI BUTLER)

Florida: On account of extreme drought very little scab developed on grapefruit from bloom at normal time. Fruit from bloom developing during the rainy season was attacked in many instances. Generally speaking, outbreaks were scattered, and there was much less damage than usual (Wolf). Spring bloom fruit practically free of scab; summer bloom fruit moderately affected (Winston).

Alabama: About the average amount on Satsuma oranges. Generally well controlled by spraying with Bordeaux (Fulton).

Mississippi: The usual amount on grapefruit and Satsuma orange, causing very slight losses. (Neal and Wedgworth).

Louisiana: Of usual moderate importance on Satsuma orange (Tims).

Texas: Unimportant traces reported from the Gulf Coast region by Taubenhaus and Bach.

MELANOSE CAUSED BY DIAPORTHE CITRI (FAWCETT) WOLF (PHOMOPSIS CITRI FAWCETT)

Florida: A prolonged spring drought hindered infection, in spite of an abnormally large amount of sporulation on twigs killed by cold. Little serious damage to new shoots with advent of rains (Wolf). Spring bloom fruit passes the susceptible period without being seriously attacked by melanose. The summer bloom fruit and the late flush of growth seriously affected (Winston)

Alabama: Slight traces on Satsuma oranges. The commercial crop is well protected by Bordeaux spraying (Fulton)

Mississippi: Reported by Neal and Wedgworth as of minor importance; favored by ample moisture and warm temperatures; grapefruit and Satsuma oranges affected.

Texas: Reported by Bach on grapefruit in Hidalgo County.

STEM END ROT CAUSED BY PHOMOPSIS CITRI FAWCETT OR DIPLODIA NATALENSIS EV. OR OTHER FUNGI

Florida: Both Phomopsis and Diplodia types of stem end rot prevalent in usual degree in spite of drought conditions during the early part of the growing season (Fulton)

BLUE MOLD AND GREEN MOLD ROTS CAUSED BY PENICILLIUM ITALICUM WEHMER AND PENICILLIUM DIGITATUM (FR.) SACC.

Florida: Less than usual in commercial shipments from the state. Relatively dry conditions in groves during shipping season probably had an influence. Green mold the most prevalent (Fulton).

California: Fawcett reports both types to have been more than normally prevalent and very important, long periods of rain in spring having been favorable for their development.

FRUIT ROTS CAUSED BY VARIOUS ORGANISMS

Alternaria citri Pierce, black rot, caused slight losses in Florida on oranges and in Alabama on Satsuma oranges (Fulton). In California it caused moderate loss, less than usual, on oranges and on lemons (Fawcett).

Botrytis cinerea Pers. Botrytis rot was of moderate importance, less than usual, in California (Fawcett).

Oospora citri-aurantii C. O. Sm., sour rot, in California, occurred on lemons more frequently than on oranges, less prevalent than usual, of moderate importance (Fawcett).

Phytophthora citrophthora (Sm. & Sm.) Leonian (Pythiacystis citrophthora (Sm. & Sm.), brown rot, was of usual prevalence in California. Lemons are more susceptible than oranges or grapefruit (Fawcett).

Sclerotinia sclerotiorum (Lib.) Massee, cottony rot, was less prevalent than usual in California. Lemons are especially susceptible (Fawcett).

Foot rot, presumably Phytophthora sp., Florida: Injury from the freeze in January did not favor foot rot, and it was less evident on old seedling sweet orange trees than in previous three seasons. Rainfall was far below normal with no downpours or prolonged periods of considerable rain. These conditions favored slow tree growth and were correlated with unfavorable conditions for foot rot development (Wolf).

GUMMOSIS AND BARK DISEASES DUE TO VARIOUS ORGANISMS.

Diplodia sp., Diplodia gummosis, was of moderate importance and of usual prevalence on lemons in California (Fawcett).

Phomopsis californica Fawc., decorticosis, was of usual moderate importance in California. Eureka variety of lemon is most susceptible, other lemon varieties less so; orange and grapefruit varieties immune (Fawcett). Sour orange stated by L. J. Klotz to be resistant.

Phytophthora (Pythiacystis) citrophthora, Pythiacystis gummosis was of usual prevalence in California; lemons are very susceptible, oranges and grapefruit less so, and sour orange is very resistant (Fawcett). Reported as occurring in Arizona. (State Comm. Hort. News Letter).

OTHER PARASITIC DISEASES

Armillaria mellea (Vahl) Quel., Armillaria root rot, was reported as occurring in usual degree in scattered localities in California (Fawcett).

Capnodium citricolum McAlp., sooty mold, was less prevalent than usual in Florida (Fulton). A trace was reported from Texas by Taubenhaus.

Cephaleuros mycoidea Karst., algal spot, is widespread in Florida but not seriously destructive. It is absent from groves that receive Bordeaux spray. It has been collected on leaves of grapefruit, of tangerine orange, of Temple orange, of Cuban shaddock and of sweet lemon (Wolf).

Colletotrichum gloeosporioides Penz., dieback, attributed to this fungus was reported by Neal from Mississippi as being of slight importance, and by Taubenhaus and Bach from Texas as occurring as a trace. For California, Fawcett reports a slight, but less than usual, anthracnose and withertip effects. Noted by L. Ogilvie as being most severe in Bermuda on lime and lemon, also to be found on orange and grapefruit.

Corticium koleroga (Cooke) Höhn., thread blight or shoestring disease, was reported in considerable quantity from a new locality in Florida, southeast of Lake Okeechobee, by Wolf.

Cuscuta sp., parasitic dodder, was reported as attacking citrus seedlings in the seed beds in Arizona.

Gloeosporium limetticolum, Clausen, lime withertip, practically absent from June bloom fruit in Florida (Winston).

False canker, a leaf spot of slight importance was reported from Mississippi (Neal)

Phymatotrichum omnivorum (Shear) Duggar, Texas root rot, was reported on orange and grapefruit in the lower Rio Grande Valley by Taubenhaus and Bach.

II NON-PARASITIC DISEASES AND INJURIES

Blight or wilt caused by deficient or irregular water supply. Florida. In some localities more prevalent than usual, due to abnormally dry season. (Fulton)

Freezing injury. Florida - Temperatures in the low twenties prevailed over much of the citrus district on the night of January 15. Considerable damage was done by freezing fruit on the trees, and much bearing wood was injured in localities where lowest temperatures prevailed (Fulton)

Spray injury. Florida - slight to moderate damage in some cases, following the use of Bordeaux oil spray. Less than the usual acreage was sprayed with this combination on account of peculiar seasonal conditions (Fulton)

III DISEASES OF UNKNOWN CAUSATION

Concave gum disease, no cause assigned, was reported by Fawcett as occurring on orange in three restricted localities in California.

Chlorosis, probably caused by too much lime, was reported from Texas by Taubenhaus.

Dieback, possibly due to poor water conditions or cultural practices, was reported by Bach from the lower Rio Grande Valley in Texas.

Dry root rot , possibly due to unfavorable water and soil conditions and associated with Fusarium invasion, reported by Fawcett in scattered localities in California.

Exanthema or ammoniation, supposedly a malnutrition disease, less prevalent than usual in Florida (Fulton). Apparently less severe than usual in Florida (Winston). In California it showed its usual slight prevalence (Fawcett).

Gummosis, cause unknown, far more prevalent than is usually the case in Florida; this may be attributed to the freezes of the last winter; gummosis usually increases after severely cold winter (Winston).

Peteca, cause unknown, a blemish of California lemons in storage, was of usual moderate importance (Fawcett)

Psorosis, cause unknown, less than usual prevalence in Florida causing slight loss this season (Fulton). A very important disease in California; sweet orange, grapefruit and tangerine are susceptible, lemon and sour orange are immune (Fawcett).

Red blotch, cause unknown, affects lemons in storage producing a blemish that is of moderate importance (Fawcett).

AVOCADO

Cephaleuros mycoidea Karst.; algal leaf spot, reported from Florida as abundant on leaves but not serious (Wolf).

Gloeosporium sp., anthracnose, reported from Texas (Taubenhaus).

Pestalozzia sp., blight, reported from Texas as a trace (Taubenhaus).

Sphaceloma sp., scab, less important than usual in Florida, on account of drought (Wolf).

DATE

Colletotrichum sp., anthracnose, traces in Texas (Taubenhaus).

Exosporium palmivorum Sacc., leaf spot, prevalent in Texas, but unimportant (Taubenhaus).

Graphiola phoenicis (Moug.) Poit., false smut, quite prevalent in Texas, but unimportant (Taubenhaus).

Pestalozzia sp., blight. Unimportant traces in Texas (Taubenhaus).

FEIJOA

Botrytis cinerea Pers., Botrytis rot. Fruit drops before ripening. Fruit left on wet ground and covered with paper ripened with little rot (Home).

FIG

Aspergillus niger Tiegh. smut, seldom found on the Kadota variety of fig in California (Condit)

Botrytis sp. Follows softening or frosting of green fruit left on tree in fall, frequently extends through stem of fig and kills bud or girdles branch. Of little consequence on Kadota variety in California (Condit).

Caconema radicicola (Greef) Cobb, root knot, moderately important in Mississippi (Wedgworth), also prevalent in Texas (Taubenhaus).

Cercospora spp., leaf spot, prevalent but unimportant in Texas (Taubenhaus).

Cerotelium fici (Cast.) Arth., rust. Of slight importance in Mississippi (Neal and Wedgworth); of moderate importance in Louisiana (Tims), in Texas very serious in unsprayed orchards, but unimportant in sprayed ones (Taubenhaus and Bach).

Fig

Corticium koleroga (Cooke) Höhn., thread blight, reported from Florida (Wolf); and as prevailing to usual extent in Louisiana (Tims).

Diplodia sp., Diplodia rot, caused a serious limb canker with 1 per cent loss in Texas (Taubenhaus).

Fusarium moniliforme var. fici, endosepsis or internal rot. Very important in the central valley of California, the commercial fig producing area, increasing in prevalence in recent years. All fig varieties are susceptible when caprified with infected Blastophaga; non-caprified varieties escape because not visited by the insect carriers of infection. Controlled by treating the spring caprifigs with a disinfectant which permits the Blastophaga to emerge without contamination with spores of Fusarium moniliforme (Horne).

Glomerella cingulata (Ston.) Spauld. and Schrenk, anthracnose. Slight loss reported from South Carolina (Ludwig), and from Mississippi. (Neal and Wedgworth). Anthracnose attributed to Colletotrichum sp. was reported as a trace from Texas (Taubenhaus).

Macrophoma fici Alm. and Cam., canker, was of very slight importance in Texas (Taubenhaus).

Phymatotrichum omnivorum (Shear) Duggar, root rot, prevalent in the black lands of Texas (Taubenhaus).

Sclerotinia sclerotiorum (Lib.) Mass., Sclerotinia canker, serious in Texas, causing 1 per cent loss (Taubenhaus)

Tubercularia fici Edg., canker, reported as occurring generally in Louisiana, with moderate loss (Tims).

Premature dropping, very prevalent in Texas with 3 per cent loss (Taubenhaus).

Soured fruit, quite prevalent in Texas (Taubenhaus). Rare in California on the Kadota fig (Condit).

G U A V A

Cephaleuros mycoidea Karst, algal leaf spot. Florida (Wolf).

L O Q U A T

Cephaleuros mycoidea Karst., algal leaf spot. Florida (Wolf).

O L I V E

Phymatotrichum omnivorum (Shear) Duggar, root rot, reported as very susceptible in Texas (Bach).

P E R S I M M O N

Corticium koleroga (Cooke) Höhn., thread blight, reported from Florida (Wolf).

Chlorosis, attributed to too much lime, reported from Texas (Taubenhaus).

Blossom shed, attributed to unbalanced fertilizer, reported from Texas (Taubenhaus).

P O M E G R A N A T E

Mycosphaerella lythracearum (Heald and Wolf) Wolf, blotch reported on fruit and leaves from Texas (Bach).

D I S E A S E S O F N U T S

P E C A N

SCAB CAUSED BY FUSICLADIUM EFFUSUM WINT.

In 1927 scab was held in check over the greater part of the pecan producing area of the United States by dry weather. The importance of this disease in different sections is well summarized by J. B. Demaree as follows:

> "During the season of 1927, pecan scab was of minor importance in North Carolina, South Carolina, the northern half of Georgia, Alabama, Mississippi, Louisiana, and the whole of Texas.
>
> The disease, while being present throughout the south Atlantic and Gulf Coast regions, generally caused less damage to the pecan crop than for the past ten or twelve years. In a pecan scab dusting experiment conducted at Monticello, Florida, during the season of 1927, the checks did not have a sufficient amount of scab to reduce the size of the nuts or lower their marketing qualities. Some nuts became spotted during the latter part of the season, but no actual damage resulted. Some localities, however, where conditions were

more favorable for infection did not fare so well. This was especially true in the flooded regions of south Mississippi, and south Louisiana, where scab caused a heavy loss."

Loss estimates are: South Carolina, 5 per cent; Georgia and North Carolina, 2 per cent; and Texas a trace. An additional estimated loss in grade of 2 per cent occurred in Georgia.

In North Carolina, according to Poole, "Seedling varieties were severely diseased and infected pecans dropped prematurely. The Stuart, Schley and better varieties of nuts seemed to be very resistant to scab." Other data on varietal susceptibility are presented in table 54.

Table 54. Data on varietal susceptibility to scab as compiled from collaborators reports, 1927.

Very susceptible	Susceptible	Resistant	Very resistant
Delmas (2)	Schley (1)	Curtis (2)	Frotscher (1)
Georgia (2)	Pabst (1) (2)	Nelson (2)	Stuart (1)
	Success (1)	Success (2)	Russell (1)
	Moneymaker (2)	Frotscher (2)	Moneymaker (1)
	Van Deman (2)	Stuart (2)	
		Moone (2)	
	Alley (2)	Tesch (2)	

Numerals indicate state and collaborator from which data were received as follows:

(1) D. C. Neal and H. H. Wedgworth, Mississippi. (2) O. C. Boyd - Georgia.

Control practices were not subjected to severe tests in the majority of Southern States in which pecans are grown, due to the unfavorable season for scab development. Hence, in many cases the effectiveness of different materials and methods could not be accurately estimated. Boyd in Georgia reported a high percentage of control with four to five applications of 3-4-50 Bordeaux mixture and with four to five applications of 20-80 dust. He states that dusting was satisfactory in several large commecial orchards. In Mississippi, Neal and Wedgworth found that four applications of monohydrated copper-lime dust gave evidence of some control but was not so effective as three applications of Bordeaux mixture.

Recent literature

1. Dye, H. W. The dusting of pecan trees with copper-lime dust is merely a new application of an established method and practice. Nat. Pecan Exch. News 4 (5): 12-13. May, 1927.

In 1927 rosette was apparently a factor of considerable importance in pecan production in North Carolina and Georgia. Losses are estimated as 10 per cent in Georgia, 2 per cent in North Carolina, and a trace in Texas. In North Carolina, according to Poole and Fant, rosette was observed in several localities in the eastern part of the state and is of common occurrence from year to year. In South Carolina the disease was found by Fenner in both budded and unbudded Stuart pecans. Boyd in Georgia states that all budded varieties are susceptible and that the disease is most severe in poorly cared for orchards where the soil is deficient in organic matter. According to Neal and Wedgworth in Mississippi, the disease is no longer confined to the Coastal Plains area but now occurs in many other parts of the state where trees are being planted. In Arkansas a number of diseased specimens were received by Young who states that rosette is probably quite important but that definite data on losses are not available.

MISCELLANEOUS DISEASES AND INJURIES

Botryosphaeria berengeriana DeNot., dieback. Reported as a disease of moderate importance in South Carolina.

Cercospora fusca (Heald & Wolf) emend. F. V. Rand, brown leaf spot. Traces were reported from North Carolina, South Carolina, Georgia, and Texas. Boyd states that in Georgia it is "noticeable only on rosetted, or otherwise impoverished trees, during the latter part of the season." Poole states that it caused some defoliation locally in North Carolina. According to Demaree this leaf spot "over a large area of the southern pecan belt was more prevalent in 1927 than in previous years."

Downy spot attributed to Cylindrosporium caryigenum Ell. & Ev. A leaf spot new to pecan was found in Georgia in 1926 and described by Demaree and Cole (3) and by Boyd (1). The causal organism has only been provisionally identified as the above named fungus. Boyd (2) says it resembles both a Cylindrosporium and a Cercosporella.

Glomerella cingulata (Ston.) Spauld. & Schrenk, anthracnose. Reported as of slight importance in Mississippi.

Mycosphaerella convexula (Schw.) F. V. Rand, leaf blotch. Demaree & Cole (3) report the observation of a "leaf blotch" in north Florida, south Georgia, and South Alabama on both orchard and nursery trees. In some nurseries complete defoliation by the middle of October occurred on account of it. They believe the fungus to be associated with Mycospharella convexula. Boyd in Georgia states that it "causes slight to severe premature defoliation especially in nurseries. It can be easily controlled in orchards with the scab spray schedule of either dust or spray."

PECAN - Miscellaneous Diseases

Phyllostica caryae Pk., leaf spot. Reported from Mississippi and Texas.

Kernel spot due to southern stink bug (Nezara viridula L.) and other factors. Estimated losses of 5 per cent occurred in Georgia and Texas. Boyd in Georgia states "The 'stink bugs' were unusually abundant and harmful on a number of crops this year including pecans. This was probably due to the warm dry spring and summer."

Recent literature

1. Boyd, O. C. An undetermined leaf spot of pecan. U. S. Dept. Agr. Plant Dis. Rep. 11: 134. Oct. 1, 1927.

2. ______________ Preliminary report on a new leaf spot of Pecan. (Abstract) Phytopath. 18: 133-134. 1928.

3. Demaree, J. B., and J. R. Cole. Two unreported leaf spots of pecan. U. S. Dept. Agr. Plant Dis. Reporter 11: 135-136. Oct. 1, 1927.

4. ______________ Sand burn of pecan seedlings. Phytopath. 17: 657-661. Sept. 1927.

W A L N U T

Bacterium juglandis (N. B. Pierce) EFS., bacterial blight. This disease was reported from Delaware, Washington and Oregon. Zeller in Oregon reported much more than usual and estimated the loss in quality as 20 per cent.

THE PLANT DISEASE REPORTER

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Supplement 61

Diseases of Vegetable and Field Crops (Other than Cereals)

In the United States in 1927

July 1, 1928.

BUREAU OF

PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF VEGETABLE AND FIELD CROPS (OTHER THAN CEREALS)

IN THE UNITED STATES IN 1927

Prepared by H. G. McMillan,
Pathologist, Office of Vegetable and Forage Diseases,
Bureau of Plant Industry.

Plant Disease Reporter
Supplement 61.

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INTRODUCTION

This summary has been compiled from information furnished by the collaborators of the Plant Disease Survey. Not every State is represented, unfortunately. The conventional methods of reporting information are fairly uniform and necessarily brief. As a whole the data for 1927 is meager compared with other years.

The collaborators in each State are well known. Their names have not always been appended to each bit of information. Other people have made valuable contributions, particularly the personnel of the Office of Vegetable and Forage Diseases, Bureau of Plant Industry. Dr. L. L. Harter prepared the section on sweet potato diseases. But it is to the collaborators, their valuable information, lively interest, and continuous good will that the Plant Disease Survey is indebted for the foundation and structure of this summary.

DISEASES OF POTATO

LATE BLIGHT CAUSED BY PHYTOPHTHORA INFESTANS (MONT.) D BY.

The late blight of potato was unusually severe in the eastern States and New England. In some other States the initial conditions were right for the development of the disease in epidemic form, but changes in the weather suppressed it. The losses given (table 55) are estimates of the reduction in yield at harvest time, and take little account of the rots which are potential in storage. Careful, rigid selection is necessary that the losses in storage may not exceed those at harvest.

Potato - Late Blight

Table 55. Percentage losses from late blight of potato, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
30	Massachusetts	2	California
25	Maine	1.5	New Jersey, North Carolina
20	New York	1	Virginia, Georgia, Minnesota
10	Delaware	0.5	Wisconsin
5.1	Oregon	Trace	West Virginia, Indiana, Michigan
5	Maryland		
3	Connecticut		

A few comments received from collaborators follow:

Massachusetts: Thirty per cent loss occurred in the unsprayed and poorly sprayed fields; properly sprayed fields lost 5 to 10 per cent; however, few were properly sprayed. (W. H. Davis)

Connecticut: Wet weather in August favored the development of the disease, and the delay in frost gave an opportunity for the blight to spread. (Clinton)

New Jersey: The early crop was unaffected, which means that the losses were not great. The disease was first observed on September 5 at Holmdale, showing one affected leaf per half-acre. Later it became very severe. The growers of the Red Skin variety have always regarded it as quite resistant, but the experience of the past year has convinced them that the variety is susceptible. (Martin)

Pennsylvania: The disease extended into Chester and Lancaster Counties, where it has seldom been found before. Losses of 50 per cent and more were common. Some were a total loss. (Thurston and Nixon)

Delaware: First heavy infection for over seven years. Confined to New Castle County. (Adams).

Maryland: Disease severe in entire western part of State. Jersey Red Skin vines only slightly affected, but tuber infection as high as 25 per cent. (Jehle)

Virginia: Severe in late crop of Idaho Red. One-third loss in spite of dusting. (Fromme)

West Virginia: A midseason start in scattered localities was checked by a hot dry spell. (Sherwood)

Potato - Late Blight

Southern Georgia: The disease appeared only in the second crop in the higher altitudes. (Boyd)

Wisconsin: A good start was checked by drought. (Vaughan)

Oregon: Very heavy loss from rot in section west of mountains. In some fields loss as high as 100 per cent. (McKay)

Recent literature

1. Alcock, N. L. Early manifestations of potato blight (Phytophthora infestans De Bary). Ann. Appl. Biol. 14: 440-441. Nov. 1927.
   Apparently healthy potatoes sprouted in the laboratory showed probable primary infection with P. infestans on the sprouts; also secondary infection. (In an experiment for potato wart.)

2. Ducomet, V. Le mildiou de la pomme de terre. Grande Rev. Agr. 1927: 135-136. Dec. 1927.
   Ligue nationale de lutte contre les ennemis des cultures, reunion de 17 novembre.

3. Lunden, A. P. Sammenligning av potetsorter pa forsøksgarden og pa spredte felter i arene 1918-26. Meld. Norges Landbruks. 7: 503-524. 1927.
   English summary: pp. 523-524.
   Potato varieties resistant to late blight.

4. Murphy, P. A. The production of the resting-spores of Phytophthora infestans on potato tubers. Sci. Proc. Roy. Dublin Soc. n. s., 18: 407-412. May 1927.
   Abst. Rev. Appl. Myc. 7: 51, Jan. 1928.

5. Murphy, P. A., and R. McKay. Some further cases of the production of diseased shoots by potato tubers attacked by Phytophthora infestans, and a demonstration of alternative sources of foliage and tuber infection. Sci. Proc. Roy. Dublin Soc. n. s., 18: 413-422. June 1927.
   Abst. Rev. Appl. Myc. 7: 52, Jan. 1928.

6. Perret, C. Quelques remarques a propos du mildiou de la pomme de terre. Rev. Path. Veg. & Entom. Agr. 14: 30-33. Jan./Mar. 1927.

7. Szymanek, J. Quelques observations sur la morphologie du mycelium et des sucoirs du Phytophthora infestans dans le tubercule de pomme de terre. Compt. Rend. Acad. Sci. Paris 184: 620-622. Mar. 7, 1927.

EARLY BLIGHT CAUSED BY ALTERNARIA SOLANI (ELL. & MART.) JONES & GROUT

Early blight was generally distributed throughout the country, but did very small damage to the crop. The first appearance of the disease was usually late. In Maryland R. A. Jehle reported:

> "Generally prevalent on all varieties, but more particularly on the Jersey Redskin. Most fields of this variety showed practically all plants affected but the damage was not serious."

R. E. Vaughan, Wisconsin, found the susceptible varieties to be Ohio and Bliss Triumph.

R. W. Goss, Nebraska, reported that early blight started in the western irrigated sections about the middle of August and was severe by September first. In these sections the vines were killed in about two to three weeks with a resultant loss of about 20 per cent. The disease was severe also in early planted dry-land fields.

Recent literature:

Gratz, L. O., and R. Bonde. Infection of potato tubers by Alternaria solani in relation to storage conditions. Florida Agr. Exp. Sta. Bul. 187: 167-182. June 1927.

SCAB CAUSED BY ACTINOMYCES SCABIES (THAX.) GÜSSOW

Common scab was general throughout the potato-growing sections, the amount developing during the season being close to the average. While this disease is yielding to seed treatment, in some sections seasonal conditions have favored its development. Scab may be regarded more as a market than as a production disease. It is of more importance in times of large crops when careful sorting must be resorted to if a salable product is to be secured.

Some of the principal losses appear in table 56.

Table 56. Percentage loss in grade of potatoes on account of scab. 1927.

Percentage loss	States reporting	Percentage loss	States reporting
5	New York, Michigan, Iowa, Oregon	3	North Carolina
3.5	New Jersey	2	Maryland, Wisconsin, Missouri, California

The comments of some collaborators are as follows:

Massachusetts: Some fields, very severe. (W. H. Davis)

New Jersey: This disease is much less prevalent than five years ago. A large number of the potato growers are now using only 50 pounds of nitrate of soda in their fertilizer mixture. The more extensive use of sulfate of ammonia has helped reduce the amount of scab. Scab-control studies this past year again showed the value of the organic mercury dips and likewise indicated that good results in the control of scab will follow the addition of the organic mercury compounds to the fertilizer. (W. H. Martin)

Delaware: Infection unusually heavy in early crop; general in late crop. (Adams)

West Virginia: Apparently the season did not favor the development of scab, even in local sections where it is usually very troublesome. (Sherwood)

North Carolina: Of increasing importance in early crop sections. Several fields observed this year with more than half the tubers seriously affected. (Fant)

Iowa: The unusual prevalence and destructiveness of common scab on Irish potatoes this year has caused some concern among potato growers as well as among many other people interested in the potato crop. Various ideas have been advanced as to the reasons for this epidemic, none of which seem to explain the situation adequately.

Scab is influenced to a marked extent by soil moisture. Dry soils favor scab while moist or wet soils are unfavorable to scab infection. The season of 1927 has supplied these favorable conditions to a marked degree because in the first place it has been very dry over the State as a whole, and a dry soil always has a higher temperature than a wet soil, provided other factors are the same in each case. (Archer)

Recent literature:

1. Duff, G. H., and Catherine G. Welch. Sulphur as a control agent for common scab of potato. Phytopath. 17: 297-314. May 1927.

2. Martin, W. H. Potato scab control with organic mercury compounds. Proc. Potato Assoc. Amer. 13: 74-81. 1927.

3. Millard, W. A., and C. B. Taylor. Antagonism of micro-organisms as the controlling factor in the inhibition of scab by green-manuring. Ann. Appl. Biol. 14: 202-216. 1927.
Actinomyces praecox, a saprophyte, has an inhibitory effect upon A. scabies when associated with it. The benificial effect of green manuring may be due to a similar competitive action.

4. Sanford, G. B, Important soil-borne diseases of crops in Western Canada. Scient. Agric, 7: 292-294. 1927.

5. Schlumberger, O. Die wirtschaftliche Bedeutung des Kartoffelschorfes. Ziele und Wege zu seiner Bekämpfung. (The economic importance of potato scab. Objects and methods of its control.) Illus. Landw. Zeit. 47: 131-132. 1927.

BLACKLEG CAUSED BY BACILLUS PHYTOPHTHORUS APPEL

The blackleg disease yielded well to seed treatments and elimination by seed-certification methods. No reports were received from a number of States, while in a few there was only a trace. The States in which 1 per cent or more was found are shown in table 57.

Table 57. Losses of 1 per cent or more due to blackleg of potato, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
5	Kansas, Oklahoma	1.5	North Carolina, Iowa
3	Minnesota	1	Virginia, West Virginia, Michigan, Wisconsin, Oregon
2	Maine		

The comments received from collaborators, with one exception, trace the disease to defective seed.

New Jersey: Found only in seed potatoes from two northern seed-growing sections. (W. H. Martin)

Pennsylvania: Some few fields as high as 25 per cent. Mostly on imported seed of Cobbler and Russet varieties. (Thurston and Nixon).

Delaware: Generally observed with early crop. (Adams)

West Virginia: Much more. Wet, cool weather prevailed during growing season, and more infected northern seed than usual was used. (Sherwood)

Indiana: Present in early crop. Worse in Red River Valley than in home-grown seed. (Gardner)

Wisconsin: More than ever before noted. Especially severe on Irish Cobbler. Very little on other varieties. (R. E. Vaughan)

Iowa: Blackleg was widely distributed, especially in home gardens. It has been well determined that the use of certified seed and seed-piece treatment are quite effective in the control of the disease. The disease was common in fields planted with northern-grown seed, while in one or two fields of home-grown seed there were only a few infected plants. (Archer)

Nebraska: Infection general all over State, up to 5 to 10 per cent in eastern and central portions. Over 0.5 per cent in dry-land fields. Few fields showing 3 per cent in seed stocks free from blackleg for last seven years planted on land which had never grown potatoes. (Goss)

Kansas: In addition to the early infection there was a high percentage of late infection. (Elmer)

Oregon: Moisture appears to favor prevalence of disease. (McKay)

Recent literature:

1. Leach, J. G. The nature of seed-piece transmission of potato blackleg. Phytopath. 17: 155-160. Mar. 1927.

2. Racicot, H. N. Does blackleg overwinter in apparently healthy potato tubers? Proc. Potato Assoc. Amer. 13: 72-74. 1927.

STEMROT AND SCURF CAUSED BY CORTICIUM VAGUM BERK. & CURT (RHIZOCTONIA SOLANI KÜHN)

Rhizoctonia continued to be one of the widespread and destructive potato diseases. While it is more severe in the northern potato growing sections, good potato farm practice everywhere recommends that the seed tubers be treated for this disease.

In Onondaga County, New York, D. D. Ward found Rhizoctonia injury more severe than for several years. In New Jersey, W. H. Martin observed that this disease was again the cause of serious losses in a number of fields. Studies showed that stemrot was more severe in dry than in wet soils, and with deep rather than shallow planted seed pieces. Jehle in Maryland found it very severe on Jersey Redskins. Sherwood in West Virginia considered the wet cool spring to be a contributing factor. In Kentucky, according to J. S. Gardner, the early crop outgrew the injury, but the late crop was affected by stemrot, which was very unusual. Fant, in North Carolina, found stemrot of common occurrence in the early crop. In southern Georgia, according to Boyd, it was too hot and dry for the disease. In Missouri Rhizoctonia was widespread, with much loss in yield (5 per cent). In the western Nebraska commercial fields there was no sprout injury, but later there developed severe girdling and little potatoes in every field, sometimes as much as 50 per cent. In Kansas (Elmer) there was more of the disease than usual, due, apparently, to the cool, wet summer. In Colorado the potatoes in the mountain sections were affected, in some cases severely, and in Utah it was more destructive than usual. In Oregon, McKay regarded the disease as the worst parasitic trouble affecting the potato. Short rotations may be partly responsible in some fields, but even with seed treatment and proper rotation, it may still be regarded as the most prevalent potato disease in the State.

The disease was general where it was found and while there were no outstanding losses, it was fully as important as in the average year. The losses in yield in percentage of the total for the States are noted in table 58.

Table 58. Percentage losses from stemrot and scurf of potato as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Kentucky	1.5	Montana
8	Oregon	1	Virginia, Michigan
6	Iowa, Missouri	0.6	Mississippi
5	New York, Maryland, Minnesota	0.5	Idaho
		0.1	Tennessee
4	North Dakota	Trace	Massachusetts, Georgia, Florida, West Virginia
3	New Jersey, Utah, California		
2	Maine, North Carolina, South Carolina, Wisconsin		

Recent literature:

1. MacMillan, H. G., and A. Christensen. A study of potato seed treatment for Rhizoctonia control. Wyoming Agr. Exp. Sta. Bul. 152: 57-67. Mar. 1927.

2. Raeder, M. M., and C. W. Hungerford. Seed treatment control of Rhizoctonia of potatoes in Idaho. Phytopath. 17: 793-814. Dec. 1927.

3. White, R. P. The efficiency of organic mercury compounds for the control of Rhizoctonia on potato. Proc. Potato Assoc. Amer. 13: 81-97. 1927.

WILT CAUSED BY FUSARIUM SPP.

The losses due to <u>Fusarium oxysporum</u> were unusually low, no State reporting more than an average amount, and many none at all. The disease was not severe except locally. Traces were indicated as appearing in Massachusetts, New York, Delaware, Kentucky, Georgia, Mississippi, Wisconsin, Kansas, Idaho, and Oregon. In Maryland the loss was said to be 1 per cent, in Virginia 3 per cent, North Carolina 2 per cent appearing locally, while Oklahoma developed 7 per cent. In

Michigan the midseason drought was favorable for the development of 1 per cent, while in Missouri about 2 per cent loss occurred in stored potatoes. North Dakota reported 1.5 per cent, and Montana 3 per cent. In Colorado the disease was general, with a loss of 10 per cent. The disease was not serious in Utah, averaging only 1 per cent.

WILT AND STEM-END ROT CAUSED BY FUSARIUM EUMARTII CARPENTER

This disease is recorded from Nebraska. In 1927 there was very little wilt in the field, but considerable stem-end rot appeared in the bin. The disease was more severe in eastern Nebraska than usual. Cobblers are more susceptible than Triumphs. (Goss)

BACTERIAL WILT CAUSED BY BACTERIUM SOLANACEARUM EFS.

This disease caused very minor losses in 1927, being reported in only three States. In South Carolina the disease appeared in two localities, in small amount. In Georgia, it was found only in second crop potatoes in higher altitudes in north Georgia, especially, where potatoes followed potatoes or tomatoes. The maximum loss in any field was 5 per cent, and in the section around Cornelia only a trace was found. (Boyd). In Florida there was a total loss of 5 per cent, appearing late in the season when the potatoes were mature, and centering around Hastings. (Gratz)

MOSAIC (CAUSE UNDETERMINED)

The mosaic disease situation throughout the country shows a decided improvement over the previous year. A distinction is more generally made between the mild and rugose types. A number of States reported none of the disease observed, and in others the use of certified seed and other methods had reduced the amount to a negligible quantity. Where traces could be found it was not apparent that the losses in yield were appreciable. The widespread use of certified seed is having a telling effect on the amount of mosaic observed.

The comments of some collaborators follow:

<u>Mild Mosaic</u>

Massachusetts: Found in each field visited. (Davis)

New Jersey: Much more prevalent than rugose, but probably not the cause of serious losses. (Martin)

Table 59. Percentage losses from mosaic of potato, both mild and rugose, as estimated by collaborators, 1927.

Percentage: loss	States reporting	Percentage: loss	States reporting
20	Mississippi	3	New York, New Jersey
15	Montana	2	Indiana
10	Utah	1	Michigan, Wisconsin, Minnesota, North Dakota, Tennessee
8	Oklahoma, Idaho		
6	Oregon, California		
5	Massachusetts, Maryland, North Carolina	0.5	Connecticut, Delaware
		Trace	Virginia, South Carolina, Georgia, Iowa, Missouri, Colorado
4	Maine		

Maryland: Use of certified seed combined with increase in production of Jersey Red Skin variety and decrease in production of McCormick variety has greatly reduced losses from mosaic. (Jehle)

Tennessee: Especially bad on uncertified Bliss Triumphs. (McClintock)

Michigan: Symptoms were masked on Rurals in lower Michigan. (Kotila)

Wisconsin: Tuber indexing giving good results. (Vaughan)

Rugose Mosaic

New Jersey: This type of mosaic seldom found in certified seed. (Martin)

Pennsylvania: Very prevalent as usual. Probably the worst of the mosaic type, but not a great factor in yield. (Thurston & Nixon)

North Carolina: Very prevalent in early crop Irish Cobblers. (Fant)

Kansas: Prevalence varies greatly in different fields. Seed stocks were grown in northern States. (Elmer)

Utah: One of the most generally destructive diseases in Utah. (Linford)

Recent literature:

1. Blodgett, F. M. Tobacco mosaic on potatoes. Phytopath. 17: 727-734. Oct. 1927.

2. Johnson, James, The properties and behavior of potato rugose mosaic. (Abstract). Phytopath. 18: 141. Jan. 1928.

3. Murphy, P. A., and R. McKay. Investigations on the leaf-roll and mosaic diseases of the potato. Jour. Dept. Lands and Agric. Ireland 26: 295-305. 1927.

4. Smith, Kenneth M. Observations on the insect carriers of mosaic disease of potato. Ann. Appl. Biol. 14: 113-131. Feb. 1927.

5. Southwell, H. Virus diseases of potatoes and the raising of seed potatoes in the Irish Free State. Jour. Min. Agric. Great Britain 24: 19-25. 1927.

LEAF ROLL (CAUSE UNDETERMINED)

Leaf roll seems not to have been as severe in 1927 as in previous years. It is accompanied by well recognized symptoms, and is being rapidly eliminated from the better seed stocks. A number of States failed to report the disease, indicating in a measure its non-importance. From a few others the comments of collaborators are instructive.

New York: Nassau County - Runs as high as 12 per cent in New York stock, but in Maine seed it is considerably lower. (Hambleton)
Onondaga County - More prevalent than last year. (Ward)

New Jersey: In such varieties as the Red Skin nearly every field showed large numbers of diseased plants. (Martin)

Pennsylvania: Has been decreasing for some time. (Thurston and Nixon)

Kentucky: Abundant in uncertified seed. (Valleau)

Ohio: Prevalent in fields from uncertified seed. (Tilford)

Utah: Occurs wherever potatoes are grown in Utah. (Linford)

Oregon: A serious factor in eastern Oregon. (McKay)

Table 60. Percentage losses from leaf roll of potato, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	Kentucky	1.5	Maryland
5	Massachusetts, New Jersey, Mississippi	1	Maine, Michigan
4	Indiana, California	0.5	Delaware
3.5	New York	Trace	Virginia, Minnesota, Iowa, North Dakota
2	North Carolina, Oklahoma, Utah, Idaho, Oregon		

Recent literature:

1. Murphy, P. A., and R. McKay. See Mosaic.

2. Schander, R. Physiologische Untersuchungen an blattrollkranken Kartoffeln. Landw. Versuchs-Stat. 105: 198-204. 1927.

3. Whitehead, T. Experiments on the control of potato leaf-roll. Welsh Jour. Agr. 3: 169-180. Jan. 1927.

SPINDLE TUBER (CAUSE UNDETERMINED)

Either this disease has declined rapidly in the better seed stocks or seasonal conditions prevented its detection in the field, for the amount reported was less than in previous years. In New York it was state wide but found only as a trace to 0.5 per cent. In Nassau County Hambleton found 23 per cent in a plot of Maine certified Cobblers as compared to 1 per cent in the Maine Green Mountains. Martin, in New Jersey, found it present in all the potato-growing sections, but not severe, the total loss being 1.5 per cent. Gratz in Florida found about 2 per cent in the field. In Minnesota it occurred locally on the Early Ohio and Irish Cobbler varieties. The disease is rare in Iowa (Archer), but general in Nebraska (Goss), where it was difficult to detect in the field, but appeared in the bin. In Kansas the imported seed brought in 2 per cent (Elmer), and in Utah (Linford) it continued to be observed. As a whole the disease appears to have been of minor importance in the country.

Recent literature:

1. Goss, R. W. Transmission of potato spindle-tuber by grasshoppers (Locustidae). Abstract. Phytopathology, 18: 140. Jan. 1928.

2. Werner, H. O. Identifying spindle-tuber in the field. Amer. Potato Jour. 4: 89-90. Aug. 1927.

WITCHES' BROOM (CAUSE UNDETERMINED)

This disease was observed affecting only one or two plants in Florida (Gratz), but appeared to be more common in Michigan, the yield being reduced by a trace, and one field showing as much as 30 per cent (Kotila), and a similar situation occurred in Oregon (McKay). In Idaho there were a few scattered infestations, but there were no reports of it in Washington.

Recent Literature:

Young, P. A. Transmission of potato witches' broom to tomatoes and potatoes. Science 66: 304-306. Sept. 30, 1927.

CALICO (CAUSE UNDETERMINED)

Traces of calico were seen in Cache, Salt Lake, Utah, and Millard counties, Utah, according to Linford. No other State reported this disease in 1927.

YELLOW DWARF (CAUSE UNDETERMINED)

This disease is reported only from New York State, where the total loss due to it was only a trace, and the maximum amount of infection in any one field was 15 per cent.

TIPBURN AND HOPPERBURN

Tipburn and hopperburn have again assumed serious proportions as a disease of the potato. Mississippi, Louisiana, and Michigan, had decided increases in the amount, while some other States, notably New York, West Virginia, Kentucky, and Iowa, suffered severely.

The losses suffered are shown in table 61.

Table 61. Percentage losses from tipburn and hopperburn of potato, as estimated by collaborators, 1927.

Percentage: loss	States reporting	Percentage: loss	States reporting
30	Kentucky	2	Tennessee, North Dakota
20	West Virginia		
15	Iowa	1.5	North Carolina
10	New York, Minnesota	1	Maine, Massachusetts, Delaware, Virginia, Missouri
5	Michigan, Colorado		
4	New Jersey, Mississippi	Trace	Maryland, Oregon
3	Georgia		

Recent Literature:

1. Rosen, H. R. A preliminary report on the relationship of insect barriers to the development of tip and margin burn of Irish potatoes. (Abstract) Phytopath. 18: 141. Jan. 1928.

2. Tilford, P. E. The superiority of freshly mixed copper-lime dust for the control of potato hopperburn. Proc. Potato Assoc. Amer. 13: 70-72. 1927.

MISCELLANEOUS PARASITIC DISEASES

Armillaria mellea (Vahl) Quel. California.

Botrytis sp. (cinerea ?). A Botrytis was isolated from stored potatoes in Maine. (Folsom)

Caconema radicicola (Greef) Cobb. Boyd, in Georgia, reported this disease unusually common in the first potato crop of the Coastal Plain and still more severe in the fall crop on the Plain and in the mountain sections. California; local, 4 per cent (Milbrath) Texas.

Macrophoma sp., probably M. phaseoli Maubl. (See bean). Georgia: This disease caused 50 per cent tuber rot in one small patch near Thomasville. A trace of what was considered to be the sterile, Sclerotium, stage, was found in July in fields at Cornelia. (Boyd).

Phoma tuberosa Melhus, Rosenbaum, & Schultz, seed-piece rot. Maine: On cut surfaces of seed pieces. (Schultz and Folsom).

Phymatotrichum omnivorum (Shear) Dug., causing the Texas root rot, was again reported from south Texas. (Taubenhaus).

Potato - Miscellaneous parasitic diseases

Sclerotium rolfsii Sacc. was common in Georgia, in both the first and second crops, causing sudden wilting and death any time after the plants were one third grown (Boyd). In Florida several affected plants were observed, but the losses were small. In southern Texas the disease was prevalent.

Spondylocladium atrovirens C. O. Harz. Silver scurf was statewide in New York, but caused little loss (Chupp). In Virginia it was unusually abundant (McWhorter). In New Jersey it was generally distributed, being abundant on the late crop (Martin). Goss reports it for the first time in Nebraska, in experimental plots at North Platte. It was found on Irish Cobblers grown in Indiana at the Potato Show at Purdue University (Gardner)

Thielavia basicola (B. & Br.) Zopf., black root rot, caused the dwarfing of potato plants in Suffolk County, New York.

Verticillium alboatrum Reinke & Berth. Martin, New Jersey, reports a case where potatoes were wilted on land on which eggplants had been severely wilted for three years. In Utah the disease is still confused with Fusarium, though Linford reports a total loss of 0.5 per cent due to this cause.

Recent Literature:

1. Paintin, Ruth Davis. Notes on the parasitology of Sclerotium rolfsii. Mycologia 20: 22-26. Jan.-Feb. 1928.

2. Weiss, F., J. I. Lauritzen and P. Brierley. Investigations of potato storage rots in 1925-26 at the Marble Laboratory, Inc., Canton, Pa. Proc. Potato Assoc. Amer. 13: 108-112. 1927.

3. Wollenweber, H. W. Die Wirtelpilz-Welkekrankheit (Verticilliose) der Kartoffel. (The whorl fungus wilt disease (verticilliosis) of the potato.) Biol. Reichsanst. für Land und Forstwirtsch. Flugbl. 84. 4 pp. 1927.

MISCELLANEOUS NON-PARASITIC DISEASES AND INJURIES

Black heart. New Jersey: Several reports of this trouble, probably due to high storage temperatures. (Martin). California: Trace (Milbrath)

Heat necrosis. California: local, 0.5 per cent (Milbrath)

Hollow heart. New York: Found in many oversized tubers where a high yield was obtained in Suffolk County (Sindon). Idaho: Caused 0.5 per cent total loss (Hungerford).

Internal browning. California and localized, 5 per cent (Milbrath).

Internal brown spot. Michigan: Due to drought and high soil temperature, a trace of this trouble developed in local areas. (Kotila). Washington.

Potato - Non-parasitic Diseases

Lightning injury occurred once in Connecticut, and in a few scattered cases in Cortland County, New York. The losses were slight.

Nut grass (Cyperus sp.) tuber formed inside of potatoes, New Jersey.

Sprout tuber, North Carolina. Severe in early crop planted from Canadian seed. A small tuber formed on end of the shoot which normally should have developed into the aerial portion of the plant (Lehman). Also reported from Virginia and South Carolina.

Recent literature:

1. Holland: Blue coloration in potato tubers. Intern. Rev. Agr. n. s., 18: 566T-567T. Oct. 1927. Lack of potash in soil.

2. Botjes, J. O., and W. B. L. Verhoeven. Het blauw worden van aardappelen. (The blue discoloration of potatoes.) Tijdschr. Plantenz. 33: 57-96. Apr. 1927.

3. Evans, A. T. Delayed dormancy as a probable cause of uneven stands in planted potatoes. Amer. Jour. Bot. 14: 284-286. May 1927.

4. Gilbert, A. H. Net necrosis of the potato. Phytopath. 17: 555-561. Aug. 1927.

5. Moore, H. C. Hollow heart in potatoes. Papers Michigan Acad. Sci. 6: 289-294. 1927.

6. Moore, H. C. Hollow heart of potatoes. A report of experiments conducted in 1926. Proc. Potato Assoc. Amer. 13: 180-182. 1927.

7. Warner, H. O. The hollow heart situation in the Russet Rural potato. Proc. Potato Assoc. Amer. 13: 45-51. 1927.

8. Weiss, F., and P. Brierley. The occurrence of sprout tubers and some factors relating to their development. Proc. Potato Assoc. Amer. 13: 33-42. 1927.

9. Wright, R. C., and H. C. Diehl. Freezing injury to potatoes. U. S. Dept. Agr. Techn. Bull. 27: 1-23. Oct. 1927.

DISEASES OF TOMATO

LEAFSPOT CAUSED BY SEPTORIA LYCOPERSICI SPEG.

The amount of leafspot reported in the country is decidedly less than last year, and probably averaged very low. In Missouri the disease was of great importance, causing a large loss. Several other states, while reporting losses, did not find them of serious consequence.

The losses by states are shown in table 62.

Table 62. Percentage losses from Septoria blight of tomato, as reported by collaborators. 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Missouri	2	New York, Arkansas
6	New Jersey, Indiana Kansas	1	Maryland
5	Iowa	0.5	Delaware, Georgia, Minnesota

The comments received from collaborators follow:

New York: (Monroe County) Serious amounts in many fields. (Coombs)

(Suffolk County). Earliana and Bonny Best plants grown beside affected plants entirely free from disease (Linden).

New Jersey: In one section severe on Baltimore, but not on Marglobe. (Martin)

Arkansas: Common in south and central parts causing considerable leaf injury. (Young)

Indiana: Abundant evidence of importation on Texas-grown plants. Good control with copper-lime dusts, with 30 to 60 per cent increase in yield and improved color. (Gardner)

Iowa: Early varieties in Muscatine County severely attacked. Late varieties escaped infection. (Archer)

Missouri: Worst year in history of tomato growing - many plants showed foliage to be completely riddled. Occurred early and spread so rapidly that plants were badly injured before coming into bearing. (Scott)

Kansas: Unusually severe during 1927 season. (Elmer)

Colorado: Present in most fields, not important. (Le Clerg)

EARLY BLIGHT CAUSED BY ALTERNARIA SOLANI (ELL. & MART.) JONES & GROUT

The disease was common throughout the eastern tomato sections, extending well south along the Atlantic States. More than usual was reported from the Mississippi Basin, Tennessee being especially hard hit. No western state reported the disease. A single report from Mexico indicates its very great severity there. Losses reported are shown in table 63.

Table 63. Percentage losses from early blight of tomato, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
20.0	Tennessee	2.0	Delaware, Missouri
7.0	Maryland	1.0	Connecticut, New Jersey, North Carolina, Ohio, Indiana
5.0	Virginia, Georgia, Mississippi	Trace	Maine, Massachusetts, New York, West Virginia, South Carolina, Wisconsin, Minnesota, Kansas

The disease affected the plant differently, as will be noted in the comments from collaborators:

Connecticut: Injurious to lower leaves. (Wilkinson)

New York: Considerable among the vines, but growers welcome its presence as a factor hastening ripening. (Linden)

Maryland: The common leaf blight this year. (Norton)

Virginia: The cause of fruit drop. (McWhorter) Severe at Danville, causing nailhead spot. (Fromme)

Tennessee: No resistant varieties.

North Carolina: Widely distributed throughout the state, causing damage to leaves and stems. No fruit infection observed. (Poole)

Georgia: The late crop ordinarily suffers. (Boyd)

Texas: Nailhead spot caused considerable loss in some plantings. (Bach)

Arkansas: Common but does not appear to cause much loss. (Young)

Indiana: Good control with copper lime dusts. Much stem and fruit invasion in September. (Gardner)

Missouri: Considerable fruit showed nailhead spots this season. (Scott)

Mexico: Varietal resistance is as follows: Comparatively immune, Marvelosa; very resistant, Marglobe; resistant, Norton and Stone; very susceptible, Globe. In a single variety test of infected fruits, Globe was 90 per cent, Marglobe 14 per cent, and Marvelosa 7 per cent. In many fields of Globe in February and March the loss in yield was 50 to 90 per cent. (A. W. Morrill)

FUSARIUM WILT CAUSED BY FUSARIUM LYCOPERSICI SACC.

There was a considerable reduction in the amount of wilt over previous years, which may be due partly to the extended use of resistant seed, and partly to more favorable growing conditions for the host. The disease was most severe in the lower Mississippi Valley States. In New Jersey and Maryland, in both of which the crop is of major importance, the losses were substantial. The percentage losses are indicated in table 64.

Table 64. Percentage losses from Fusarium wilt of tomato, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
15.0	Arkansas	2.0	Virginia, Missouri, Colorado, Texas
13.0	Mississippi		
10.0	Oklahoma, Tennessee	1.5	Utah
6.0	Kansas	1.0	Ohio, South Carolina
5.0	New Jersey, Kentucky, North Carolina, Georgia	0.5	California
		Trace	Minnesota, Wisconsin, New York, Delaware, Iowa, West Virginia
4.0	Maryland		

Some of the reports from collaborators follow:

New Jersey: Marglobe very resistant. (Martin.

West Virginia: Season too moist to be favorable for disease. (Sherwood)

Kentucky: Becoming less prevalent. (J. S. Gardner)

North Carolina: Marglobe has generally given good results. (Poole and Fant)

Tomato - Fusarium Wilt

Arkansas: Very common except on new land. (Young)

Minnesota: Growers have stopped raising the very susceptible Bonny Best variety. (Sect. Plant. Path.)

Missouri: Cool summer seemed to inhibit wilt considerably. (Scott)

Recent literature:

1. Ludwig, C. A. Fusarium wilt of tomatoes. Notes on varietal resistance at Clemson College, South Carolina. U. S. Dept Agr. Plant Dis. Rep. 11: 123-124. 1927.

2. White, R. P. Studies on tomato wilt caused by *Fusarium lycopersici* Sacc. Jour. Agr. Res. 34: 197-239. 1927.

YELLOWS (WESTERN YELLOW BLIGHT OR CURLY TOP) (VIRUS)

There is appreciable improvement in this disease situation in the states reporting. The details appear in the reports of collaborators which follow:

New Mèxico: A large amount. (Crawford)

Arizona: Observed in many of the plantings in the Salt River valley this season. (Arizona News Letter)

Utah: Crop of major importance, suffered a total loss of 6 per cent from the disease. Co-extensive with tomato culture in Utah. Forty-one fields examined in the five tomato canning counties showed an average count of 5.7 per cent affected plants, and many of these developed the disease after they had begun to produce. (Linford)

Idaho: Loss 5 per cent. (Hungerford)

Washington: Present to some extent wherever tomatoes are grown. (Dept. Plant Path.)

Oregon: The total reduction in yield was 25 per cent, with the maximum infection in any one field being 95 per cent. Very destructive in most sections east of the mountains. The one limiting factor to successful tomato production in four-fifths of the state. (McKay)

California: Total reduction in yield 10 per cent. Generally distributed over the state. Very severe in Stanislaus County. No fruits are produced if plants are diseased early. (Kendrick)

Recent literature:

1. Rosa, J. T. Chemical changes accompanying the western yellow blight of tomato. Plant Physiology 2: 163-169. No. 2, April 1927.

2. Severin, Henry H. P. Crops naturally infected with sugar beet curly top. Science n. s. 66: 137-138. Aug. 5, 1927.

MOSAIC (VIRUS)

Mosaic was very general in the states reporting it, but did not appear to be a serious or limiting factor in production. In Massachusetts it was more wide spread than usual, and the infected plants ceased to yield. The disease was very general in Pennsylvania, Delaware, and New York and in some cases quite destructive. Maryland suffered a 3 per cent loss, West Virginia a trace, and Tennessee 5 per cent. In Ohio mosaic caused a greater loss in greenhouses than in the field, and in Indiana plants in greenhouses were likewise affected, its occurrence being correlated with aphid prevalence and with handling. The disease was not important in commercial plantings in Michigan. Scott reported that mosaic, of which filiform leaf was the most characteristic symptom and which may not be the true mosaic, was severe in several fields in the canning districts of southwestern Missouri, but the loss for the state was only a trace. In Kansas the shoe-string type only caused damage. The shoe-string type was noted in Wisconsin also. The disease was not regarded as severe in Utah, but caused a loss of 1 per cent. In Oregon most of the damage was caused in the greenhouses, with a loss in the field and house of a trace. It appeared wherever tomatoes were grown in California, reducing the yield by 1 per cent.

Recent literature:

1. Brewer, P. H., H. R. Kraybill, and M. W. Gardner. Purification of the virus of tomato mosaic. Phytopath. 17: 744. Oct. 1927.

2. Doolittle, S. P. Soil transmission of tomato mosaic and streak in the greenhouse. (Abst.) Phytopath. 18: 155, Jan. 1928.

3. Kraybill, H. R., and S. H. Eckerson. Tomato mosaic. Filtration and inoculation experiments. Amer. Jour. Bot. 14: 487-495. Oct. 1927.

4. Sorokin, H. Phenomena associated with the destruction of the chloroplasts in tomato mosaic. Phytopath. 17: 363-379. June 1927.

STREAK (VIRUS)

Only a few reports of this disease were received. In New York it appeared to be general and a loss of 0.5 per cent was suffered. It appeared on a few farms in southern New Jersey and in two fields in north western Ohio, causing slight loss. In Indiana it was quite prevalent in greenhouses, but rarely found in fields. In Wisconsin a few greenhouses near Milwaukee contained diseased plants. It was reported from Iowa and Missouri for the first time, in both states being found in greenhouses. It was found sparingly in Utah in the field. In Oregon it was more severe than usual, but was confined to greenhouses, apparently. As a whole it appears much more serious in the greenhouse than in the field.

Recent literature:

1. Berkeley, G. H. Studies in tomato streak. Sci. Agr. 7: 210-223. Feb. 1927.

2. Gardner, M. W., and J. B. Kendrick. Potatoes - a virus disease menace to tomatoes. Hoosier Hort. 9: 5-8. 1927.

3. Simmonds, J. H. Spotted wilt of tomatoes. Queensland Agr. Jour. 28: 28-30. July 1927.

4. Stover, W. G. Experiments with tomato streak. (Abstract) Phytopath. 18: 154, Jan. 1928.

BACTERIAL WILT CAUSED BY BACTERIUM SOLANACEARUM EFS.

Bacterial wilt was observed in only a few states, causing on the whole, very small losses. A trace of the disease appeared in Massachusetts (in greenhouses only), Maryland, Virginia, Mississippi, Texas and Michigan, while 2.5 per cent loss is reported from North Carolina, 2 per cent from South Carolina, and 0.5 per cent from Georgia.

In Georgia more was observed than in previous years, especially in wet and poorly drained places. In Michigan occasional plants showing symptoms of this disease appeared only in fields from southern grown plants, according to Nelson, who stated that no attempt was made to confirm the diagnosis by cultural methods.

BACTERIAL CANKER CAUSED BY APLANOBACTER MICHIGANENSE EFS.

The bacterial canker, or Grand Rapids Disease as it is sometimes called, is being recognized more by pathologists. Two new states, Georgia and Utah, were added to its known range in 1927. In Massachusetts it was reported as serious in a number of greenhouses, with losses as high as 2 per cent. In Connecticut there were several reports, without estimates. In New York the disease was general, appearing in a large number (eight) of scattered counties, with an estimated loss of 0.5 per cent. In Georgia where the loss was 1 per cent, Boyd reported that the disease made headway in fields retarded by drought and poor transplanting methods, and was less severe in wet areas. Plants with mild symptoms appeared to recover entirely after the drought was broken. In Michigan 5 per cent loss was suffered, the affected plants having been imported from the South. In some fields total infection was observed. The greatest loss, 12 per cent, was reported from Utah.

BACTERIAL SPOT CAUSED BY BACTERIUM VESICATORIUM DOIDGE

This disease appeared in slightly increased amounts in New York and Missouri, but the losses were only a trace. It occurred locally in Florida, but with no appreciable loss. The weather was too cool for its development in Indiana, and in Michigan it caused a slight loss, the southern grown plants being commonly affected. In the neighborhood of Muscatine, Iowa, the losses amounted to a trace, but it was not otherwise reported in the state.

CROWN GALL CAUSED BY BACTERIUM TUMEFACIENS EFS. & TOWNS.

Crown gall was reported occurring naturally only once in 1927, having been observed once in Chautauqua County, New York.

Recent literature:

1. Hill, J. Ben. The method and rate of migration of Bacterium tumefaciens in tomato. (Abstract) Phytopath. 18: 192, Jan. 1928.

BLOSSOM-END ROT, NON-PARASITIC

Thirty states reported this disease, eight of them as more severe than the average year. In 17 states the disease was recognized as being generally distributed. As a whole it was of serious proportions in 1927. Table 65 shows the percentage losses.

Table 65. Percentage losses from blossom-end rot of tomato, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
5-10	Michigan	0.5	New Jersey, Maryland, Ohio, California
5	Georgia, Mississippi, Missouri		
3	North Carolina, Texas	Trace	Massachusetts, West Virginia, Oklahoma, Iowa, Colorado, Idaho, Oregon
2	Tennessee, South Dakota		
1	Kansas		
0.5-1	New York		
0.75	North Dakota		

LEAF MOLD CAUSED BY CLADOSPORIUM FULVUM CKE.

This disease was reported from fifteen states as causing losses to greenhouse tomatoes. The losses varied, in some states being regarded as severe, in others as nominal. It would appear from the remarks of collaborators that the greenhouse losses were associated directly with poor management of the house. In Georgia and North Carolina the disease was observed in the field. The greenhouse losses in Ohio were 0.5 per cent. The late spring crop in Michigan suffered generally, with slight losses. The losses in Wisconsin greenhouses amounted to 5 per cent, but the disease was not regarded as serious in the field, where Bordeaux copper lime dusts have proved of some value in control. In Florida, Tennessee, Kentucky, and Louisiana the disease was reported, apparently in the field, but no losses were specified.

Recent literature:

1. Jagger, I. C. Tomato mildew. Ann. Rept. Exp. and Res. Sta. Nursery and Mark. Gard. Industr. Devel. Soc. 12: 34. 1927.

2. Friebels, H. Die Bekampfung der Brunfleckenkrankheit bei Tomaten. Gartenwelt 31: 268-270. 1927.

OTHER DISEASES

Blossom drop. (non-par.) Texas: Very prevalent, causing 1 per cent loss. Illinois: Bloomington. Probably due to too much manure.

Botrytis sp. stem blight. New Jersey: Formed brownish stem lesions on nearly mature plants in greenhouse. (Dept. Plant Path.)

Caconema radicicola (Greef) Cobb, root knot. New York: (Suffolk County) Plants were stunted in one grower's hot frames. New Jersey: Present, apparently in greenhouse. South Carolina: Generally distributed. Georgia: 10 per cent total loss, with weather relations favorable. Mississippi: Jackson County. Texas: Prevalent, causing 0.5 per cent loss. Wisconsin: Causing considerable damage in Milwaukee greenhouses. Utah: occurs in Weber and Davis Counties. Also reported from Arizona and California.

Collototrichum phomoides (Sacc.) Chester, anthracnose. General in New Jersey and Florida. Observed in Indiana at canning-factory receiving platforms.

Corticium vagum Berk. & Curt. (Rhizoctonia solani Kühn), fruit rot. New York: loss 1 to 5 per cent, widespread, caused by damping-off and wire stem. Virginia: greenhouse seedlings damped off in large numbers. Florida: present in usual amount, causing buckeye rot. Texas: present, causing soil rot. Utah: caused decay of ripening fruit in field.

Fruit rots. Missouri: 5 per cent loss. Much complaint made all over the state about rotting of fruit. Much was sunburned, and many rots were an aftermath of blossom end rot. Many species of fungi were isolated from market fruits, but Fusarium predominates. Wet summer with much fruit on the ground. (Scott).

Glomerella cingulata (Stoneman) Sp. and V. Sch. Maine: found on fruits in garden near old neglected apple trees.

Leafroll. (undet.) New York: caused 0.1 per cent loss on the Grant variety, in three producing districts.

Oospora lactis parasitica Pritchard and Porte. Florida: appears to be general.

Phoma destructiva Plowr. Maine: isolated from fruit ripening in storage. New Jersey: reported once, but probably general. Texas: Traces in southern part. California: in local areas causing 0.5 per cent loss.

Phymatotrichum omnivorum (Shear) Duggar. Texas root rot. Caused 1 per cent loss in Lamb County.

Phytophthora infestans (Mont.) D By. Late blight. Maine: unusually conspicuous. New York: trace. Found only when tomatoes were growing near blighting potatoes. In one case 10 per cent of the fruit was destroyed. Not observed on the foliage. California: general in late crop in coastal counties of Orange, Los Angeles, Ventura, with loss of 75 per cent.

Phytophthora terrestris Sherb., buckeye rot. Massachusetts: 10 per cent loss under glass at Woburn. Florida: general.

Potash hunger (non-par.) Indiana: occurs in dark loam soils in North Central portion.

Puffing (non-par.) Texas: prevalent, causing 1 per cent loss.

Rhizopus nigricans Ehr., black mold rot. California: general, causing 2 per cent loss.

Sclerotinia sclerotiorum (Lib.) Massee. Ohio: reported in greenhouses in Cleveland.

Sclerotium rolfsii Sacc., stem and fruit rot. Indiana: found locally on plants imported from Arkansas. South Carolina: reported causing a fruit rot.

Sunscald. (non-par.) Pennsylvania: newly set tomatoes underwent pronounced wilting.

Tip-burn. Ohio: occurred in and about Circleville.

Verticillium albo-atrum R. & Br., wilt. Massachusetts: common on trellised tomatoes at Waltham. California: local, trace. New York: Nassau County. A characteristic collar rot (?) was traced to the seed bed.

Recent literature:

1. Brittlebank, C. C. and S. Fish. A garden fungus disease. A wilt of tomatoes, Iceland poppies, and other garden plants in Victoria caused by the fungus Phytophthora cryptogea (Pethy. and Lafferty). Jour. Dept. Agr. Victoria 25: 380-381. 1927.

2. Drechsler, C. Two water molds causing tomato rootlet injury. Jour. Agr. Res. 34: 287-296. 1927.

3. McCubbin, W. A. and F. F. Smith. Rate of virus spread in tomato plants. Science n. s. 66: 486-487. 1927.

4. Simmonds, J. H. Irish blight of tomatoes. Queensland Agr. Jour. 28: 453-455. No. 5, Nov. 1927.

5. Small, T. Rhizoctonia "foot-rot" of the tomato. Ann. Appl. Biol. 14: 290-295. 1927.

6. Williams, P. H. Damping-off of tomatoes and cucumbers. Ann. Rept. Exp. & Res. Sta. Nursery & Mark. Gard. Industr. Devel. Soc. 12: (1926) 29-32. 1927.

7. Williams, P. H. Thiolavia root rot of the tomato. Ann. Rept. Exp. & Res. Sta. Nurs. & Mark. Gard. Industr. Devel. Soc. 12 (1926) 126-29. 1927.

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DISEASES OF SWEET POTATOES

Prepared by L. L. Harter

STEM ROT CAUSED BY FUSARIUM BATATATIS WOLL. AND F. HYPEROXYSPORUM WOLL.

Stem rot is widely distributed throughout the United States where susceptible varieties are grown. Compared with last year, there is little difference in the percentage of the disease, Missouri and Kansas being the only states to report a reduction. The percentage losses reported were as follows: New Jersey 14; Tennessee and North Carolina 10; Texas 1; Iowa 8, and California 5; Delaware, Virginia, Mississippi, Oklahoma, and Arkansas 3; Maryland, Georgia, Missouri, and Kansas 2. That this disease is capable of causing heavy losses is shown by the reports from New Jersey and North Carolina where 80 and 100 per cent respectively of the plants in individual fields became infected. The mortality was probably very high.

Martin of New Jersey reports a reduction in the percentage of infection and a corresponding increase in yields as a result of immersing the sprouts before planting in some of the organic mercury compounds. He also found that on infested soil the yield could be increased by planting two and three plants

The Yellow Yam, White Yam, Triumph, and Red Brazil varieties are reported as very resistant in North Carolina, while Nancy Hall, Porto Rico, and Yellow Jersey are very susceptible.

Harter and Whitney (2) reported that as a result of several years' tests of a number of commercial varieties on badly infested soil they found that while none of the varieties were entirely immune a number were sufficiently so to be grown with success on badly infested soil.

Recent literature:

1. Harter, L. L. and W. A. Whitney. Relation of soil temperature and soil moisture to the infection of sweet potatoes by the stem rot organisms. Jour. Agr. Res. 34: 435-441. 1927.

2. Harter, L. L. and W. A. Whitney. The comparative susceptibility of sweet potato varieties to stem rot. Jour. Agr. Res. 34: 915-919. 1927.

3. Martin, W. H. The value of more than one plant to each hill in reducing losses from stem rot. Proc. New Jersey State Hort. Soc. 52: 14-21. 1927.

4. Poole, R. F. Sweet potato stem rot prevented by treating stems and roots with Bordeaux mixture. (Abstract) Phytopath. 18: 152. 1928.

BLACK ROT CAUSED BY CERATOSTOMELLA FIMBRIATA (ELL. & HALS.) ELLIOTT

The distribution of black rot seems to be coincident with the growth of the sweet potato. During the past year an increase was reported from some states, which was probably due to neglect of the application of sanitary control measures, such as seed selection and seed disinfection. Delaware, Maryland, Virginia, New Jersey, Tennessee, North Carolina, Indiana, and Kansas reported an increase over last year while South Carolina reported a decrease. The percentage of black rot was reported by states as follows: Tennessee 20, Mississippi and Texas 5; New Jersey 4; Kentucky and Indiana 3; North Carolina, South Carolina, Iowa and Kansas 2; Georgia 0.5, and Maryland a trace.

McWhorter reported more black rot in the Norfolk section in the fall of 1927 than in 1925 and 1926 due probably to the carelessness of the farmers. Crawford found the disease prevalent in New Mexico on the slips and severe in storage. Boyd (1) reports poor control in 1927 in the plant beds when inoculated roots were treated with each of 16 different disinfectants.

Recent literature:

1. Boyd, O. C. Comparison of various disinfectants in the treatment of sweet potatoes for black rot control: A progress report. (Abstract) Phytopath. 18: 153. 1928.

SOIL ROT CAUSED BY ACTINOMYCES SP.
(formerly attributed to Cystospora batata).

Soil rot was reported from eight states as follows: New Jersey 1.5 per cent; Maryland 1.0; slight loss in Louisiana, Texas and Kansas; reported from Delaware, North Carolina, and Florida.

North Carolina: Found on Yellow Jersey in Currituck County - very slight infection observed on Porto Rico in Craven, Pamlico, and Carteret Counties (Poole).

New Jersey: While not generally severe, this disease was present in fields which had previously been limed. (Martin)

Maryland: Becoming more severe on Eastern Shore. (Jehle)

Recent literature:

1. Adams, J. F. An Actinomycete the cause of soil rot or pox in sweet potatoes. (Abstract) Phytopath. 18: 152. 1928.

SCURF CAUSED BY MONILOCHAETES INFUSCANS HALS.

Scurf is reported from fifteen states, the losses varying from a trace to 1.5 per cent. Valleau and Gardner reported the disease as severe all over the state of Kentucky. Scurf is a disease not generally regarded as causing severe losses or particularly difficult to control. The losses are confined largely to the reduction in the market price resulting from the objectional appearance of the potatoes and to shrinkage in storage.

W. H. Martin of New Jersey says: "Tests conducted this year showed the value of organic mercury compounds for disinfection of sweet potatoes", while R. F. Poole of North Carolina reports that recent control studies have indicated that this disease would be greatly reduced if potatoes free of scurf were used for growing sprouts.

FOOT ROT CAUSED BY PLENODOMUS DESTRUENS HARTER

Foot rot was observed in only four states, namely Maryland, Florida, Virginia, and Mississippi, and in no case was more than a trace reported. McWhorter reported that foot rot is now comparatively rare in Virginia. This is in sharp contrast to its occurrence ten or more years ago when foot rot was so severe in the state as to threaten the industry. When this disease was first observed in Virginia as much as 90 per cent of the plants were infected and frequently the yield was reduced 75 per cent or more. Seed selection and the application of other control measures have almost exterminated this disease.

ROOT KNOT CAUSED BY CACONEMA RADICICOLA (GREEF) COBB

Root knot was reported from Tennessee, North Carolina, South Carolina, Georgia, Florida, and Arkansas. North Carolina reported a loss of 1.0 per cent. Georgia and Florida reported a trace. V. H. Young reported root knot as common and important in Arkansas.

Poole of north Carolina classifies some of the commercial varieties with respect to their susceptibility or resistance as follows: very resistant, Porto Rico and related strain, Yellow and Big Stem Jersey and related strains; resistant, Triumph; susceptible, Southern Queen, Yellow Yam, and others; very susceptible, Nancy Hall, General Grant, and Red Brazil.

MOSAIC (CAUSE UNKNOWN)

Mosaic was reported from only two states, Mississippi and Iowa. The reports indicate only a trace of infection and no loss from the disease. In Iowa it occurred only on the Nancy Hall. As a matter of fact there have been no authentic reports of mosaic on any variety of sweet potatoes except the Nancy Hall.

STORAGE ROTS, DUE TO VARIOUS ORGANISMS

Judging from the reports of collaborators, the losses in storage appear to be considerably less than in previous years, which may in part at least be attributed to the improved methods in harvesting and handling the crop and to better management of the storage houses. Rhizopus nigricans leads all other organisms in causing storage losses estimated in 1927 at 20 per cent in North Carolina, 5 per cent in Texas and California, and heavy in New Jersey. A trace was reported from Iowa. It was also reported from Mississippi. Sclerotium bataticola (= Rhizoctonia bataticola; see also bean, Macrophoma phaseoli)was reported from Maryland, North Carolina, South Carolina, Georgia, Florida, Mississippi, and Louisiana. North Carolina reported a loss of 1 per cent from this disease, the other states only a trace. Dry rot (Diaporthe batatatis) was reported from North Carolina.

OTHER DISEASES

Albugo ipomoeae-panduranae (Schw.) Sw., white rust. North Carolina: The heavy defoliation of Nancy Hall and Yellow Jersey varieties and low yields that are produced indicate that the disease is causing a reduction in yield in some areas. (Poole) Also reported from New Jersey.

Bacillus carotovorus Jones, bacterial soft rot, Connecticut.

Cold injury. North Carolina: In many sections of the state the crop is not harvested until frost has killed the vines. Frequently the delay in harvest is 7 to 10 days after frost. When rain and cold weather follow the loss from this trouble is very great (Poole).

Diaporthe batatatis (Ell & Hals.) Harter & field, dry rot. North Carolina, in a large number of storage houses causing very slight loss. (Poole)

Diplodia tubericola (Ell. and Ev.) Taub., Java black rot. Texas.

Internal breakdown. Arkansas.

Phyllosticta bataticola Ell. & Mart (=P. batatas (Thuem.) Cke.), leaf spot. North Carolina.

Phymatotrichum omnivorum (Shear) Dug., root rot. Prevalent in black lands of Texas. Estimated loss 10 per cent.

Rhizoctonia sp. was reported from Texas. O. H. Elmer of Kansas reported a disease affecting the stems of slips in the seed bed and occasionally found in the field which is suspected of being caused by Rhizoctonia. Symptoms consist of slightly elongated brown necrotic cankers that resemble Rhizoctonia cankers on Solanum tuberosum. Rotting off of the stem is frequently caused although this may be through effect of secondary invaders. A large percentage of infections are outgrown by the plant. Considerable damage was done due to the rotting off of sprouts whereupon numerous weak lateral shoots were produced.

Sclerotium rolfsii Sacc., southern blight. Georgia, Arkansas and Mississippi.

> Arkansas: An unusual type of rolling in beds and blighting of slips noted commonly near Texarkana. Material all yields Sclerotium rolfsii which appears to be the sole cause of the trouble. (V. H. Young)
>
> Georgia: According to Higgins (3) it causes serious losses throughout upper Coastal Plains section, especially bad during seasons of high temperatures in April and May. Does not spread in field but losses heavy in beds. Application of builders' hydrated lime 6 to 8 tons per acre thoroughly mixed with upper 6 inches of soil recommended as a control measure. Organic fertilizers should not be used where the disease is present.

Septoria bataticola Taub., leaf spot. Iowa, damage very slight but prevalent.

Recent literature:

1. Gray, Dan T. Plant Pathology. Ann. Rept. Arkansas Agr. Exp. Sta. (Bul. 221).39: 25-29. 1927.

2. Harter, L. L. & Whitney, W. A. Mottle Necrosis of sweet potatoes. Jour. Agr. Res. 34: 893-914. 1927.

3. Higgins, B. B. Bed rot of sweet potatoes. Ga. Agr. Exp. Sta. Circ. 80: 219-221. 1927.

4. Trotter, A. Sulla presenza della 'Lasiodiplodia tubericola' Ell. et Evr. in Egitto ('Java black-rot') e sul pericolo della sua introduzione in Italia. (On the presence of Lasiodiplodia tubericola Ell. and Ever. in Egypt ('Java black-rot') and the danger of its introduction into Italy.) Boll. R. Staz. Pat. Veg. 7: 93-98. 1927.

DISEASES OF BEAN

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LINDEMUTHIANUM (SACC. & MAGN.) BRIOSI & CAV.

The severity of anthracnose was generally less in the eastern States where it usually causes decided losses. The weather was the principal factor in this but the use of disease-free seed, grown where the disease does not prevail, appears to be of benefit. In the East the disease was general. In the Middle West it was local or scattered, and not severe. In the West it was not reported, except a trace from Montana.

Table 66. Percentage losses from anthracnose of bean as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Massachusetts	1	West Virginia
	Tennessee	0.5	Georgia, Michigan
2	Mississippi	0.01	Ohio
1.5- 0.5	New York	Trace	Delaware, Kentucky, Wisconsin, Minnesota, Missouri, Montana
1.5	Maryland		

Reports received from collaborators follow:

New York: (Nassau County) - In one planting 20 per cent of the seedlings were affected. (Hambleton)

(Erie County) - Several cases in Marilla section. (Taylor)

(Geneva) - Some fields of yellow snap beans were almost a total loss. (L, K. Jones)

(Nassau County) - Losses ran high due to prolonged wet spell. (Hambleton)

Delaware: Canning crop very free this season. (Adams)

Maryland: Surveys showed less infection in fields grown from seed from Idaho, Colorado, and California than in fields grown from Michigan and New York seed. (Jehle)

Virginia: Abundant in the Tidewater region where it does little or no damage ordinarily (McWhorter).

West Virginia: Early crop suffered severely, but late beans were much less diseased. (Sherwood).

Tennessee: Very common in eastern Tennessee. Associated with strains of Giant Stringless Greenpod from certain States. (McClintock)

Missouri: Very few beans grown commercially. Anthracnose more injurious than usual in many gardens. (Scott)

Recent literature:

1. Bredemann, G. and H. ten. Doornkaat-Koolman. Zur Immunitätszüchtung bei Phaseolus vulgaris gegenüber Colletotrichum lindemuthianum und seinen Biotypen. Zeitschr. Pflanzenzucht. 12: 209-217. Feb. 1927.

2. Doornkaat Koolman, H. ten. Die Brennfleckenkrankheit der Gartenbohne in Lichte der Vererbung. Versuche zur Immunitätszüchtung bei Phaseolus vulgaris gegenüber Colletotrichum lindemuthianum (Sacc. & Magn.) und seinen Biotypen. Forsch. Gebiet Pflanzenkr. & Immunität Pflanzenr. 4: 112-225. 7 pl. 1927.

3. Müller, H. R. A. Onderzoekingen over Colletotrichum lindemuthianum (Sacc. et Magn.) Bri. et Cav. en Gloeosporium fructigenum Berk. forma hollandica nova forma. Wageningen. 1927. Proefschr. Landbouwhoogeschool Wageningen. English summary.

BACTERIAL BLIGHTS CAUSED BY BACTERIUM PHASEOLI EFS., PHYTOMONAS MEDICAGINIS PHASEOLICOLA BURK., AND B. SOLANACEARUM EFS.

B. phaseoli appears to be the commonly observed bean blight, causing rather extended losses. In no State did the amount noted increase appreciably over past years, and in most States it fell. It may be that more extended acquaintance with the Phytomonas, and B. solanacearum, as well as B. flaccumfaciens Hedges, which is not reported this year, may cause further fall in the amount of B. phaseoli reported, and more weight given the other organisms.

Reports from collaborators concerning B. phaseoli are as follows:

New York: (Nassau County) - some dusting with sulfur-lime has been done with fair results. (Hambleton)

(Ontario County) - blight is doing much damage. (Bullock)

New Jersey: Probably present in all parts of South Jersey. (Martin)

Maryland: Somewhat more prevalent than last year. (Jehle)

Kentucky: Generally present in bean plantings. (Gardner)

North Carolina: Both lima and wax beans are attacked. (Poole)

Texas: Epidemic in lower Rio Grande Valley. (Taubenhaus)

Wyoming: Five per cent infection in the vicinity of Powell. (L. L. Harter)

Colorado: Common in Greeley section. (MacMillan)

Table 67. Percentage losses from B. phaseoli blight of bean as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Oklahoma, Wisconsin	1 to 3	New York
5	Texas, Montana	1	Virginia, Indiana Minnesota, Utah
2	Mississippi		
1.5	Maryland	0.1	Tennessee
		Trace	Delaware, West Virginia, Kentucky, Georgia, Iowa, Oregon

Phytomonas medicaginis, phaseolicola.

New York: One per cent total loss for the State. Generally distributed. (L. K. Jones)

Bacterium solanacearum.

Georgia: First occurrence noted in the State. Diagnosis confirmed by Mary K. Bryan. The disease was local, in one field, and amounted to 2 per cent loss. (Boyd)

Recent literature:

1. Stapp, C. Die bakteriolle Welkekrankheit der Bohnen. Nachrichtenbl. Deut. Pflanzenschutzd. 7: 88-90. Sept. 1927.
Although Bacterium flaccumfaciens has been isolated from German seed, it has not been reported from Germany itself.

RUST CAUSED BY UROMYCES APPENDICULATUS (PERS.) LINK.

Rust was generally more severe in the States reporting than is usually the case. Five States reported the Kentucky Wonder as being very susceptible, and mentioned no other variety. In Colorado the pinto bean was generally a total loss where grown under irrigation, as was Longfellow in the Greeley area. Other varieties showed varying resistance, but nearly all were injured to some extent. The rust was noted at Grand Junction on the western slope, possibly the first time it has been reported in the Great Basin.

Table 68. Percentage losses from rust of bean, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	Colorado	0.1	Ohio
5	Missouri	Trace	Massachusetts, New Jersey, Maryland, West Virginia, Georgia, South Dakota
3	California		
1	Texas		
0.5	Mississippi, Virginia		

MOSAIC (VIRUS)

Mosaic was reported as occurring widely in the crop, the distribution usually being general. The eastern States reported, as a rule, only losses amounting to a trace, the Mississippi Valley and the Northwest being more severely affected. Susceptible varieties reported were Wax Yellow and Bountiful in New Jersey and Red Valentine and Burpee's Stringless in Georgia. Taubenhaus, in Texas, found the disease more prevalent following leaf-hopper injury.

As some of the losses reported appear to be high for this disease, the question must be asked if the reported losses in yield were not lower, and if the figures given do not more truthfully represent percentage of infection.

Table 69. Percentage losses from mosaic of bean, as estimated by collaborators, 1927.

Percentage	States reporting	Percentage loss	States reporting
10	Texas, Oklahoma, Oregon.	1 - trace	New York
8	Utah	0.1	Tennessee
7	Montana	Trace	Massachusetts, New Jersey, Maryland, West Virginia, Kentucky, Ohio, Colorado, California
5	Wisconsin, Idaho		
4	Mississippi		
2	Indiana		
1	Georgia		

Recent literature:

1. Fajardo, T. G. Progress on experimental work with the transmission of bean mosaic. (Abstract) Phytopath. 18: 155, Jan. 1928.

ASHY STEM BLIGHT CAUSED BY MACROPHOMA PHASEOLI MAUBL.

Ashy stem blight was reported from Georgia and Mississippi, as follows:

Georgia: Unusually prevalent as compared with former years. At least two fields lost 50 per cent of the plants due to this. Plentiful in every bean section of the Coastal Plain area surveyed. Total loss 2 per cent. (Boyd)

Mississippi: Less than last year. Loss a trace. Observed on both spring and fall plantings; greatest injury in seedling stage of fall planting. (Wedgworth)

This fungus has been placed by Ashby (1) in the genus Macrophomina, Genetic connection of the sterile form Rhizoctonia bataticola (Taub.) Butler (Sclerotium bataticola Taub.), the organism causing the charcoal rot of sweet potatoes, with the Macrophomina pycnidial stage has been proved. The fungus is widely distributed. According to Small (4), the two stages cause distinct diseases on bean, the Macrophoma attacking the stem while the Rhizoctonia affects the roots.

Recent literature:

1. Ashby, S. F. Macrophomina phaseoli (Maubl.) comb. nov. the pycnidial stage of Rhizoctonia bataticola (Taub.) Butl. Trans. Brit. Mycol. Soc. 12: 141-147. 1927.

2. Barre, H. W. Plant disease investigations. In Ann. Rept. South Carolina Agr. Exp. Sta. 40: 45-48. 1927.

3. Briton-Jones, H. R. Macrophomina phaseoli (Maubl.) Ashby. Trop. Agr. West Indies 4: 194-195. Oct. 1927.

4. Small, W. Further notes on Rhizoctonia bataticola (Taub.) Butler. Trop. Agr. Ceylon 69: 9-12. July 1927.

STEM ROT CAUSED BY CORTICIUM VAGUM BERK. & CURT.

This disease caused 2 per cent loss in Mississippi and California, being generally distributed in both States. Losses amounting to a trace occurred in New York and Texas. In Florida it was generally distributed, and was regarded as more severe than usual, but the losses were not stated. In Virginia it caused some "wire-stem" injury. It was also reported from Utah.

ROOT ROTS DUE TO VARIOUS ORGANISMS

Fusarium martii phaseoli Burk., dry root rot, caused losses reported as 5 er cent in New York, and a trace in Massachusetts, Georgia, and Michigan. It was lso reported from Florida, Oregon, and California.

Fusarium spp. causing root rot were reported as follows: Noted at Nor-olk, Virginia, June 6. (Harter) An unusual amount in West Virginia (Giddings) ccurs widely in Utah (Linford). Two per cent loss from dry root rot in Idaho. Hungerford) Loss 2 per cent in California. (Milbrath)

Phymatotrichum omnivorum (Shear) Dug., Texas root rot. Two per cent oss in Texas.

Undetermined and general. Root rots on snap beans have been common in ew York. (Buckman) Severe throughout the Coastal region of South Carolina. Moore). Unidentified root rot occurred in California, Colorado, and Wyoming. Harter)

OTHER DISEASES

Blossom drop. Prevalent in Texas, causing 1 per cent loss.

Caconema radicicola (Greef) Cobb, root knot. Georgia. 5 per cent loss enerally distributed. Texas, prevalent in light sandy loams. California, 2 er cent loss in San Joaquin Valley.

Cercospora cruenta Sacc., leaf-blotch. Georgia, prevalent on pole beans, ausing slight losses. Texas, prevalent in restricted localities, causing 1 er cent loss.

Chlorosis, caused by too much lime. Slight losses in Texas.

Curly top (virus), Idaho, present in slight amount. Oregon, destructive ase of mountains, causing 2 per cent loss.

Damping-off, caused by several fungi, reported from Florida.

Erysiphe polygoni DC., powdery mildew. South Carolina, single outbreak te in season. Florida, general over the State. Texas, prevalent. Iowa, mage negligible. Utah, some damage in Davis County. California, localized sses amounting to 1 per cent.

Isariopsis griseola Sacc., angular leaf spot. New York, causing slight sses in Suffolk County. Florida, local losses, slight in amount. Indiana, te season appearance on Burpee's Stringless Greenpod.

Sclerotinia sclerotiorum (Lib.) Massee, rot. Florida, generally distributed but less prevalent than usual.

Recent Literature:

1. Severin, Henry H. P. Crops naturally infected with sugar beet curly top. Sdience n. s. 66: 137-138. Aug. 5, 1927.

DISEASES OF LIMA BEANS

Bacterium phaseoli EFS., bacterial blight. New York, Suffolk County, leaf spot is serious in some fields (Linden). Utah, a bacterial spotting has been detected, due to an organism closely resembling, but possibly distinct from the common bean blight. (Linford)

Bacterium viridifaciens T. & W., bacterial leaf spot. New Jersey, probably present wherever the crop is grown. (Martin) Nebraska, reported for the first time; on plantings at Lincoln. (Goss)

Corticium vagum Berk. & Curt., stem rot. California, southern half of State suffered a loss of 10 per cent in yield. The disease was very severe in the upper Delta region. The loss largely due to poor stand caused by death of plants in seedling stage. (Kendrick)

Diaporthe phaseolorum (Cke. & Ell.) Sacc. pod blight. New York, local in Suffolk County, loss slight (Sinden). New Jersey, present in southern part of State (Martin). South Carolina, severe injury in very restricted localities. (Ludwig) Mississippi, present in slight amount. (Wedgworth)

Nematospora phaseoli Wingard, yeast spot. Maryland, doing severe damage in local areas. (Jehle) Virginia, present in several counties. (Fromme) Mississippi, found locally in Pontotoc County. (Wedgworth)

Phytophthora phaseoli Thax., downy mildew. Collaborators' reports are as follows:

Connecticut: Found in slight amount. (Stoddard)

New York: Observed only on Long Island, where it was favored by excessive rains, and caused 25 per cent loss of crop. (Hambleton, Sinden)

New Jersey: Very severe in all parts of the State, in some cases making it useless to harvest the crop. Losses amounted to 35 per cent of the crop. (Dept. Pl. Path.)

Pennsylvania: A few specimens were received from Berks County. (Thurston)

Delaware: General throughout the state. (Adams)

DISEASES OF ONION

SMUT CAUSED BY UROCYSTIS CEPULAE FROST

The amount of onion smut over the country appears to be declining. In Massachusetts it was less than in the average year. In New York the disease is spreading. In Wayne County there was an average of 5 per cent loss, with 12 per cent loss in untreated fields. In Genesee and Orleans Counties the smut area is gradually spreading over the muck soils. In the southern part of Orange County, considerable is present in untreated beds on old land. Pennsylvania reports that commercial onion production is declining, but that the disease occurs as formerly. A slight loss occurred in Maryland. In Ohio there was a total loss of 1 per cent with a maximum infection of 10 per cent. Dust disinfectants are being studied there. The disease was recorded in the commercial crop for the first time in Indiana, but its importance is slight. In Wisconsin the spring rains washed the formaldehyde from the soil allowing the fungus to reach the seedlings in a susceptible stage. The losses, which were local, reduced the yield 2 per cent. Minnesota, Iowa, Colorado, and Oregon report slight losses.

Recent literature:

1. Walker, J. C. An onion disease under successful control. Wisconsin Hort. 17: 155-156. June 1927.

DOWNY MILDEW CAUSED BY PERONOSPORA SCHLEIDENI UNG.

Of the nine states which reported downy mildew New York suffered the greatest loss. In Orleans and Genesee Counties it was abundant and many stands were badly injured, and it appeared in Wayne and Oswego Counties also, in all causing 2 to 3 per cent loss. California reported a 3 per cent loss, localized, the seed crop being affected. Scattered losses in Massachusetts amounted to 0.1 per cent. In Maryland and Colorado the losses were slight. In Colorado Bordeaux mixture to which a suitable sticker was added gave good results in control. Pennsylvania, Arkansas, Washington, and Oregon reported the disease present.

NECK ROTS CAUSED BY BOTRYTIS SPP.

Neck rots occurred in storage in the Twin Falls, Idaho, section, causing losses of 20 per cent. This condition existed locally, and was not reported elsewhere in the state. Indiana reported a 2 per cent loss which was very prevalent in white onions. It was not eliminated in grading. Red and yellow varieties were immune. In the Orleans-Genesee section of New York, in Louisiana, and Wisconsin, slight losses were reported. A report from Virginia states that the onion sets received were of variable quality, some car lots averaging close to 50 per cent unsalable because of Botrytis and Fusarium rots. The Yellow Danvers and Japanese varieties are mentioned, but the origin of the shipments is not.

PINK ROOT

Pink root has been attributed to Fusarium malli Taub, and other Fusaria, but Hansen (1) reports that in his studies in California an undetermined species of Phoma was found to be the initial cause and the Fusaria were secondary invaders.

Losses reported in 1927 were: 2 per cent in Texas, 0.5 per cent in California, 0.2 per cent in Ohio, and slight losses in New York and Maryland. The disease was reported from Louisiana, Michigan, and Minnesota, and for the first time from Mississippi and Utah.

Recent literature:

1. Hanson, H. N. "Pink root" of onions caused by Phoma sp. Science n. s. 64: 525. Nov. 26, 1926.

ONION SMUDGE CAUSED BY COLLETOTRICHUM CIRCINANS (BERK.) VOGL.

Smudge caused a 5 per cent total loss in Indiana, where it was universally present on white onions. The yellow and red varieties which constitute the bulk of the crop were not affected. In Missouri the disease was observed for the first time, on a single planting in Franklin County where it appeared on sets received from Illinois. The disease was noted as present in Connecticut.

OTHER DISEASES

Aspergillus niger Tiegh., black mold. One per cent loss in Texas, 2 per cent in California.

Bacillus carotovorus Jones., soft rot. Serious loss in one storage house in New Jersey.

Bastard seed head (Cause unknown). Reported from New Haven County, Connecticut.

Caconema radicicola (Greef) Cobb, root knot. Traces in Texas.

Damping-off. More than usual in the Elba district, New York. Due to wet weather.

Macrosporium porri Ell., mold. Utah, reported but not seen by collaborator in Salt Lake County.

Macrosporium sarcinula parasiticum Thuem., leafspot. Louisiana. Local occurrence at Baton Rouge.

Penicillium spp., silver spot. Indiana, General. Circular silvery patches along veins of outer scales on red and yellow varieties, detracts from the bright clear skin desired. (Gardner)

Sunscald (non-par.). Indiana. Hot weather in September and October caused 1 per cent loss. The most serious cause of loss in red and yellow varieties, which compose majority of crop. Early digging and too long exposure during heat of September promoted the scald. (Gardner)

Recent literature:

1. Nolla, J. A. B. A new Alternaria disease of onions (Allium cepa L.). Phytopath. 17: 115-132. 1927.
Alternaria allii n. sp. Porto Rico.

2. --------------- Onion-leaf anthracnose. Jour. Dept. Agr. Porto Rico 10: 245-256. July/Oct. 1926 (Sept. 1927).
Colletotrichum chardonianum n. sp. Porto Rico.

DISEASES OF CRUCIFERS

CABBAGE

YELLOWS CAUSED BY FUSARIUM CONGLUTINANS WOLL.

Yellows was serious in Iowa where there was a total loss of 30 per cent of the crop mostly in Muscatine County, the principal cabbage-growing district of the State. The varieties Copenhagen Market and Golden Acre were severely attacked. Iacope and Marion Market were very resistant, some strains of Iacope being particularly so. Maryland suffered an 8 per cent loss, North Carolina 1.5 per cent loss, and Louisiana, New York, New Jersey, West Virginia, Mississippi, Ohio, and Wisconsin reported slight losses. The disease was reported from Tennessee, Arkansas, Indiana, Michigan, Minnesota, Missouri, Kansas, and Kentucky, where it was severe in some home gardens.

Recent literature:

1. Melhus, I. E., and D. R. Porter. The use of selection and selfing in improving Iacope cabbage. (Abstract) Phytopath. 18: 142. Jan. 1928.

2. Walker, J. C., J. Monteith, and F. L. Wollman. Development of three midseason varieties of cabbage resistant to yellows (Fusarium conglutinans Woll.) Jour. Agr. Res. 35: 785-809. Nov. 1, 1927.

3. ----------------. and F. L. Wellman. A Fusarium-resistant cabbage of Jersey Wakefield type. (Abstract) Phytopath. 18: 142. Jan. 1928.

BLACK ROT CAUSED BY BACTERIUM CAMPESTRE (PAM.) EFS.

Black rot was generally noted throughout the Mississippi Valley, and in some eastern States. No western State reported the disease. Kentucky suffered a possible loss of 10 per cent in commercial plantings, the disease being more severe on plants shipped into the state. In Texas black rot was severe in the lower Rio Grande Valley, causing 5 per cent loss. The other principal losses were, Mississippi 3 per cent, North Carolina 2 per cent, and New York 1 per cent to a trace. In some cases the percentage loss was high locally. Twelve other States reported losses amounting to a trace, and four others that it was present. Practically no comments were received from collaborators about this disease.

BLACKLEG CAUSED BY PHOMA LINGAM (TODE) DESM.

North Carolina reported 2 per cent, and Maryland and Mississippi each 1.5 per cent loss. In New York where the loss amounted to less than 1 per cent the disease was said to be decreasing due to seed treatment. Slight losses were noted in West Virginia (principally on young plants), Georgia, Ohio, and Wisconsin. Black leg was reported as present in Massachusetts, New Jersey, Delaware, Kentucky, Florida, Louisiana, Arkansas, and Minnesota.

CLUBROOT CAUSED BY PLASMODIOPHORA BRASSICAE WOR.

Only a few States report this disease any more. Wisconsin suffered the greatest loss of any, with 2 per cent reduction in yield. It was prevalent in northern Ohio, causing a loss of 1 per cent. In New York, while not regarded as serious, it caused a loss estimated between 1 and 2 per cent of the total yield. Massachusetts, Connecticut, New Jersey, Maryland, and West Virginia all reported slight losses, and Minnesota reported it as present.

Recent literature:

Wellman, F. L. The reaction and treatment of soils infested with Plasmodiophora brassicae Wor. (Abstract) Phytopath. 18: 141-142. Jan. 1928.

OTHER DISEASES

Alternaria brassicae (Berk.) Sacc., black leafspot. New York, statewide, of no economic importance. Georgia, abundant in seedlings raised for shipment. New Jersey, Mississippi, Louisiana, Indiana.

<u>Bacillus carotovorus</u> Jones, bacterial soft rot. New York, trace, not as serious as usual. Minnesota.

<u>Bacterium maculicolum</u> McCul., peppery leaf spot. California, local, 0.5 per cent loss. New York, Washington.

<u>Black spot</u> (non-par). Washington, usual amount.

<u>Botrytis</u> sp., gray mold. California, general, causing 2 per cent loss.

<u>Caconema radicicola</u> (Greef) Cobb, root knot. Texas, prevalent in light sandy loams, causing 0.5 per cent loss.

<u>Intumescences</u> (non-par.) Washington, single report.

<u>Mosaic</u> (undet.) New York, rarely observed in Suffolk County.

<u>Mycosphaerella brassicicola</u> (Duby) Lindau, ringspot. California, worse than usual, 6 per cent loss.

<u>Oedema</u> (non-par.) New Jersey, single report.

<u>Peronospora parasitica</u> (Pers.) D By., downy mildew. New York, very common but not destructive, loss slight. New Jersey, general. Georgia, abundant on seedlings. Florida, general. Texas, 2 per cent loss on early cabbage. California, general, loss 1 per cent. Mississippi and Louisiana, reported as present, no loss.

<u>Tipburn</u> (non-par.) New York, loss 1 to 2 per cent. Many fields were badly damaged, so that from a distance they looked almost black. In addition to moisture, fertilizers seem to have important relationship. (Chupp)

<u>Corticium vagum</u> Berk. & Curt, wire stem. New York, common throughout the state. Very well controlled by frequent applications of mercuric chloride 1-2000 to the seed bed while plants are growing. Loss 1 to 3 per cent. South Carolina one local outbreak noted. North Dakota, observed for the first time.

<u>Sclerotium rolfsii</u> Sacc., southern blight. Texas.

<u>Sclerotinia sclerotiorum</u> (Lib.) Mass. Florida.

<u>Recent literature</u>:

1. Walker, J. C. Diseases of cabbage and related plants. U. S. Dept. Agric. Farmers' Bull. 1439. 30 pp. 1927.

<u>C H I N E S E   C A B B A G E</u>

<u>Alternaria herculea</u> (Ell. & Mart.)Elliott, leafspot. Indiana, of slight importance.

Chinese Cabbage

Plasmodiophora brassicae Wor., clubroot. Ohio, serious in some fields. Apparently worse than in cabbage.

Recent literature:

1. Davis, W. H. Notes on the Cercosporella leafspot of Chinese cabbage in Massachusetts. Phytopath. 17: 669-670. Sept. 1927.

C A U L I F L O W E R

Alternaria brassicae (Berk.) Sacc., black leafspot. New Jersey, only one report, but probably general. California, 0.5 per cent loss.

Bacterium campestre (Pam.) EFS., black rot. New York, 1 to 2 per cent loss. Very little in State since seed treatment has become general.

Bacterium maculicolum McCul., peppery leafspot. New York, loss up to 0.5 per cent, general. California, 0.5 per cent loss. Connecticut, Washington.

Corticium vagum Berk. & Curt., wire stem. New York, 1 to 2 per cent loss. Minnesota, Kentucky, Washington.

Mycosphaerella brassicicola (Duby) Lindau, ring spot. California, 8 per cent loss.

Peronospora parasitica (Pers.) D By., downy mildew. New Jersey, general. Virginia, severe where late infection occurred.

Phoma lingam (Tode) Desm., blackleg. New York, 1 to 2 per cent loss. Virginia, severe on cold-frame plantings of Snow Queen variety. Pennsylvania.

Plasmodiophora brassicae Wor., club root. New York, Connecticut.

Whiptail (non-par.) New York, general, 2 to 3 per cent loss.

Recent literature:

Weber, G. F. Disinfect your seed before planting. Treatment controls seed-borne diseases. Florida Grow. 35 (10): 47. March, 1927.

B R O C C O L I

Plasmodiophora brassicae Wor., club root. New York, slight loss. Reported only from Nassau County.

BRUSSELS SPROUTS

Alternaria brassicae nigrescens Rogl., leaf spot. Indiana, local infections.

HORSERADISH

Albugo candida (Pers.) Kuntz., white rust. Connecticut, Ohio, Iowa.

Alternaria brassicae (Berk.) Sacc., leaf spot. Reported for first time from Iowa, and Utah.

Alternaria herculea (Ell. & Mart.) Elliott, leafspot. New York, very common in Nassau County.

Cercospora amoraciae Sacc., leafspot. Reported from Indiana and Utah, and from Iowa for the first time.

Curly top (virus). Oregon: Total loss 20 per cent, including 10 per cent reduction in yield, and 10 per cent other loss. Up to 30 per cent disease noted in plants, all of which came from vegetative propagations from diseased plants of year before. No current season spread because leaf hoppers were absent from horseradish locality this year. Abundant moisture inimical to leafhoppers. (McKay)

Ramularia armoraciae Fckl., leafspot. Utah.

KALE

Bacterium campestre (Pam.) EFS., black rot. Virginia, severe.

Fusarium conglutinans Woll., yellows. California, 20 to 30 per cent loss in the Petaluma section, where it is grown for greens for poultry.

MUSTARD

Albugo candida (Pers.) Kuntze, white rust. Mississippi.

RADISH

Albugo candida (Pers.) Kuntze, white rust. Ohio, isolated cases. Michigan, 15 per cent loss. Iowa, very general.

Aphanomyces raphani Kendrick, black root. Indiana, Iowa.

Radish

Recent literature:

Kendrick, J. B. The black-root disease of radish. Indiana Agr. Exp. Sta. Bul. 311. 32 pp. June, 1927.

RAPE

Plasmodiophora brassicae Wor., club root. New Jersey, 4 acre field at College farm destroyed. (Martin)

RUTABAGA

Bacterium campestre (Pam.) EFS., black rot. Mississippi.

TURNIP

Albugo candida (Pers.) Kuntze, white rust. Florida, Texas.

Alternaria sp., leaf spot. Utah.

Alternaria herculea (Ell. & Mart.) Elliott, leaf spot. Indiana.

Bacillus carotovorus Jones, soft rot. Kansas.

Bacterium campestre (Pam.) EFS., black rot. Massachusetts.

Colletotrichum higginsianum Sacc., anthracnose. Mississippi.

Erysiphe polygoni DC., powdery mildew. Indiana, Iowa, Utah.

Mosaic (Virus). Kansas, Indiana, Mississippi.

Recent literature:

1. Cunningham, G. H. Dry-rot of swedes and turnips: its cause and control. Bul. New Zealand Dept. Agr. 133. 51 p. July, 1927.
   Phoma lingam (P. napo-brassicae)

2. Murphy, Paul A. Some fungus diseases of root crops. Jour. Dept. Lands & Agr. Ireland 27: 12-23. 1927.

3. Wormald, H., and R. V. Harris. Bacterial rot of turnips. Ann. Rept. East Malling Res. Sta. 13 (II Suppl.): 89-91. 1927.
   Bacillus carotovorus.

DISEASES OF CUCURBITS

CUCUMBER

BACTERIAL WILT CAUSED BY BACILLUS TRACHEIPHILUS EFS.

The reports from collaborators generally did not contain extended comment on the disease. A few are of interest.

Connecticut: More of this trouble than in the average season. (Clinton)

Delaware: Very common and spread may be associated with heavy prevalence of beetle. (Adams)

Wisconsin: Not seen in field. Few reports from Milwaukee greenhouses. (Vaughan).

The disease was reported from Connecticut, New Jersey, Virginia, Florida, Indiana, Wisconsin, and Minnesota.

Table 70. Percentage losses from bacterial wilt of cucumber, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Iowa, West Virginia	Trace	North Carolina, Georgia, Missouri, Kansas, Colorado
7.5	New York		
2	Ohio		
1	Texas		

Recent literature

1. Clayton, E. E. Effect of early spray and dust applications on later incidence of cucumber wilt and mosaic diseases. Phytopath. 17: 473-481. July, 1927.

2. Isely, D. The striped cucumber beetle. Arkansas Agr. Exp. Sta. Bul. 216. 36 pp. 1927.

3. Jewett, H. H. The striped cucumber beetle. Kentucky Agr. Exp. Sta. Circ. 37: 19-34. 1927.

ANGULAR LEAFSPOT CAUSED BY BACTERIUM LACHRYMANS ERS. & BRYAN

The disease was prevalent in the western half of New York, and caused a otal loss estimated at 1 to 3 per cent. Ohio, Illinois, and Wisconsin reported light losses. Georgia, Minnesota, Iowa, and Utah reported the disease, but not s causing appreciable losses. In Indiana it was found in greenhouses.

Recent literature

Weber, George F. Cucumber fruit-rot and angular leafspot.(Abstract) Phytopath. 18: 133. Jan. 1928.

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALST.

Anthracnose was of increased severity in West Virginia, causing a 5 per cent estimated loss. Slight losses were reported in New York, Delaware, Georgia and Ohio, where it also appeared in greenhouses. It was reported from Delaware, Florida, Wisconsin, and Minnesota, and from Massachusetts in greenhouses.

MOSAIC (VIRUS)

The mosaic disease appears to be increasing in importance in some producing sections. Other diseases and accidents have reduced the apparent severity of the disease in some quarters. In New York it is gradually getting worse up state, and has been severe on Long Island for a long time. No resistant varieties were observed. The losses ranged from 30 to 50 per cent. (Chupp) In Massachusetts, where the crop is of much less importance, the loss was 10 per cent. In California it was general, with a loss of 5 per cent. Maryland lost 3.5 per cent of the crop, and Texas 1 per cent. Slight losses were reported from Ohio, Missouri, Iowa, North Dakota, and Colorado, and eleven other states reported mosaic as present, including North Carolina and Indiana, where it appeared in greenhouses.

Recent literature

1. Doolittle, S. P., and M. N. Walker. Aphis transmission of cucumber mosaic. (Abstract) Phytopath. 18: 143. Jan. 1928.

2. Gilbert, W. W. Cucurbit mosaic control a demonstrated fact. U. S. Dept. Agr. Ext. Path. 6: 4. Jan. 1928.

3. Porter, R. H. Further evidence of resistance to cucumber mosaic in the Chinese cucumber. (Abstract) Phytopath. 18: 143. Jan. 1928.

DOWNY MILDEW CAUSED BY PSEUDOPERONOSPORA CUBENSIS (BERK. & CURT.) ROSTEW.

Except for a severe epidemic in Florida causing an estimated loss of 25 per cent and 10 per cent loss in Texas, little damage was reported from downy mildew. Maryland reported 0.5 per cent loss, New York, West Virginia, Georgia and Missouri slight losses, and Massachusetts, Delaware, and Virginia the occurrence of the disease.

OTHER DISEASES

Caconema radicicola (Greef) Cobb, root knot. Georgia, general, total loss 15 per cent. (Boyd) Texas, 1 per cent loss. Mississippi, found in greenhouses. Oregon, slight losses. California, 2 per cent loss, localized.

Cladosporium cucumerinum Ell. & Arth., scab. This disease seems to be spreading in New York, although it has not become serious except in a few fields and greenhouses. Those who followed recommendations for control had very good success. Losses reported trace to 0.5 per cent. (Chupp) Reported present in Maine, Connecticut, and Wisconsin.

Curly-top (virus) Oregon, important east of mountains.

Erysiphe cichoracearum DC., powdery mildew. Texas, 5 per cent loss. California, 3 per cent loss. Present in Massachusetts, New York, and Indiana.

Macrosporium cucumerinum Ell. & Ev., leafblight. New York, general all over the State, causing loss of 2 to 3 per cent. Maryland, 2 per cent loss. Present in New Jersey, Florida, and Utah.

Mycosphaerella citrullina C. O. Smith, gummy stem-blight. New Jersey, one report.

Sclerotinia sclerotiorum (Lib.) Massee, wilt. Washington, single report.

MUSKMELON

LEAFBLIGHT CAUSED BY MACROSPORIUM CUCUMERINUM ELL. & ARTH

As a rule leafblight was general in those States reporting it and caused heavy losses in some cases. New York, New Jersey, and Delaware reported the disease as general but mentioned no losses. In Maryland the loss was 8 per cent but would have been much greater had not so many fields been dusted or sprayed. (Jehle) The 15 per cent loss in Georgia was in a measure due to the late development of the main crop which carried it into July. (Boyd) In Florida and Texas there were local outbreaks. In Arkansas the disease was severe. No accurate loss data is available, but in local instances as much as 70 per cent was reported. (V. H. Young) In Illinois there was a general loss amounting to 10 per cent. Here the "Hearts of Gold" variety seemed resistant. (Meckstroth and Stout). Michigan reports only 1 per cent loss, due to the widespread use of sprays for control. (Div. Bot.) It is mentioned as occurring in Colorado, Utah, and Oregon, but appears to be a negligible factor in production.

BACTERIAL WILT CAUSED BY BACILLUS TRACHEIPHILUS EFS.

This disease appears to have increased in severity slightly over the average, due in some cases to unfavorable weather conditions and in others to neglect of the approved control methods. It was reported as present in New Jersey, Virginia, Kentucky, Florida, Louisiana, Michigan, Minnesota, and Kansas. In New York and South Dakota the losses were slight. However, Iowa suffered a 5 per cent loss, Illinois 4 per cent, Ohio 3 per cent, Mississippi and West Virginia 1 per cent, and Maryland 0.5 per cent.

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALS.

In West Virginia anthracnose is regarded as of considerable importance. In 1927 it was very severe, was found in practically every field, and caused a total loss of 10 per cent. This was due to the late planting and the wet cold spring followed by hot wet weather in midseason. (Sherwood) Maryland reported 0.2 per cent loss, which would have been worse had the disease not been checked by dusting with copper-lime dust. In New Jersey, Delaware, Georgia, Ohio, Michigan, and Iowa the disease was general and caused slight losses. It was reported as present without doing appreciable damage in North Carolina, Florida, Arkansas, Wisconsin, Minnesota, and Kansas.

DOWNY MILDEW CAUSED BY PSEUDOPERONOSPORA CUBENSIS (BERK. & CURT.) ROSTEW.

Downy mildew was very severe in the lower Rio Grande Valley in Texas causing a total loss estimated at 90 per cent of the crop. In Maryland there was a loss of 1 per cent but the use of control measures probably prevented a greater loss. Virginia, Georgia, Illinois, and Arkansas suffered slight losses. Delaware, Florida, and Louisiana report the disease present without appreciable loss

MOSAIC (VIRUS)

Chupp states that in New York "Mosaic seems to be spreading rapidly in upstate sections and will finally ruin the crop if a remedy cannot be found. Destroying known weed hosts has not proved satisfactory yet." In Connecticut, according to Clinton, five reports were received, one of almost complete loss. Valleau in Kentucky reports "Only occasional plants found affected. The virus transfers to tobacco where it produced necrotic lines somewhat similar to ringspot, but it may be cucumber mosaic." Other reports of occurrence were received from Delaware, Maryland, Ohio, Michigan, Wisconsin, Iowa, Colorado, and Californ[ia]. In no case was the loss when estimated greater than 0.1 per cent

POWDERY MILDEW CAUSED BY ERYSIPHE CICHORACEARUM DC.

In Georgia there was a total loss of 10 per cent, including reduction in yield and in quality. In the Imperial Valley, California, a loss of 5 per cent is estimated, which, although large considering the value of the crop is slight when compared to the disastrous loss of 1926. The disease was reported from New York and Texas also.

Recent literature

Sherbakoff, C. D. Powdery mildew of muskmelon. Phytopath. 17: 414-415. June 1927.

OTHER DISEASES

Caconema radicicola (Greef) Cobb, root knot. Georgia, general in southern part, increasing in amount slightly. Loss totals 10 per cent. (Boyd) Texas, prevalent on light sandy loams. California, general, causing 5 per cent loss. New Mexico, present in southern part.

Chlorosis. Too much lime, Texas, trace.

Cladosporium cucumerinum Ell. & Arth., scab. Massachusetts, Virginia.

Curly top (virus). Oregon, very destructive in local areas in eastern Oregon. Losses 20 per cent, maximum field infection 90 per cent.

Fusarium sp., fruit rot. Maryland, Texas, New Mexico, California.

Sclerotium rolfsii Sacc. Texas, prevalent.

PUMPKIN

Bacillus tracheiphilus EFS., wilt. Colorado, general where pumpkins are grown. (Le Clerg)

Erysiphe cichoracearum DC., powdery mildew. Colorado, present in western slope fields. (Le Clerg)

SQUASH

Bacillus carotovorus Jones, soft rot. Maryland.

Bacillus tracheiphilus EFS. Bacterial wilt. Connecticut, New Jersey, Iowa, and probably Utah.

Caconema radicicola (Greef) Cobb, root knot. Texas.

Curly top (virus). Utah, Oregon, California.

Fusarium sp., wilt. Texas.

Macrosporium cucumerinum Ell. & Ev., leaf blight. Utah.

Mosaic (virus). Connecticut, New Jersey, Louisiana, Texas.

Pseudoperonospora cubensis (Berk. & Curt.) Rostew., downy mildew. Delaware, Texas.

WATERMELON

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALST.

The disease was of real importance in practically all of the seventeen States from which it was reported. The losses were high as a rule, and in several States it was much more prevalent than in the average year.
Some of the reports from Collaborators are instructive:

> West Virginia: Crop was very late. The wet, cold spring followed by hot moist weather in midseason spread the disease to practically all patches. (Sherwood)

> North Carolina: Seed transmission apparently of considerable importance as evidenced by the appearance of disease in several fields of newly cleared land. (Fant)

> Georgia: Little damage to the early crop. Disease became epidemic only during the delayed July crop. (Boyd)

Table 71. Percentage losses from anthracnose of watermelon as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	South Carolina	1	Texas
20	West Virginia	Trace	Iowa
10	Georgia, Illinois	Present, no loss estimate	New Jersey, Delaware Kentucky, Tennessee, Florida, Louisiana, Arkansas.
8	Maryland, North Carolina		
5	Kansas		
2	Mississippi		

WILT CAUSED BY FUSARIUM NIVEUM EFS.

Wilt was severe in Iowa appearing in the field in the seedling stage and causing a loss estimated at 50 per cent. This is probably the controlling factor in Muscatine County, the principal growing section, as formerly about 7,000 acres were grown, but now only about 500 are planted. (Archer) In Illinois the disease was severe also, the losses amounting to 25 per cent, and being general over the State. In States where the watermelon is a major crop the losses were less, Mississippi reporting 3 per cent, Georgia 2 per cent, Texas 1 per cent. The total loss in California was 5 per cent, but losses in Stanislaus County were much heavier. North Carolina, Florida, Louisiana, Arkansas, and Utah, merely report the disease as present.

OTHER DISEASES

Bacillus tracheiphilus EFS., bacterial wilt. Maryland, slight loss. Virginia and Florida, present.

Blossom-end rot (unknown). Texas, 2 per cent. Georgia, 1.5 per cent. Iowa, 1 per cent. Present in Utah.

Caconema radicicola (Greef) Cobb, root knot. Georgia, 2 per cent loss in yield, 4 per cent in quality. California, 5 per cent general loss. Texas, prevalent.

Capnodium sp., honeydew. Texas.

Cercospora citrullina Cke., leafspot. Texas.

Erysiphe cichoracearum DC., powdery mildew. New York: eleven varieties of watermelons were grown in the University vegetable gardens. All of them had some mildew on the fruit, but none on the leaves. The Monte Cristo and White Seeded Angelino were much more severely infected than others. Burrell's Select Winter Queen was almost free from the mildew (Chupp).

Macrosporium cucumerinum Ell. & Ev., leafblight. Utah.

Pseudoperonospora cubensis (Berk. & Curt.) Rostow., downy mildew. Georgia, California, Missouri, all report slight losses. Present in Delaware and Florida. This is the first year the disease was reported from Missouri.

Rhizoctonia sp. Georgia, slight loss. Texas.

Sclerotium rolfsii Sacc., ground rot. Georgia, 2 per cent loss, scattered.

Thielavia basicola (Berk. & Br.) Zopf., black root rot. Utah.

Recent literature

1. Porter, D. R. Watermelons that won't wilt on sick ground. Rep. Iowa State Hort. Soc. 61 (1926): 213-216. (1927)

2. --------------- Studies with the watermelon wilt, caused by Fusarium niveum E.F.S. (Abstract). Phytopath. 18: 143-144. Jan. 1928.

3. --------------- Varietal resistance of watermelons to wilt (Fusarium niveum E.F.S.). (Abstract). Phytopath. 18: 144. Jan. 1928.

D I S E A S E S O F C E L E R Y

EARLY BLIGHT CAUSED BY CERCOSPORA APII FRESENIUS

This disease was especially severe in Massachusetts, the field losses amounting to 5 to 10 per cent of the crop. This years' attack was regarded by Davis as the worst in five years or longer. The loss in Ohio was 0.2 per cent, and slight losses were reported in New York and Colorado. The disease was present in Connecticut, New Jersey, Tennessee, North Carolina, Indiana, Minnesota, North Dakota, and Iowa. In the latter state it was reported for the first time.

LATE BLIGHT CAUSED BY SEPTORIA APII ROSTR.

Late blight was less severe than in 1926, although apparently more widespread. Twenty-four states report it to some extent. Losses reported were Ohio and Michigan each 5 per cent, Kansas and Colorado each 2 per cent, New York 1 per cent, Massachusetts, Wisconsin, and Utah slight losses. Sixteen other state report the disease. The following comments are of interest:

New York: A very serious disease where the seed bed and fields are not sprayed or dusted carefully (Chupp).

Kentucky: At Paducah all men sprayed and losses were slight. (Valleau)

North Carolina: Severe the latter part of the season (Poole).

Wisconsin: Outer infected leaves trimmed off so losses were minor (Vaughan).

OTHER DISEASES

Bacillus carotovorus Jones, heart rot. New York.

Bacterium apii Jagger, bacterial blight. New York 0.5 per cent loss. Delaware, Ohio, Michigan, Minnesota.

Black heart (undet.). Florida, Idaho, Utah, California.

Caconema radicicola (Greef) Cobb, root knot. Florida, Ohio, California.

Fusarium sp., yellows. Slight losses in Ohio and Michigan. Present also in New York, Ohio, Minnesota.

Hollow-stem (undet.) California.

Marl disease (undet.) Michigan.

Mosaic (virus). Connecticut, Florida.

Root-rot (undet.) New York, Ohio.

Rhizoctonia sp. Damping-off. New Jersey, Virginia.

Sclerotinia sclerotiorum (Lib.) Mass. Pink rot. Florida, California.

Recent Literature

1. Leach, J. G. The relation of insects and weather to the development of heart rot of celery. Phytopath. 17: 663-667. Sept. 1927.

2. Dye, H. W. Celery blight control. Ann. Rept. Veg. Grow. Assoc. Ontario. 22: 20-24. 1927.

DISEASES OF LETTUCE

Bacillus carotovorus Jones, soft rot. California: 0.5 per cent loss in Monterey County (Milbrath). Connecticut.

Botrytis sp., gray mold rot. New York: occurred in a few cold frames in Nassau County where early lettuce was coming into head (Hambleton). California: loss 2 per cent, localized (Milbrath). Present in greenhouses in Connecticut and Indiana, and reported from New Jersey as state-wide.

Lettuce - Diseases.

Bremia lactucae Regel., downy mildew. California: 10 per cent estimated loss. Heavy in the Imperial Valley (Milbrath). New York: loss slight to 0.25 per cent. Reported from Connecticut, Virginia and Indiana.

Brown blight. (undet.) California: Imperial Valley losses 4 per cent (Milbrath).

Chlorosis. (non-par.) Texas: trace.

Corticium vagum Berk. & Curt. Bottom rot noted in the Genesee-Orleans section, New York (Cook). Stem rot found in Indiana greenhouses. (Gardner). Root rot local in some Texas communities (Taubenhaus).

Macrosporium sp., leaf spot. New York: trace in Elba district. (Chupp)

Marssonina panattoniana (Berl.) Magn. Anthracnose. New York: scattered outbreaks, losses slight (Chupp).

Phymatotrichum omnivorum (Shear) Duggar, root rot. Texas: Prevalent on overgrown lettuce (Taubenhaus).

Rio Grande disease (unknown). Texas: trace in Rio Grande Valley. (Taubenhaus).

Root rot (unknown). New York: A dipterous larva inhabiting lettuce roots has done considerable damage in one locality. A root rot follows the injury--losses slight. (Hambleton).

Sclerotium sp., drop. Virginia: Causes a typical "drop." At present it does little damage. In wet years it may become serious. The organism appears to belong to the group of S. delphinii rather than S. rolfsii (McWhorter).

Sclerotinia sclerotiorum (Lib.) Massee, drop. California: 3 per cent loss, general (Milbrath). Indiana: in greenhouses when the lettuce was watered too heavily. Reported also from New Jersey, South Carolina, Florida, Washington.

Septoria lactucae Pass., leafspot. New Jersey, Virginia.

Stem girdle (unknown). New York.

Tip-burn (non-par.) New York: In the Genesee-Orleans section 25 to 35 per cent damaged. Injury appears to be much more severe in muck soils with large amounts of available potash and an excess of nitrogen (Chupp). California: general loss of 3 per cent (Milbrath). New Jersey: severe in parts of Cumberland County (Martin). Noted in Utah and Washington.

Wilt. (undet.) New York: A very common and serious disease. Losses about 0.5 per cent (Chupp).

Yellows (undet.) New York. Elba District as high as 40 per cent in some fields, common in Nassau County. Total loss estimated at 3 per cent (Chupp).

General note. New York: Although the estimates for losses of lettuce seem very high, all the field men feel that the figures are conservative. Taking the maximum of all diseases the total is 77.75 per cent loss. The field men insist that 80 or even 90 per cent would be no exaggeration. (Chupp).

D I S E A S E S O F P E A S

ROOT ROTS AND WILTS CAUSED BY VARIOUS ORGANISMS

Aphanomyces euteiches Drechs., root rot. Losses: Maryland 8 per cent, Wisconsin 5 per cent, Utah 3 per cent, Minnesota 1 per cent, California 0.5 per cent. Slight losses in New York and Ohio. Reported also from Connecticut, New Jersey, Delaware.

Corticium vagum Berk, & Curt., root rot. Montana. Local losses as high as 90 and 100 per cent. The disease is very common but usually does little damage (P. A. Young). New York, loss 5 per cent. Present in New Jersey and Utah.

Fusarium sp., root rot. California.

Fusarium martii pisi Jones, root rot. California, general. Losses 2 per cent (Milbrath). Minnesota, losses 0.6 per cent. Infection aided by poor growing weather. (Sec. Plant Path.) Maryland, 0.5 per cent loss, general. Colorado, causing some damage (Le Clerg). Iowa, causing slight losses, scattered. (Archer) Reported also from Maine.

Undetermined. Arkansas, in home gardens. Utah, in old pea fields (New York).

Recent literature:

1. Linford, M. B. Additional hosts of Aphanomyces euteiches, the pea rootrot fungus. Phytopath. 17: 133-134. Feb. 1927.

2. Haenseler, C. M. Pea root rot studies. Ann. Rept. New Jersey Agr. Exp. Sta. 47: 334-339. 1927.

BLIGHT CAUSED BY ASCOCHYTA SPP.

The most serious loss reported was 5 per cent in restricted sections in California. New York and Maryland reported slight losses. Leafspot was reported from Delaware, leafspot and foot rot from New Jersey, and pod spot from Louisiana and Minnesota.

Pea - Blight

Two papers dealing with these organisms appeared during the year. Three species of Ascochyta are concerned - I, A. pisi Lib.; II, the pycnidial stage of Mycosphaerella ~~pinodes~~ (Berk. & Blox.) Stone described by Jones (1) as A. pinodes; and III, another form designated by Linford and Sprague (2) as "M pinodes micro form?" but described by Jones as A. pinodella. All three cause spotting of leaf, stem, pod and seeds. M. pinodes and A. pinodella cause a foot rot also. Apparently M. pinodes was responsible for most of the severe outbreak of Ascochyta blight that have been reported. A. pinodella is able to live in the soil for at least two years. All three species are carried in the seed.

Recent literature:

1. Jones, L. K. Studies of the nature and control of blight, leaf and pod spot, and footrot of peas caused by species of Ascochyta. New York (Geneva) Agr. Exp. Sta. Bul. 547. 46 p. Dec. 1927.

2. Linford, M. B. and R. Sprague. Species of Ascochyta parasitic on the pea. Phytopath. 17: 381-397. 1927.

OTHER DISEASES

Bacterium pisi. (Sack.) EFS., bacterial blight. Minnesota, losses 0.5 per cent on canning peas. Slight losses in New York and Wisconsin. In the latter state the trouble is largely outgrown at the canning stage according to Vaughan. Reported from New Jersey, Florida, and Utah, and possibly occurring in South Carolina.

Caconema radicicola (Greef) Cobb, root knot. Texas, Utah.

Chlorosis (undet.) Vermont, due to root rot or malnutrition. Texas, due to excess lime.

Collototrichum pisi Pat., anthracnose. Wisconsin, slight damage. Minnesota, first report.

Erysiphe polygoni DC., powdery mildew. One per cent loss in Minnesota and California, slight loss in Iowa. Reported from Florida, Louisiana, Texas, New Mexico, Utah.

Fusicladium pisicola Linford, black leaf. Utah.

Mosaic (virus) New Jersey, Utah.

Peronospora viciae (Berk.) D By., downy mildew. Slight losses, Minnesota, Utah, North Carolina, California.

Pythium sp., root rot. South Carolina, followed cold weather (Ludwig).

Septoria flagellifera Ell. & Ev., leaf spot. Minnesota.

Septoria pisi West., leaf blotch. Minnesota 0.5 per cent loss. New York trace. Florida, Minnesota.

Thielavia basciola (Berk. & Br.) Zopf., black root rot. New York, trace.

Recent literature:

1. Crawford, R. F. Powdery mildew of peas. New Mex. Agr. Exp. Sta. Bul. 163. 13 p. June 1927.

2. Hynes, H. J. Defective germination in peas. The desirability of local seed production. Agr. Gaz. New South Wales 38: 251-254. March 1927.

3. Skoric, V. Bacterial blight of pea: overwintering, dissemination, and pathological histology. Phytopath. 17: 611-627. Sept. 1927.

D I S E A S E S   O F   C O T T O N

WILT CAUSED BY FUSARIUM VASINFECTUM ATK.

In 1927 the damage caused by wilt was moderate, but important, considering the extent and value of the crop. In Texas the losses were 8 per cent, in Oklahoma 5 to 6 per cent. In Arkansas where the loss was 4 per cent, it is considered the most destructive plant disease in value of crop according to V. H. Young. In North Carolina 2 per cent loss was reported by Fant, who stated that the varieties "Dixie Triumph" and "Super Seven" are most extensively grown of the resistant strains. New localities in the Piedmont section were added to the known infested acreage in South Carolina where the loss was 2 per cent. One per cent loss was reported from Tennessee and Georgia, and slight losses from Virginia and Missouri.

Recent literature:

1. Fahmy, Towfik. The Fusarium disease of cotton (wilt) and its control. Intern. Rev. Agr. 18: 601-602. June 1927. Fusarium vasinfectum aegyptiacum Fahmy.

2. Fulton, H. R. Organic fertilizers and cotton wilt control. Science n. s. 66: 193-194. Aug. 26, 1927.

3. Gray, Dan T. Plant Pathology. In Ann. Rept. Arkansas Agr. Exp. Sta. 39 (Bul. 221): 25-29. Aug. 1927.

4. Neal, D. C. Cotton wilt: a pathological and physiological investigation. Ann. Missouri Bot. Gard. 14: 359-424. Nov. 1927.

5. Woodroff, Naomi C. A disease of cotton roots produced by Fusarium moniliforme Sheld. Phytopath. 17: 227-238. 1927.

ANTHRACNOSE CAUSED BY GLOMERELLA GOSSYPII (SOUTHWORTH) EDG.

The importance of anthracnose may best be judged from comments from some of the collaborators:

South Carolina: Appeared as a seedling disease, not recorded as a boll rot. (Ludwig).

Mississippi: Frequently more serious on heavy alluvial soil where cotton growth is rank.

Louisiana: There was considerable loss due to boll rot on low alluvial lands (Brown).

Arkansas: Certain strains such as "Trice" were badly affected on the bolls. Apparently there is a great difference in strains. (Young).

Table 72. Percentage losses from anthracnose of cotton as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
10	Tennessee	1.	Missouri
3	Oklahoma	0.5	Arkansas
2-3	Mississippi	0.2	Louisiana
2	Virginia	Trace	South Carolina, Georgia
1.8	North Carolina	Present	Texas

ANGULAR LEAF SPOT CAUSED BY BACTERIUM MALVACEARUM EFS.

As a whole the disease appeared to be of less importance than in 1926. The greatest loss, 5 per cent, was reported from Tennessee. In North Carolina it was found in all counties where cotton is grown, chiefly causing leaf lesions. The loss was 1.5 per cent (Lehman and Fant). One per cent loss was caused in South Carolina, Oklahoma, Texas, Arkansas, and Mississippi. Slight losses occurred in Virginia and Georgia. It was present in Louisiana and New Mexico.

Recent literature:

1. Archibald, R. G. Sulfuric acid treatment of cotton seed. Soil Science 23: 1-3. 1927.

2. --------------- Black arm disease of cotton with special reference to the existence of the causal organism. B. malvacearum, within the seed. Soil Science 23: 5-9. 1927.

3. Massey, R. E. On the relation of soil temperature to angular leafspot of cotton. Ann. Bot. 41: 497-507. July 1927.

4. Sherbakoff, C. D. A modified method of delinting cotton seed with sulphuric acid. Phytopath. 17: 189-193. 1927.

ROOT KNOT CAUSED BY CACONEMA RADICICOLA (GREEF) COBB

While few collaborators commented on the presence of this disease, undoubtedly it occurred to some extent in each cotton producing state, especially on sandy soils. Oklahoma reported 5 per cent loss. Arkansas 2 per cent, and Missouri, Georgia, and North Carolina each 1 per cent.. Slight losses occurred in Virginia, South Carolina, and Mississippi.

STEM ROT, SORESHIN, DAMPING-OFF CAUSED BY CORTICIUM VAGUM BERK. & CURT.

Stem rot caused 0.5 per cent loss in Tennessee during the early season when it was wet and cool. Stem rot and soreshin occurred in Arkansas. Soreshin caused the heaviest loss in Texas, taking 3 per cent of the stand. Damping-off caused slight losses in Mississippi and New Mexico.

Recent literature:

1. Park, M. Some investigations into conditions affecting the parasitism of Rhizoctonia solani Kühn. Ann. Rept. Bot. Gard. Peradeniya 10: 259-273. July 1927.

WILT CAUSED BY VERTICILLIUM ALBOATRUM REINKE & BERTH.

The following quotation taken from a letter of C. D. Sherbakoff is of especial interest:

"During latter part of September of 1927 Prof. S. H. Essary brought in for my examination samples of cotton wilt collected by him, in company with Mr. Newman Hancock, in various fields of Lake County, Tennessee, on September 19 and 20, 1927. Prof. Essary states that many of the wilted cotton plants still had green branches near the ground while the tops were dead with squares still clinging. According to Mr. Hancock, they examined at least a dozen typical cotton fields in Lake County and found the wilt generally present, affecting on an average at least 10 per cent of the plants, and he states also that in the growers' opinion the wilt occurs irregularly about one in three or four years.

"My cultural examination of four of the specimens of the wilt showed for two of them a uniform presence of Verticillium albo-atrum in pure condition and for the two others a miscellaneous collection of various fungi, but none of Fusarium vasinfectum. Therefore, the writer is inclined to believe that the wilt in Lake County (West Tennessee, along the Mississippi River) is due to Verticillium albo-atrum. The cultures of Verticillium obtained from the wilted cotton samples are indistinguishable from the Verticillium albo-atrum cultures which I happened to obtain about the same time from wilt affected maple trees at Knoxville, Tennessee."

OTHER DISEASES

Alternaria sp. leafspot. Mississippi: loss 1 per cent. Disease becomes more severe following periods of dry weather (Neal).

Diplodia gossypina CKE., boll rot. Texas.

Lightning injury. Mississippi.

Malnutrition, (non-par.) Rust. Louisiana: 7 per cent loss, scattered. Georgia: 5 per cent loss, general, aided by drought. Mississippi: Loss 2 to 3 per cent, occurs more especially in fields which are lacking in organic content and potash (Neal). Tennessee: Loss 2 per cent. Arkansas and North Carolina: reported.

Mycosphaerella gossypina (Cke.) Earle. Leafspot. Texas.

Phymatotrichum omnivorum (Shear) Duggar, root rot. In Texas the disease was severe late in the season, acquiring epidemic proportions, and causing a total loss estimated at 15 per cent (Taubenhaus). It occurred in Arkansas also.

Puccinia hibisciata (Schw.) Kell. rust. Texas.

Recent literature:

1. King, C. J. and H. F. Loomis. Factors influencing the severity of the crazy-top disorder of cotton. U. S. Dept. Agr. Bul. 1484, 21 p. June 1927.

2. Sawhney, A. Studies in the biological and cultural characters of Capnodium sp. on cotton. Jour. Indian Bot. Soc. 5: 141-186. Jan. 1927.

3. Shapovalov, M. The two most common decays of cotton bolls in the southwestern states. Jour. Agr. Res. 35: 307-312. Aug. 15, 1927.
Aspergillus niger, Rhizopus nigricans.

4. Sherbakoff, C. D. A modified method of delinting cotton seed with sulphuric acid. Phytopath. 17: 189-193. March 1927.

5. Woodroof, N. C. Cotton seed treatment by the dusting method. (Abstract). Phytopath. 18: 134. Jan. 1928.

DISEASES OF TOBACCO

WILD FIRE CAUSED BY BACTERIUM TABACUM WOLF & FOSTER

In Maryland, where the total losses were 3 per cent, the wet spring was favorable for seed bed infection. Spraying the seed beds saved them from destruction and greatly reduced the possibilities of later infection by keeping infected plants from the fields, according to Jehle. The disease caused no other losses of consequence, but was reported from Massachusetts, Connecticut, New York, Pennsylvania, Virginia, Kentucky, North Carolina, Florida, and Wisconsin.

ANGULAR LEAF SPOT CAUSED BY BACTERIUM ANGULATUM FROMME & MURRAY

This disease, which requires favorable weather conditions for its spread and development, was not serious in 1927. In North Carolina rains spread infection and the loss was 3 per cent. Lehman and Fant state that treatment is becoming a common practice and has had a tendency to reduce the amount of disease. In Maryland the loss was 0.5 per cent. The disease was reported also from Virginia, Tennessee and Kentucky.

BLACK ROOT ROT CAUSED BY THIELAVIA BASICOLA (BERK. & BR.) ZOPF.

The disease was regarded by collaborators generally as less severe in 1927 than is usual. Wisconsin reported 10 per cent loss, mostly in old fields. The loss in Maryland was 0.5 per cent. The disease was reported from Massachusetts, Connecticut, New York, Virginia, and Kentucky.

Recent Literature:

1. Anderson, P. J. Soil reaction and black root rot of tobacco. (Abstract). Phytopath. 18: 131. Jan. 1928.

2. Conant, G. H. Histological studies of resistance in tobacco to _Thielavia basicola_. Amer. Jour. Bot. 14: 457-480. Oct. 1927.

3. Doran, W. L. Relation of the adjustment of soil reaction to black root-rot of tobacco. Science n. s. 66: 661-662. Dec. 30, 1927.

4. Mandelson, L. F. Black root-rot of tobacco in New South Wales. Thielavia basicola (B. and Br.) Zopf. Agr. Gaz. New South Wales. 38: 523-531. July, 1927.

5. Slagg, C. M., J. E. Montreuil, and T. G. Major. The effects of lime on cigar tobacco. (Abstract). Phytopath. 18: 130-131. Jan. 1928.

MOSAIC (VIRUS)

This serious disease was general over the tobacco-growing sections, but of unequal severity. The total losses estimated are: Wisconsin 10 per cent, North Carolina 8 per cent, Maryland 4 per cent, Georgia 1.5 per cent, Tennessee slight. In seven other states where it was a factor, no losses were given.

The comments of several collaborators are of interest.

Massachusetts: Very severe in some fields, causing complete loss; in some fields damage slight; and in others, none. (Doran).

Connecticut: Has been one of the worst mosaic years. (Anderson)

Maryland: Becoming more severe every year. (Jehle).

North Carolina: Occurs in all tobacco sections, but especially in Coastal Plain counties. (Fant).

Recent Literature:

1. Blodgett, F. M. Tobacco mosaic on potatoes. Phytopath. 17: 727-734. Oct. 1927.

2. Cook, M. T. The effect of mosaic on the content of the plant cell. Jour. Dept. Agr. Porto Rico. 10: 229-238. July-Oct. 1926. (Sept. 1927).

3. Holmes, Francis O. Accuracy in comparing various concentrations of tobacco-mosaic virus. (Abstract). Phytopath. 18: 132. Jan. 1928.

4. Johnson, J. The classification of plant viruses. Wisconsin Agr. Exp. Sta. Res. Bul. 76. 15 p. 1927.

5. Valleau, W. D., and E. M. Johnson. Experiments and observations on the control of true tobacco mosaic. (Abstract). Phytopath. 18: 132. Jan. 1928.

6. ______________________________ The effect of a strain of tobacco mosaic on the yield and quality of Burley tobacco. Phytopath. 17: 523-527. Aug. 1927.

7. ______________________________ Commercial tobaccos and cured leaf as a source of mosaic disease in tobacco. Phytopath. 17: 513-522. Aug. 1927.

8. Vinson, C. G. Precipitation of the virus of tobacco mosaic. Science n. s. 66: 357-358. Oct. 14, 1927.

OTHER DISEASES

Alternaria sp. leafspot. Georgia, Florida.

Bacterium solanacearum EFS. Bacterial wilt. North Carolina: four per cent loss. Distributed over tobacco growing sections, but most prevalent on soils of the Granville series (Fant). Georgia: slight losses.

Brown root rot (undet.) Connecticut, Wisconsin.

Caconema radicicola (Greef) Cobb, root knot. Georgia: 5 per cent reduction in yield, 20 per cent in grading. General, occurring in middle to late season (Boyd). Severe in Florida and South Carolina.

Cercospora nicotianae, Ell. and Ev., frog-eye. Georgia: 2 per cent loss. Florida.

Corticium vagum Berk. and Curt., damping-off. New Mexico; heavy loss in cold frames (Crawford). Wisconsin: Florida: causing sore shin.

Curly top (undet.). New Mexico: a condition has developed in fields near Albuquerque which has the characteristics of curly top, and which cannot be otherwise identified (Crawford).

Frenching (undet.). Maryland, Wisconsin.

Fusarium affine Fautr. & Lamb., brown spot. Kentucky: this disease was unusually abundant in seed beds. The poor condition of yellow appearing plants was in part due to poor growing conditions in the spring. In yellowed plants in the beds the disease was very injurious, on green healthy plants it is of no importance. Seed treated with hot water (52c for 20 minutes) gave plants fairly free of disease (Valleau).

Fusarium oxysporum nicotianae Johnson, wilt. Maryland.

Phytophthora nicotianae (Speg.) Van Breda de Haan, black shank. Georgia, Florida.

Tobacco - Other Diseases

Ring spot (virus). Connecticut, New York, present. In Maryland, Virginia, Kentucky, it is becoming more severe and an economic problem.

Sclerotium rolfsii Sacc., stem rot. Florida.

White speck (undet.) Connecticut.

Starvation. Connecticut. Lack of proper fertilizers and poor weather conditions. (McCormick).

Recent Literature:

1. Doran, W. L. Effect of timothy infusion of different ages on the growth of tobacco and on brown root rot of tobacco. (Abstract). Phytopath. 18: 131-132. Jan. 1928.

2. Fromme, F. D., S. A. Wingard, and C. N. Priode. Ringspot of tobacco: an infectious disease of unknown cause. Phytopath. 17: 321-328. May, 1927.

3. Jochems, S. C. J. Parasitaire stengelverbranding bij Delitabak. (Parasitic stem scorch of Deli tobacco). Meded. Deli Proefst. Medan-Sumatra. II, 49. 35 p. 1927. (English summary p. 34-35. Abst. Rev. Appl. Myc. 6: 754, 1927). Pythium spp.

4. Johnson, James. Further studies on the attenuation of plant viruses. (Abstract). Phytopath. 18: 156. Jan. 1928.

5. Jones, J. P. The influence of cropping systems and fertilizers on black and brown root rot of tobacco. (Abstract). Phytopath. 18: 131. Jan. 1928.

6. McKinney, H. H. Virus diseases observed by the Allison V. Armour Expedition. (Abstract). Phytopath. 18: 155. Jan. 1928.

7. Valleau, W. D. and E. M. Johnson. Some virus diseases of tobacco in Kentucky. (Abstract). Phytopath. 18: 132-133. Jan. 1928.

8. Wingard, S. A. and Fromme, F. D. Tobacco ringspot; a virus disease with a wide host range. (Abstract). Phytopath. 18: 133. Jan. 1928.

D I S E A S E S O F S U G A R C A N E

MOSAIC (VIRUS)

Louisiana: Loss 10 per cent. General. Losses are greatly reduced by the increasing use of resistant varieties. Cayana 10 is immune; P. O. J. 213 is very resistant; P. O. J. 234 and P. O. J. 36 are resistant; Purple, striped, and D. 74 are susceptible. (Tims).

Mississippi: loss 15 per cent. The disease is serious in all counties south of the A. & V. railroad, or nearly one-half the area in the state with severe damage in some sections. (Neal).

Recent Literature:

1. Cook, M. T. Photo-synthesis of the sugar cane mosaic plant Jour. Dept. Agr. Porto Rico 10: 239-242. July-Oct. 1926 (Sept. 1927).

2. ________________ The effect of mosaic on the content of the plant cell. Jour. Dept. Agr. Porto Rico. 10: 229-238. July -Oct., 1926. (Sept. 1927).

3. Cross, Wm. E. The P. O. J. canes in Louisiana. Reasons for recommending these varieties as means of restoring industry set forth. - Tucuman's parallel case. Facts About Sugar 22: 1230-1231, 1235. Dec. 17, 1927.

4. Edgerton, C. W. and E. C. Tims. Investigations on the sugar cane diseases situation in 1925 and 1926. Louisiana Agr. Exp. Sta. Bul. 197. 50 p. 1927.

5. Rands, R. D. and S. F. Sherwood. Yield-tests of disease-resistant sugar canes in Louisiana. U. S. Dept. of Agr. Cir. 418. 20 p. 1927.

6. Reyes, G. M. The mosaic disease of sugar cane. Philippine Agr. Rev. 20: 187-228. 1927.

7. Verret, J. A. Losses from mosaic. Kohala sugar company, experiment no. 1. Hawaiian Plant. Rec. 31: 244-245. July, 1927.

OTHER DISEASES

Colletotrichum falcatum Went., red rot. Louisiana: 5 per cent loss; worse in some sections than ever noted before. (Tims). Mississippi: 1 per cent loss. Florida: present.

Helminthosporium sacchari Butl., eye leafspot. Louisiana: Trace. An unusually heavy infection on D 74 and Purple near Baton Rouge. (Tims).

Phytomonas sp., red stripe. Louisiana: reported for the first time (Tims).

Root rot (undet.) Louisiana: loss 10 per cent. General.

Recent Literature:

1. Barnum, Clyde C. Progress report on root rot investigations. Rept. Ann. Meeting Assoc. Hawaiian Sugar Technol. 6: 37-40. 1927.

2. Cook, M. T. The eye-spot disease of sugar cane. Jour. Dept. Agr. Porto Rico 10: 207-227. July-Oct. 1926. (Sept. 1927).

3. ________________ The gummosis of sugar cane. (Abstract). Phytopath. 18: 135. Jan. 1928.

4. Drechsler, Charles. A species of Helminthosporium distinct from Helminthosporium sacchari, causing brown stripe of sugar cane. (Abstract). Phytopath. 18: 135-136. Jan. 1928.
H. stenospilum.

5. Earle, F. S. Sugar cane and its culture. Facts About Sugar 22: various nos. 1927.

6. Edgerton, C. W., and E. C. Tims. Investigations on the sugar cane disease situation in 1925 and 1926. - Louisiana Agr. Exp. Sta. Bul. 197. 50 p. 1927.

7. Faris, James A. Brown stripe of sugar cane in Cuba. (Abstract). Phytopath. 18: 135. Jan. 1928.

8. ________________ Sugar cane eye spot in Cuba. (Abstract). Phytopath. 18: 135. Jan. 1928.

9. ________________ Zonate foot rot of sugar cane. Phytopath. 17: 83-94. Feb. 1927.
Fomes sp.

10. ________________ Field control of sugar cane root disease conditions. Bul. Trop. Plant Res. Found. 6. 16 p. 1927.

11. Faris, J. A., and R. V. Allison. Sugar cane root disease in Cuba. A progress report upon the root disease situation in 1925. Phytopath. 17: 61-82. 1927.

12. Lee, H. A., C. C. Barnum, D. M. Weller, and C. W. Carpenter. Progress report of the Pythium root rot phase of the Lahaina growth failure problem. Rept. Assoc. Hawaiian Sugar Technol. 6: 16-21. 1927.

13. Lee, H. A. and Martin, J. B. More effective dust fungicides by the use of oxidizing agents with sulfur. Industr. & Engin. Chem. 20: 23-28. Jan. 1928.

14. ______________________ The development of more effective dust fungicides by adding oxidizing agents to sulphur. Science n. s. 66: 178. Aug. 19, 1927.

15. Lyon, J. L. The effect of potash fertilizers on eye-spot at the Waimanalo Sugar Company. Hawaiian Plant. Rec. 31: 284-287. July, 1927.

16. ______________________ The susceptibility to eyespot of H 109 ratoons as compared with plant cane. Hawaiian Plant. Rec. 31: 296-299. July, 1927.

17. ______________________ The effect of frequency of irrigation applications on eyespot at the Lihue Plantation Company, Ltd. Hawaiian Plant. Rec. 31: 292-296. July 1927.

18. North, D. S. Leaf-scald, a bacterial disease of the sugar cane. Intern. Sugar Jour. 29: 151-154. March 1927.

19. Rands, R. D., and S. F. Sherwood. Yield tests of disease-resistant sugar canes in Louisiana. U. S. Dept. Agr. Circ. 418. 19 p. June 1927.

20. Sartoris, G. B. A cytological study of Ceratostomella adiposum (Butl.) comb. nov., the black-rot fungus of sugar cane. Jour. Agr. Res. 35: 577-585. Oct. 1, 1927.

21. Tims, E. C. and P. J. Mills. Some fungi associated with the root disease of sugar cane in Louisiana. Reference Book Sugar Ind. World (Louisiana Planter) 5 (5): 33-37. July, 1927.

DISEASES OF SUGAR BEET

CURLY TOP (VIRUS)

Although curly top in Utah was late in developing it caused severe damage, resulting in a loss of 15 per cent. In California the loss was 2 per cent. In Idaho, where the disease is usually severe, only a trace is reported. Curly top seemed to be more prevalent than usual in New Mexico. The disease prevents commercial culture of sugar beets in many sections of Oregon, according to McKay.

Severin and Severin (9) report that curly top was found to occur, on rare occasions, in beet fields in the west central part of South Dakota. The leaf hopper was not found.

Sugar Beet - Curly Top

According to Fawcett (5) curly top in the Argentine is not the same as the curly top of North America. It is transmitted by Agallia sticticollis, not by Eutettix tenella, which has not been found to occur in the Argentine.

Recent Literature:

1. Böning, Karl. Die kalifornische Blattrollkrankheit der Rübe (curly-top). Sammelreferat der wichtigsten nordamerikanischen Arbeiten. Centralbl. Bakt. Abt. II, 72: 379-398. Nov. 1927.

2. Carter, W. A technic for use with homopterous vectors of plant disease, with special reference to the sugar-beet leaf hopper, Eutettix tenellus (Baker). Journ. Agr. Res. 34: 449-451. Mar. 1, 1927.

3. ________________ Extensions of the known range of Eutettix tenellus Baker and curly-top of sugar beets. Jour. Econ. Entom. 20: 714-717. 1927.

4. Davis, E. W. Notes on collections of the sugar beet leaf-hopper showing the extension of its known range into British Columbia and to the coast in Washington and Oregon. Jour. Econ. Entom. 20: 581-586. 1927.

5. Fawcett, G. L. The curly top of sugar beet in the Argentino. Phytopath. 17: 407-408. June, 1927.

6. Haegele, R. W. The beet leafhopper (Eutettix tenellus Baker): A survey in Idaho. Idaho Agr. Exp. Sta. Bul. 156. 28 p. 1927.

7. Knowlton, G. F. The beet leafhopper and curly-top situation in Utah. Utah. Agr. Exp. Stat. Circ. 65. 12 p. May, 1927.

8. Severin, H. H. P. Crops naturally infected with sugar beet curly-top. Science n. s. 66: 137-138. Aug. 5, 1927.

9. ______________________ and H. C. Curly-top of sugar beets in South Dakota. Journ. Econ. Entom. 20: 586-588. Aug. 1927.

OTHER DISEASES

Corticium vagum Berk. & Curt., root rot. Louisiana, less severe than usual, but causing 4 per cent loss (Tims. Florida, damping-off. Utah, Idaho, dry-rot canker, causing some loss.

Cercospora beticola Sacc., leaf spot. Colorado, causing appreciable losses. Iowa, 1 per cent loss. Reported from Louisiana, Utah, and California.

Mosaic (virus). New Mexico, Utah.

Heterodera schachtii Schmidt, nematode. Colorado, general, trace.

Phoma betae (Oud.) Frank, root rot and leaf spot. Louisiana and Oregon report its occurrence as a leaf spot. In Idaho it caused a damping-off. Reported also from Wisconsin, Utah and Iowa.

Sclerotium rolfsii Sacc., stem rot. Louisiana, general, 6 per cent loss.

Uromyces betae (Pers.) Lév., rust. California.

Recent Literature:

1. Böning, K. Die Mosaikkrankheit der Rübe. Forsch. Gebiet Pflanzenkr. & Immunitat Pflanzenkr. 3: 81-128. 1927.

2. Coons, G. H., and D. Stewart. Prevention of seedling diseases of sugar beets. Phytopath. 17: 259-296. May, 1927.

3. Drechsler, Charles. The occurrence of Aphanomyces cochlioides n. sp. on sugar beets in the United States (Abstract). Phytopath. 18: 149. Jan. 1928. Michigan.

4. Goffart, H. Versuche zur Bekämpfung der Rübennematoden (Heterodera schachtii Schm.) mit calciumcyanid. Arb. Biol. Reichsanst. Land. u. Forstw. 15: 249-259. 1927.

5. Molz, E. Zur frage des Geschlechtsverhältnisses des rübennematoden Heterodera schachtii. Zeitschr. Pflanzenkr. 37: 260-266. 1927.

6. Schaffnit, E., and H. Weber. Über das Vorkommen von intrazellularen Körpern in den Geweben mosaikkranker Rüben. Forsch. Gebiet Pflanzenkr. & Immutität Pflanzenr. 4: 23-42. 1927.

7. Thorne, G. The life history, habits, and economic importance of some mononchs. Journ. Agr. Research 34: 265-286. 1927.

D I S E A S E S O F O T H E R C R O P S

A S P A R A G U S

Cercospora asparagi Sacc., leafspot. Texas, Missouri.

Cercospora caulicola Wint., leafspot. Florida.

Colletotrichum sp., anthracnose. Virginia.

Fasciation (undet.) New Jersey.

Fusarium sp., wilt, New Jersey. Root rot, Missouri: Crowns of plants at one nursery badly rotted with internal browning; roots dry with bark remaining, internal tissues decomposed. Some evidence that Fusarium may be the primary cause. (Scott)

Puccinia asparagi DC., rust. Slight losses in Pennsylvania, Wisconsin, Minnesota, Iowa, South Dakota. Also reported from New York, Delaware, Virginia, Michigan, New Mexico, California. Old plantings, non-resistant varieties usually affected.

Canker (undet.) South Carolina.

B E E T S, G A R D E N

Actinomyces scabies (Thax.) Gues., scab. New Jersey, Minnesota.

Bacterium tumefaciens EFS. & Town., crowngall. New Jersey.

Caconema radicicola (Greef) Cobb, rootknot. Florida, Texas.

Cercospora beticola Sacc., leafspot. Caused 0.5 per cent loss in Maryland, and less than 1 per cent loss in New York. Twenty-one other states report the presence of the disease, but regard it of little importance.

Corticium vagum Berk. & Curt., root rot. Virginia.

Mosaic (undet.) Utah.

Phoma betae (Oud.) Frank. Connecticut.

C A R R O T

Alternaria sp. New York, black rot. Louisiana, leafblight severe.

Bacillus carotovorus Jones, soft rot. New York, 2.5 per cent loss. New Jersey, heavy loss in storage at Vineland, Iowa, Michigan.

Caconema radicicola (Greef) Cobb. Oregon, severe in canning carrots. Utah, loss 6 per cent.

Cercospora apii carotae Pass., leaf spot. New York, 4 per cent loss. Indiana, Iowa.

Corticium vagum Berk. & Curt., stem rot. New York.

Curly top (Undet.) Utah.

Macrosporium carotae Ell. & Langl., leaf blight. New York, New Jersey, Florida, California.

Rhizoctonia crocorum (Pers.) DC., violet root-rot. Oregon, local, 0.3 per cent.

Sclerotium rolfsii Sacc. Florida, Texas.

C A S T O R   B E A N

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

D I L L

Cercospora anethi Sacc., leaf spot. Iowa. First report for State. Severe infections found in two sections (Archer).

E G G P L A N T

Bacterium solanacearum EFS., bacterial wilt. Virginia, South Carolina, Ohio.

Botrytis cinerea Auct., gray mold rot. New Jersey.

Corticium vagum Berk. & Curt., damping-off. New York, New Jersey, Virginia.

Macrosporium sp., leafspot. Virginia.

Mosaic (undet.) Virginia, Texas.

Phomopsis vexans (Sacc. & Syd.) Harter, leafspot. Virginia, New Jersey, Texas, Iowa.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas, severe in spring and fall crops in lower valley. (Bach)

Sclerotium rolfsii Sacc., stem rot. Virginia; unusually active, causing damping-off. (McWhorter)

Verticillium albo-atrum Reinke & Berth., wilt. New York, losses 30 to 50 per cent. Few eggplants grown in the state because of this disease. Black Beauty most susceptible. (Chupp). New Jersey, Mississippi, Utah.

E N D I V E

Yellows (?). New York. In Nassau County a number of varieties are grown for greens. They have a serious disease of unknown origin, which resembles the yellows of lettuce. (Chupp).

E S C A R O L L E

Sclerotinia sclerotiorum (Lib.) Massee, drop. Florida.

F E N N E L

Botrytis sp., New York. In Nassau County a large amount of fennel is grown. This has almost no diseases. The tarnished plant bug stings the tender shoots, which die, and some of these are later invaded by Botrytis. The plants are not injured commercially. (Chupp).

G I N S E N G

Alternaria sp. Pennsylvania, caused considerable trouble to a few growers who planted the crop on natural forest land. (Thornton).

Phytophthora cactorum (Leb. & Cohn.) Schroet., rot. Indiana.

L E E K

Macrosporium sarcinula parasiticum Thuem., black stalk rot. Florida.

M A N G E L W U R Z E L

Phoma betae (Oud.) Frank, root rot. Washington.

Recent Literature:

1. Millard, W. A., & F. Bewley. Mangel scab.-- Its cause and histogeny. Ann. Appl. Biol. 14: 296-311. Aug. 1927.

O K R A

Alternaria sp. Utah.

Caconema radicicola (Greef) Cobb, root knot. Texas, 4 per cent loss.

Fusarium vasinfectum Atk., wilt. Texas.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas, 15 per cent loss.

Rhizoctonia sp., root rot. Texas.

Sclerotinia sclerotiorum (Lib.) Massee, drop. Massachusetts.

Verticillium albo-atrum, Reinke & Berth., wilt. New Jersey, general in a few okra growing sections. Loss in acid soil (Haenseler).

P A R S L E Y

Fusarium sp., wilt. Virginia.

Sclerotinia sclerotorium (Lib.) Massee, Virginia.

Septoria sp., leaf blight. New York, trace.

P A R S N I P

Cercospora apii pastinacae Farl., leaf spot. Connecticut, New York, Indiana, Iowa, Utah.

P E A N U T

Cercospora personata (Berk. & Curt.) Ell. & Ev., leaf spot. Louisiana.

Chlorosis. Too much lime. Texas.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

Rhizoctonia sp., root rot. Georgia.

Sclerotium rolfsii Sacc., stem rot. Virginia, Mississippi, Texas.

PEPPER

Alternaria sp., fruit rot. Iowa, first report.

Bacterium solanacearum EFS., bacterial wilt. South Carolina, Florida, Texas.

Bacterium vesicatorium Doidge, bacterial spot. New Jersey.

Bacterial soft rot. New York (Suffolk), 25 per cent loss on cheese pepper. (Lindon).

Botrytis sp., gray mold. New Jersey.

Cercospora capsici Heald & Wolf, leaf spot. Florida, Texas.

Corticium vagum Berk. & Curt., damping-off. New York, New Jersey.

Curly top (virus), Oregon, 2 per cent loss. New Mexico, present.

Fusarium sp., wilt. Iowa, in one garden (Archer).

Glomerella sp., anthracnose. Texas, 1 per cent loss.

Mosaic (virus). Connecticut, New York, New Jersey, Virginia, Indiana.

Phyllosticta sp., leaf spot. Virginia.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas, 1 per cent loss

Phytophthora capsici Leonian., blight. New Mexico, serious on chili pepper. (Crawford).

Sclerotinia sclerotiorum (Lib.) Massee, damping-off. Florida.

Sclerotium rolfsii Sacc., stem rot. Florida.

Sunscald (non-par.). Utah, makes infection by various organisms possible. (Linford).

R H U B A R B

Ascochyta rhei Ell. & Ev., leafspot. Connecticut, Missouri.

Caconema radicicola (Greef) Cobb, rootknot. Utah.

Phyllosticta straminella Bres., leafspot. New York, New Jersey, and Utah for the first time.

Root rot (cause undet.) Utah, possibly a Phytophthora.

R O S E L L E

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas. Probably a new host. (Bach).

S A L S I F Y

Albugo tragopogonis (DC.) Gray, white rust. New York, statewide, loss slight to 1 per cent. Present in Virginia, Indiana, Colorado.

Yellows (unknown). New York. Rather common on Long Island. The plants have many more leaves than normally. These leaves are much shorter and thinner than usual, and are almost colorless. (Chupp).

S O U R G R A S S O R S C H A F F (RUMEX ACETOSA)

Gloeosporium rumicis, leaf spot. New York, Nassau County. Occurs in places to such an extent that the grass is hardly marketable. (Chupp).

S P I N A C H

Colletotrichum spinaciae Ell. & Halst., anthracnose. Texas, 1 per cent loss.

Curly top (virus). Utah.

Fusarium sp., wilt. Texas.

Heterosporium variabile Cke., leafspot. Virginia, less than usual. (McWhorter).

Mosaic (virus). Maryland, 1 per cent loss. Slight loss in Massachusetts. Reported from Virginia, Kentucky, North Carolina, Indiana, and from Iowa for the first time.

Phyllosticta chenopodii Sacc., leafspot. New York.

S W I S S   C H A R D

Cercospora beticola Sacc., leafspot. Texas, Indiana, Iowa.

T E A S E L

Tylenchus dipsaci (Kuehn) Bast., stem nematode. Oregon: Losses 50 per cent locally. The disease has been present locally for 30 years or more, but the cause has just recently been definitely recognized (McKay).

THE PLANT DISEASE REPORTER

ISSUED BY

THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

Supplement 62

Diseases of Cereal and Forage Crops

In the United States in 1927

August 1, 1928

BUREAU OF
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF CEREAL AND FORAGE CROPS IN THE UNITED STATES IN 1927.

lant Disease Reporter.
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August 1, 1928.

Prepared by

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Associate Pathologist in Charge,

Plant Disease Survey.

Contents.

FOREWORD

This report on diseases of cereal and forage crops in 1927 is based on information received by the Plant Disease Survey from various sources, particularly collaborators. Out of the total of 2597 individual disease reports and literature references on cereal diseases received during the year collaborators sent in 1730.

The writer wishes to take this occasion to thank collaborators and members of the Office of Cereal Crops and Diseases and Vegetable and Forage Diseases, as well as other pathologists for supplying information for this report.

An effort has been made this year to condense and shorten this summary. For this reason fewer reports of collaborators have been quoted and the list of literature references has been reduced by including only those references that appear to be most important.

Special surveys were made in Iowa and Utah in 1927. Additional facts concerning cereal diseases in those states, not included in this summary, may be found in the reports of those surveys. (Plant Disease Reporter Supplements 58 and 59).

DISEASES OF CEREAL CROPS

WHEAT

STINKING SMUT OR BUNT CAUSED BY TILLETIA LAEVIS KÜHN AND T. TRITICI (BJERK.) WINT.

Stinking smut continued unusually prevalent in 1927. East of the Mississippi River, with the exception of Virginia and Delaware, it seemed to be generally even more prevalent than last year. Also in the durum wheats of the Dakotas an increase over last year and the average year seemed evident. However, in Kansas, where the losses have been heavy recently, it was said to be of much less importance than last year, especially in the hard red wheats of the western part of the state, but appeared in increased amounts in the soft wheats of eastern Kansas. Marked decreases were reported from Colorado and California where intensive seed treatment campaigns have been in progress. Minnesota, Iowa, and Missouri reported only slight amounts of bunt.

For the country as a whole it is probable that, owing to a decrease in some of the states of largest production, the losses will not total as much as in 1926.

Table 73 gives a comparison of the estimated percentage losses for the past two years.

Table 73. Estimated percentage loss from bunt of wheat in 1926 and 1927.

State	Estimated percentage loss		State	Estimated percentage loss	
	1927	1926		1927	1926
N. Y.	2	0.2	N. D.	2.5	2
Pa.	6.3	6	S. D.	2	1
Del.	3.5	3.5	Neb.		6
Md.	2	3	Kans.	2.6	10
Va.	3	5	Tenn.	2	-
W. Va.		trace	Texas	-	0.5
N. C.	4	4	Okla.	-	0.75
Ohio	2	0.5	Ark.	-	trace
Ind.	3	4	Mont.	-	2
Ill.	3.9	0.7	Colo.	5	8
Mich.	5	4	Ariz.	-	5
Wisc.	0.3	-	Idaho		6
Minn.	trace	0.5	Wash.		2
Iowa	trace	0.5	Oreg.		3
Mo.	trace	trace	Calif.		1

Some collaborators report on prevalence and severity as follows:

Pennsylvania: Number of acres surveyed - 2,468.
Per cent infection in 194 untreated fields - 7.24.
" " " 60 fields treated with 50% $CuCo_3$ - .0396
" " " 20 " " " 20% " - .437
(Kirby)

Maryland: Out of 342 fields inspected, 151, or 44 per cent, had more than 1 per cent smutted heads. Fifty-nine fields, or 17 per cent, had 1 per cent or less, and 64 fields, or 19 per cent, had a trace. In 68 fields (20 per cent) none was found. (Jehle)

North Carolina: Observed in 14 out of 16 fields examined in the Piedmont Section. From all accounts it is common each year. Several fields unfit for milling. (Fant)

Wheat - Stinking Smut

Indiana: Very prevalent and attracted much attention- in fact caused widespread concern. Mr. L. C. Cochran, student assistant, made a survey of seven farms in Clinton County to obtain data on loss from bunt due to discounts. This was done after harvest and was based on counts made on the grain and information from the growers.

Farm no.	Wheat acreage	Total bushels	No. of grains examined	Per cent bunt	Loss
1	26	620	1,000	1.3	$1.00 per acre, estima
2	26	590	1,000	1.8	Docked $.02 pe bu. ($11.80)
3*	23	195	600	7.5	Unsalable
4	30	690	1,000	0.5	Docked $.03 ($20.70)
5*	23	345	800	5.0	Docked $.05 ($17.25)
6	20	520	1,000	0.4	$.50 per acre, estimate.
7	50	1,200	2,000	0.7	$.50 per acre, estimate.

*Note low yields correlated with high per cent bunt.

50 per cent of the farmers did not treat seed grain in this region. (M. W. Gardner)

Montana: In northern part of Gallatin Valley. Nineteen fields of winte wheat averaged 3.2 per cent bunt. Highest - 100-acre field with 20 per cent smut. (Morris)

Utah: Of 148 fields examined, 80, or 54 per cent showed bunt, and 46 of them, or 31 per cent, contained more than a trace of the disease. The average infestation was 2.2 per cent. (Linford)

In order to obtain information on losses because of dockage, Tehon in Illinois sent questionnaires to members of the Illinois Grain Dealers Association. Two hundred and twelve dealers furnished reports which when compiled showed:

> "The actual money loss either to growers or dealers was $64,956.77, this being the total dockage actually made on 775,192 bushels, an average dockage of 8.3 cents per bushel for all bushels docked. There were, however, 284,213 bushels reported more or less smutty but not docked, thus bringing the total amount of infested wheat to 1,059,40 bushels. Of the 4,146,360 bushels reported marketed, the total smutty wheat constituted 25.5 per cent, that to which dockage was applied constituted 18.7 per cent, and that to which dockage was not applied constituted 6.8 per cent.

Wheat - Stinking Smut

"The estimated wheat production in Illinois during 1927, according to the Illinois Crop Reporter of November 1, 1927, is 33,411,000 bushels. On this basis, the following smut estimates are made for the entire crop of the state:

"Total bushels of smutty wheat..................8,519,805
"Total bushels of smutty wheat docked...........6,247,857
"Total bushels of smutty wheat not docked.......2,271,948
"Total probable money loss by dockage at
8.3 cents per bushel.................. $518,572,13"

Several cases of exceptional damage were reported. In Pennsylvania, R. S. Kirby observed the worst infestation he has seen, 85 per cent. In Michigan the Division of Botany reported "heaviest infestation yet observed in Michigan. Field after field in northern Michigan showed a loss of over 90 per cent." Other maximum percentages of infected heads were: 75 per cent, New Mexico; 65 per cent, New York; 54 per cent, Kansas; 50 per cent, North Dakota; 41 per cent, Illinois; 37 per cent, Utah; 35 per cent, Colorado; 30-35 per cent, Oklahoma; and 10 per cent Wisconsin and Virginia.

Several collaborators mention correlation of heavy infection with late planting. In Oklahoma, Colorado, and Delaware the fields with maximum infection were planted later. In Pennsylvania three acres of Pennsylvania 44 wheat planted September 30 showed 2 per cent bunt while 10 acres of the same wheat planted October 15 showed 20 per cent.

Gaines (2,3) and Stephens (5) have recently reported new physiologic forms of _Tilletia tritici_ in the Northwest. The former offers the suggestion that a possible reason for the gradual increase of bunt in America during the last few years is on account of the introduction and spread of new physiologic forms.

A few new facts concerning the geographic distribution of the two species of bunt have been reported during the year. In Connecticut only one infested field was observed. This field showed 10 per cent infection. Of the samples taken from it all proved to be _Tilletia laevis_ except one spike which was infected with _Tilletia tritici_. The occurrence of this latter species in New England is not common. In Michigan the notation was made that the bunt in the badly diseased fields of the northern part of the state was chiefly T. laevis. In Utah head samples from 72 fields were examined microscopically and the two fungi were found in about equal amounts. In Washington, Heald reported that

> "_Tilletia tritici_ is still the predominating species but _T. laevis_ has appeared in several localities especially in the drier portion of the wheat area."

Varieties that were thought to be resistant or immune at Moro, Oregon, such as White Odessa, Martin, Hussar, Ridit and Albit showed considerable infection in 1927. Stephens (5) and Gaines (2) reported other similar cases. Presumably these were on account of a new physiologic form of bunt. Hussar and also C. I. 4843 were said to be immune in Indiana according to E. B. Mains. Hope was said to be very resistant in North Dakota as was Berkley Rock in Pennsylvania. Other varieties said to be resistant were Purkoff and Fultz in Pennsylvania, and Harvest Queen and Red Wave in Illionois.

Wheat - Stinking Smut

Notes on control follow:

New York: About 2,500 bushels of seed wheat were treated in Cayuga County. (Chupp)

Pennsylvania: High grade copper carbonate again appears to be a very effective control measure but the low grade is only moderately effective. (Kirby)

Maryland: In the fall of 1927 about 203,883 bushels of wheat were treated for smut, 29,011 pounds of dust, mostly 20 per cent $CuCO_3$ were used. (Jehle)

Virginia: Bunt occurred in 40 per cent of the 116 fields in ten counties examined. In forty-six fields seed was treated with copper carbonate. (Fromme)

North Carolina: $CuCO_3$ where used has given good results. (Fant)

Kansas: Seed treatment campaign gradually reducing bunt. (Johnston)

Colorado: Eighty to 90 per cent of farmers treated their seed (for the 1927 crop). An average of only 1.30 per cent smut was found by actual count on farms where pure copper carbonate was used, while fields where no seed treatment has been given showed 20 to 25 per cent smut. (W. Kidder)

A combination recleaning and seed treating outfit mounted on an automobile truck has been operated very successfully in San Luis Obispo County, California, during the past year. (Coke (1)).

Recent literature

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2. Gaines, E. F. New physiologic forms of Tilletia tritici in wheat. (Abstract) Phytopath. 18: 139. 1928.

3. ______________ Why smut is increasing. Extension Pathologist (mimeo.) 6: 14-15. Feb. 1928.

4. Rodenhiser, H. A., and E. C. Stakman. Physiologic specialization in Tilletia laevis and Tilletia tritici. Phytopath. 17: 247-253. Apr. 1927.

5. Stephens, D. E. Cereal Courier 19: 216. July 10, 1927.

6. Thomas, R. C., W. G. Stover, and H. A. Runnels. Dust treatments for the control of stinking smut of wheat. Ohio Agr. Exp. Sta. Bimonth. Bull. 12: 115-117. July-Aug. 1927.

7. Tisdale, W. H., C. E. Leighty, and E. G. Boerner. A study of the distribution of Tilletia tritici and T. laevis in 1926. Phytopath. 17: 167-174. Mar. 1927.

LOOSE SMUT CAUSED BY USTILAGO TRITICI (PERS.) ROSTR.

Loose smut occurred in about the average amounts according to reports submitted from the majority of the states. Somewhat less than usual, however, was noted in Pennsylvania, Maryland, Iowa, and South Dakota.

In Michigan the smut seemed to be more prevalent in the northern than in the southern part of the state. In Idaho and Utah it was said to be common in the irrigated but not in the dry land sections.

The estimates of losses are given in table 74.

Table 74. Percentage losses from loose smut of wheat in 1927 as estimated by collaborators. (Figures in parentheses indicate the maximum percentage of infection in any one field).

Percentage loss	States reporting	Percentage loss	States reporting
2.5	Virginia (3.5)		Texas, Utah (15)
2	Indiana, North Dakota (15)		Idaho
		0.8	Illinois (4.7)
1.5	Pennsylvania (12.5) Michigan	0.5	Maryland, Tennessee
1	Connecticut, New York, North Carolina, Ohio, Minnesota (10), Missouri (4), South Dakota,	trace	Maine, Delaware, Wisconsin, Iowa (5) Kansas, Wyoming, Colorado (5), Washington

Varietal resistance was reported as follows:

<u>Varieties reported very resistant</u>: Leaf and Gold Coin in Pennsylvania.

<u>Varieties reported resistant</u>: Fultz and Forward in Pennsylvania; Mediterranean, Rudy and Red Wave in Illinois (according to field observations).

<u>Varieties reported susceptible</u>: Pennsylvania 44 and Fulcaster in Pennsylvania; Fulcaster, Fultz, Harvest Queen, and Kanred in Illinois (field observations).

<u>Varieties reported very susceptible</u>: Red Rock and Dowson in Pennsylvania; Turkey and Valley in Illinois (field observations); Kota in North Dakota.

C. O. Johnston stated that soft winter wheats such as Harvest Queen in northeastern Kansas showed 10 per cent while hard red winter wheats showed a trace.

Wheat - Loose Smut

Recent literatnre

1. Sherbakoff, C. D. Seed treatment for wheat, barley, and oat smuts. Tennessee Agr. Exp. Sta. Circ. 16: 2 p. 1927.

2. Tisdale, W. H., and V. F. Tapke. Smuts of wheat and rye and their control. U. S. Dept. Agr. Farm. Bull. 1540. 16p. Dec. 1927.

FLAG SMUT CAUSED BY UROCYSTIS TRITICI KOERN.

P. A. Glenn reported on the situation in Illinois as follows:

"No extensive survey was made for flag smut last year. While passing through the infested area of Madison County, I examined twenty-five or thirty fields in what was once the generally infested area, and succeeded in finding but one diseased plant, which indicates that flag smut, in Madison County at least is at a very low ebb.

"For the last three years we have had lots of rain between harvest and sowing time and three years ago we had a very hard winter that killed out most of the wheat. I think that these climatic conditions have had much to do with the almost disappearance of flag smut."

No reports were received from the other two states, Missouri and Kansas, where the disease is known to occur.

Recent literature

1. Tisdale, W. H., C. E. Leighty, and B. Koehler. Further studies on flag smut of wheat. U. S. Dept. Agr. Dept. Circ. 424. 12p. 19

STEM RUST CAUSED BY PUCCINIA GRAMINIS PERS

The year 1927 will be remembered as a year when stem rust was epiphytoti in parts of the spring wheat area - southern Minnesota and eastern North and South Dakota. It was a year when weather conditions generally seemed favorable for rust development and the majority of wheat states from Colorado eastward re ported more than usual. The situation in the spring wheat states is well summarized in the Rust Reporter for October 15, 1927.

"About the middle of July the stem rust epidemic in the spring wheat area became threatening. It was apparent that wheat in southern Minnesota was doomed. The initial infection in this region seemed to be heavier than it was farther west. For several weeks, however, wheat and oats in northern South Dakota, eastern North Dakota, and northwestern Minnesota were threatened also. There was plenty of rust, the outcome would depend entirely on the weather.

"At harvest time there was from 70 to 90 per cent stem rust on every susceptible plant of wheat and oats in eastern North Dakota, and in Minnesota.

"The loss in most of South Dakota and western North Dakota, however, was slight. There was considerable loss in northeastern South Dakota, where the grain was late. Wheat in the Red River Valley escaped with only moderate loss. But southern and central Minnesota could not escape. Stem rust destroyed from 50 to 75 per cent of the wheat in the average field in this region. There is also some evidence that leaf rust alone took a toll of 10 per cent."

Concerning the situation in other states collaborators report as follows:

Pennsylvania: Observed in 35 per cent of the fields surveyed; average infection 1.44 per cent. (Kirby)

Maryland: Was severe in certain localities. (Jehle)

Virginia: Severe in certain fields in Pulaski County, Berberis canadensis nearby.

North Carolina: Occurrence confined to mountain counties. (Lehman)

Ohio: The general sprinkling of stem rust was heavier for the state as a whole than it has been in the last eight years. The source of this sprinkling of rust remains a conjecture. Most of the wheat in the state escaped damage. The loss will probably not exceed 1 per cent of the total crop. (Baringer)

Indiana: Only a trace found. (Leer)

Illinois: Very little in northern part of state until the second week in July, when a heavy infection suddenly appeared on spring wheat and late oats. On July 23 there were prospects of some loss due to stem rust on these grains but at harvest time it appeared that most of the spring wheat and oats had escaped with only slight loss. (Rust Reporter, Oct. 15)

Michigan: Wet spring insured heavy infection on barberries but continued cold checked rapid spread to fields some distance from barbarries. (Div. of Botany)

Iowa: In general winter wheat matured and was harvested with a trace to 1 per cent infection although a number of reports were received of severe infection and damage particularly in Warren County. Spring wheat had a trace to 1 per cent infection in northwestern Iowa and suffered more damage than winter wheat. Spring wheat plantings were not common this year, however. The reduction in prevalence and loss is due directly to the drouth conditions which existed until near harvest time. (Archer)

Missouri: Not so severe as usual, while per cent of infection was as great the number of sori per plant was much less so that actual injury was greatly reduced. (Scott)

Nebraska: Winter wheat - only a trace at harvest and no loss. Spring wheat - more than in winter wheat. There was probably 5 per cent severity and 20 per cent prevalence in northern counties and a trace in the southern counties (Thiel)

Kansas: Developed late in the season in northern Kansas and became severe in only occasional fields. In southern Kansas it developed earlier and considerable damage was done in some fields. (Johnston)

Wyoming: A sprinkle of stem rust over southern Wyoming but hardly enough to do much damage. Much of the wheat was being cut at that time (August 31). (Lungren, Sept. 3. Cereal Courier 19: 302. Sept. 10)

Colorado: No loss in winter wheat and most of the spring wheat was cut before rust did any damage. The weather was favorable for rust throughout the growing season but there was no rust epidemic. (Lungren, l. c.)

Utah: Very little seen in July. During early August, however, rust quickly became widespread in late irrigated spring wheat. In many fields the injury was negligible but in others there was rather severe injury. Several fields suffered injury of 5 per cent or above. (Linford)

Washington: Present. Can be found in traces in low areas. (Heald)

Table 75. Percentage loss from stem rust of wheat as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
30	Minnesota	0.5	Pennsylvania, Kansas, Texas
10	North Dakota, South Dakota	0.1	Virginia, Nebraska, Montana
1.5	Wisconsin	trace	New York, New Jersey North Carolina, Ohio, Indiana, Missouri, Kentucky, Tennessee, Wyoming, Colorado, New Mexico, Utah, Idaho
1	Maryland, Michigan, West Virginia		
0.75	Illinois		

Table 76. Dates and places of first observation of stem rust on barberry and wheat in 1927, as reported to the Survey.

Date	Place	County	State	Observer
On barberry bushes				
April 11	Columbus	Franklin	Ohio	Baringer
20	- - -	Colfax	Nebraska	Thiel
27	Maryville	Nodaway	Missouri	Smith
28	- - -	Ingham	Michigan	Reddy
28	- - -	Wayne	Iowa	Smith
28	Bement	Piatt	Illinois	Bills
28	- - -	Washington	Minnesota	Walker
30	Madison	Dane	Wisconsin	Jackson
May 2	Rochester	Fulton	Indiana	Leer

Wheat - Stem Rust

Date	Place	County	State	Observer
May 13	Bell	Prince Georges	Maryland	Humphrey
3	Hiawatha	Brown	Kansas	Schrivner
7	Lexington	Fayette	Kentucky	Valleau
18	Volza	Brookings	South Dakota	Hutton
June 4	Loveland	Larimer	Colorado	Lungren
On wheat				
May 19	Columbus	Franklin	Ohio	Baringer
21	Assaria	Saline	Kansas	Schrivner
June 3	Pratte	Pratte	Kansas	Thiel
7	Bruning	Thayer	Nebraska	Humphrey
14	Brookings	Brookings	South Dakota	Michaels
18	- - -	Jay	Indiana	Leer
21	Buffalo Lake	Renville	Minnesota	Cotter
	St. Bonifacius	Hennepin	Minnesota	Cotter
22	Wahpeton	Richland	North Dakota	Butler
22	Sawkville	Ozaukee	Wisconsin	Walker
				Christensen
26	Yuma	Yuma	Colorado	Lungren

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3. Bailey, D. L., and F. J. Greaney. Field experiments on the control of stem rust by sulphur dust. Scient. Agric. 7: 153-156. 1927.

4. Durrell, L. W., and E. A. Lungren. Barberry eradication and sources of black stem rust in Colorado. Colorado Agric. Exp. Sta. Bull. 315. 18p. 1927.

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7. Kempton, F. E., and L. D. Hutton. Report of progress in barberry eradication for the calendar year ended December 31, 1926. Cereal Courier 19: 49-62. Feb. 28, 1927.

8. Newton, M., and T. Johnson. Color mutations in Puccinia graminis tritici (Pers.) Erikss. and Henn. Phytopath. 17: 711-725. Oct. 1927.

9. ______________________ Greenhouse experiments on the relative susceptibility of spring wheat varieties to seven physiologic forms of wheat stem rust. Sci. Agr. 7: 161-165. 1927.

10. Newton, M., and T. Johnson. Physiologic forms of wheat stem rust in western Canada. Sci. Agr. 7: 158-161. 1927.

11. Melander, L. W., and J. H. Craigie. Nature of resistance of Berberis spp. to Puccinia graminis. Phytopath. 17: 95-114. 1927.

12. Patch, E. M. Bread or barberries. U. S. Dept. Agr. Misc. Publ. 7. 14p. Jan. 1928.

13. Peltier, G. L., and A. F. Thiel. Stem rust in Nebraska. Nebraska Agr. Exp. Sta. Res. Bul. 42. 40 p. 1927.

14. Stakman, E. C., F. E. Kempton, and L. D. Hutton. The common barberry and black stem rust. U. S. Dept. Agr. Farm. Bull. 1544. 28 p. Nov. 1927.

LEAF RUST CAUSED BY PUCCINIA TRITICINA ERIKS.

Collaborators are almost unanimous in reporting that leaf rust was more prevalent and destructive in 1927 than it has been for several years. This condition applied all over eastern United States and as far west as Colorado. Kirby reported it the most severe epiphytotic ever occurring in Pennsylvania; Archer in Iowa said it was the most severe development witnessed in many years with wheat plants in some fields stunted to half their normal size; and Thiel in Nebraska said that it was more abundant than he had seen it in his seven years experience in the state. Some of the observations in prevalence and severity are as follows:

Spring wheat States: The season was, of course, exceptionally favorable for the development of rust. Some of the loss attributed to stem rust unquestionably was caused by leaf rust, particularly on susceptible varieties like Ruby, Quality, and Kota. There is some evidence that the reduction in yield due to leaf rust was from five to seven bushels an acre. These estimates are based on the results of dusting experiments in which leaf rust was controlled and in which very little stem rust developed on the checks. (Stakman)

Pennsylvania: Average percentage of infection 62 per cent. The rust appeared early and developed into one of the most severe epidemics ever occurring in this state. (Kirby)

North Carolina: Very prevalent this year. (Lehman)

Texas: Very prevalent; 3 per cent loss. (Taubenhaus)

Oklahoma: Very severe, Stillwater, May 12. (C. O. Johnston)

Michigan: Considerable leaf rust especially in northern part of state. Damage evident. (Div. Bot.)

Wisconsin: Very prevalent this year. Winter wheat in milk stage has leaves 75 to 100 per cent infected. (Vaughan)

Minnesota: There has been an unusually heavy epidemic of leaf rust on both spring and winter wheat throughout the state. Plants were practically defoliated and the heads ripened earlier. (Sect. Pl. Path.)

Iowa: The epidemic of leaf rust in Iowa this year was the most severe witnessed in many years. Extremely heavy infection occurred over the entire state; in fact some fields were so severely infected early in the season that the heads never formed, in others the plants were so badly checked in their growth that heads did not fill properly. Fields commonly had an 80 per cent infection. In northwestern Iowa in some fields a 100 per cent infection caused the plants to be stunted to half the normal size. In southwestern Iowa plants frequently had half of their leaves killed. The main factor influencing the cause of the epidemic probably can be traced to the damp, wet weather of May which was extremely favorable for winter wheat infection. (Archer)

Missouri: Heavy rainfall as well as mild winter was probably responsible for heavy infection. However, temperatures were low during May and June. 100 per cent infection only in one or two cases. Average 25 per cent. (Scott)

North Dakota: Very severe on spring wheat. Many of the more resistant varieties especially in the durum class have developed flecks. These have attracted the attention of many growers. (Brentzel)

Kansas: An extremely heavy infection of leaf rust of wheat occurred in most parts of Kansas this year. Only a small section in the western part of the state where the crop was injured by dry weather escaped. Many fields showed 70 to 100 per cent infection on all leaves. Reductions in yield of 2 to 20 per cent undoubtedly resulted.

Overwintered in abundance in Oklahoma and Texas and to a moderate degree in Kansas. It became severe early in the season and the most severe and widespread epidemic of recent years developed. (C. O. Johnston)

Colorado: More prevalent this year than in the past five years. Very heavy in eastern Colorado on winter wheat; also prevalent in the spring-wheat area. (E. A. Lungren)

Utah: This has continued to be a negligible factor in the irrigated wheat examined this summer. (Linford)

Washington: Present but of moderate importance. (Sect. Pl. Path.)

It is probable that we have been underestimating the losses from leaf rust in the past. We have not attached enough importance to this disease. This may be concluded from the work of E. B. Mains (Pl. Dis. Reptr. 11: 168-169. Nov. 15, 1927) in Indiana who dusted wheat in 1927 for rust control. The yielc in the sulfur-dusted plots of winter wheat, where leaf rust was suppressed, was 10.9 per cent more than in the checks and 24.3 per cent more than the checks ir the case of spring wheat. This was on wheat showing 75 to 100 per cent infecte leaf area just before ripening. On the basis of these experimental data Mains estimated the loss for Indiana at 13 per cent. The estimation of losses in othr states show considerable variation a part of which may be due to different opin ions as to the amount of loss that leaf rust is capable of producing.

Table 77. Estimated percentage loss from leaf rust of wheat as estimate by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
20	Tennessee	2	South Carolina, North Dakota
15	Iowa	1.5	Virginia
13	Indiana	1	New York, West Virginia Michigan
8	Kansas	0.5	Maryland, Ohio
6	Pennsylvania	trace	Delaware, Wisconsin Missouri, Colorado, Utah, Idaho
3	North Carolina South Dakota, Minnesota, Texas		
2.5	Illinois		

Table 78. Dates and places of first observation of leaf rust of wheat, a reported by collaborators, 1927.

Date	Place	County	State
April 4	Ullin	Pulaski	Illinois
11	Clemson College		South Carolina
May 4		Jackson	Indiana
19	Bridgeville		Delaware
20	Madison		Wisconsin
June 1	State College		Pennsylvania
1			Colorado
10		Tompkins	New York
20	Fargo		North Dakota
29		Weber	Utah
July 1	Bozeman		Montana
13	Wallingford	New Haven	Connecticut

Notes on susceptibility of varieties follow:

Pennsylvania: Susceptible - Pennsylvania 44, Leap, Forward, Fulcaster, Fultz. Very susceptible - Red Rock.

North Carolina: Resistant - Fulcaster. Susceptible - Leaps Prolific, Purple Straw, Alabama Blue Stem.

Illinois: Field examination shows as follows: Resistant - Kanred, 7 per cent; Marquis, 8 per cent; Mediterranean, trace. Susceptible - Ohio 127, 26.5 per cent; Turkey, 30 per cent; Fulcaster, 30.4 per cent; Fultz, 33.1 per cent; Valley, 37.1 per cent. Very susceptible - Flint, 42.6 per cent; Harvest Queen, 42.1 per cent; Red Wave, 47.6 per cent.

South Dakota: Very resistant - durums. Resistant - Marquis. Very susceptible - Kota, Ruby, and Quality.

Kansas: Very resistant - Karvale, Kanmarq, Fulhard. Susceptible - Turkey, Blackhull, Kanred. Very susceptible - Burbank Super.

Recent literature

1. Allen, Ruth F. A cytological study of orange leaf rust Puccinia triticina physiologic form 11, on Malakoff wheat. Jour. Agr. Res. 34: 697-714. 1927.

2. Tehon, L. R. Epidemic diseases of grain crops in Illinois, 1922-1926. The measurement of their prevalence and destructiveness and an interpretation of weather relations based on wheat leaf rust data. Bull. Nat. Hist. Surv. Illinois 17: 1-96. Oct. 1927.

SCAB CAUSED BY GIBBERELLA SAUBINETII (MONT.) SACC.

Scab was said to be more prevalent than usual in New York, Delaware, Virginia, Indiana, Illinois, and Missouri. In the last three states it was especially troublesome. For the country as a whole it was generally more prevalent than last year. Some of the collaborator's reports on prevalence follow:

Delaware: Heaviest infection observed during the past seven years. Complete infection of entire head commonly found, June 16 (Adams)

Pennsylvania: Observed in many of the wheat fields surveyed, but due to more or less dry weather after the wheat came into flower, it is only slightly more severe than last year. (Kirby)

Illinois: There is a high percentage of wheat scab in the southern half of Illinois this season. Some fields are running as high as 30 per cent infection. Even in Turkey wheat, infection is running up as high as 10 per cent. The northern third of the state seems to have escaped pretty well, at least in sections which I have visited. (B. Koehler)

Iowa: In 1927 infection was unusually slight. Only a rare head could be found and this usually with just a few of the kernels infected. In an average year the loss is estimated as a trace; rarely the loss is more, i.e. 4 per cent in 1923 and 5 per cent in 1924. (Archer)

Missouri: Scab is more severe this season than any year since 1919. Some fields observed show some scab on as many as 50 per cent of the heads. The season has been unusually favorable for scab infection in this state as there has been an abnormally heavy rainfall during April, May, and the early part of June, with much cloudy weather. (Scott)

Kansas: Only a few scattered reports of scab limited to soft wheats in southeastern Kansas. (Johnston)

Table 79. Estimated losses from wheat scab as reported by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
4.9	Illinois	trace	Virginia, West Virginia
4	Missouri		North Carolina,
2	Indiana		Tennessee, Ohio, Michigan
1	Maryland, North Dakota		Wisconsin, Minnesota.
			Iowa, South Dakota
0.5	Pennsylvania, Delaware, Kentucky		

Reduction in yield is not the only way that losses from scab occur as will be seen from the following quotation from I. T. Scott in Missouri. The poor seed wheat in the areas where the disease was worst is liable to result in considerable seedling blight in 1928.

"Due to the serious infection of wheat with scab this season much concern is being shown by growers in obtaining clean seed for fall sowing The weight of much grain is lowered this season because of the presence of many scabby grains. Germinator tests show low germination with the development of much mold on the seedlings which has been found to be Gibberella in practically all cases. It is feared that the use of this year's grain for seed will result in large losses from seedling blight and in poor stands, particularly if the coming season is favorable for this disease. Fanning and seed treatment is being recommended, especially where germinator tests show much scab."

In Illinois, a field with as high as 32 per cent infected spikelets was seen. In this field 37.2 per cent of the heads were scabbed and on them an average of 88.1 per cent of the spikelets were diseased. This means 32 per cent loss. As high as 65 per cent infected heads was observed in Missouri and 20 per cent was observed in Pennsylvania.

Table 80. Dates and places of first observation of wheat scab as reported by collaborators, 1927.

Date	Place	County	State
June 1			Missouri
1	Filmore		North Dakota
2	Central City	Marion	Illinois
16	Georgetown	Sussex	Delaware
18	State College		Pennsylvania
28	Conesville		Iowa
July 7	Ithaca	Tompkins	New York
23	Northville	Rice	Minnesota
25	Madison		Wisconsin

Field examinations showed the following percentages of infection in different wheat varieties in Illinois:

Resistant - Kanred trace; Marquis 1.3 per cent; Rudy trace; Valley, 1.8 per cent.

Susceptible - Flint 4.3 per cent; Fultz 3.7 per cent; Red Wave 3.4 per cent; Harvest Queen 3.2 per cent.
Very susceptible - Turkey 11.6 per cent.

Fulcaster and Mediterranean were mentioned as susceptible by Scott in Missouri, and soft wheats only showed infection in Kansas according to Johnston.

ERGOT CAUSED BY CLAVICEPS PURPUREA (FR.) TUL.

In Minnesota and North Dakota traces of ergot were reported on durum wheats. E. B. Mains of Indiana reported traces in some of the spring wheats especially in the F- of hybrids of a Chinese wheat.

ANTHRACNOSE CAUSED BY COLLETOTRICHUM GRAMINICOLUM (CES.) WILS.

Ten states, from Pennsylvania to Kansas, reported anthracnose in 1927. In Pennsylvania, according to Kirby, it was more prevalent than usual causing an estimated reduction in yield of 2.5 per cent. The average infection was 13.8 per cent with as high as 90 per cent infection observed in one field. Of the 281 fields surveyed 77 per cent showed the disease. In Illinois, where also anthracnose was more prevalent than usual, G. L. Stout reported the losses as a trace. In one field 20.3 per cent of the leaf and stem area was diseased. Field observations showed the varieties Harvest Queen and Fultz to be susceptible. In Kansas, according to C. O. Johnston,

> "The disease is not common and probably there was no damage except in isolated cases such as one in Montgomery County where injury was severe."

Other losses reported were: Ohio, 0.1 per cent; Indiana, 1 per cent; and Illinois and Wisconsin each a trace.

GLUME BLOTCH CAUSED BY SEPTORIA NODORUM BERK.

Glume blotch was reported from the majority of eastern wheat states. It was not reported from west of Kansas. In general it was rated as unimportant causing little or no loss but in Maryland when 3 per cent loss was estimated it was considered one of the important diseases. It was also troublesome in Pennsylvania (1.5 per cent loss) and was serious, locally at least, in North Carolina. Other states reporting did not mention more than a trace.

> Delaware: More than usual. Wet weather favored development. (Adams

> Pennsylvania: More. Average per cent infection found 16.1. Of the fields inspected 99.4 per cent showed the disease. (Kirby)

> North Carolina: In one field observed loss due to this disease was about 50 per cent. Attacked nodes causing a high percentage of the culms to break over before harvest. Infection was leaf and stem chiefly. Leap's Prolific susceptible. (S. G. Lehman)

Illinois: Much more than usual. Of the 1927 acres examined only 450 showed infection and these showed 29.5 per cent of the spikelets infected. As high as 74.5 per cent infected spikelets was observed in one field. Field observations show: Red Wave, 1.2 per cent; Valley, 1.9 per cent; Flint, 0.11 per cent; Harvest Queen, 61.9 per cent; and Fultz, 44.7 per cent. (Tehon)

SPECKLED LEAF BLOTCH CAUSED BY SEPTORIA TRITICI DESM.

This disease was widespread as usual. More than the average amount was reported from Pennsylvania, Indiana, Illinois, Kansas, and California. In Texas, Oklahoma, and Kansas it was reported by C. O. Johnston as causing severe damage to the lower leaves in May. Losses of 0.7 per cent in Illinois and 0.5 per cent in Indiana and Maryland were estimated. In California, according to Mackie, this disease was very important this year causing premature ripening, lodging and shriveling of the grain. Early sown wheat on summer fallowed land suffered the most in that state and losses of 60 to 70 per cent of the crop were noted.

The variety Velvet Chaff was said to be susceptible in Pennsylvania, and in Illinois field observations showed as follows: Varieties susceptible - Red Wave 28 per cent infected leaf area, Fulcaster 25 per cent. Varieties very susceptible - Fultz 40 per cent, Harvest Queen 54.7 per cent, Kanred 63 per cent, Turkey 54 per cent, Valley 54 per cent.

BLACK CHAFF CAUSED BY BACTERIUM TRANSLUCENS UNDULOSUM S. J. & R.

Scattered reports of occurrence were received from Iowa, Minnesota, North Dakota, South Dakota, Kansas, Colorado, Utah, and Idaho. North Dakota, with an estimate of 0.5 per cent reduction in yield, was the only state that reported more than a trace of loss. Durum, and hard red wheats in Iowa, and Kota in North Dakota were reported susceptible.

POWDERY MILDEW CAUSED BY ERYSIPHE GRAMINIS DC.

Powdery mildew occurred commonly as usual in the humid areas of both eastern and western United States and in some of the irrigated sections of the West. Pennsylvania, where 97 per cent of the fields showed the disease, was the only state reporting more than a trace of damage.

The varieties Norka and Michigan Amber 29-1-1-1 were reported immune by E. B. Mains in Indiana.

TAKE-ALL CAUSED BY OPHIOBOLUS GRAMINIS SACC.

Take-all was reported from three states, New York, Maryland, and California. In New York it appears to have been more serious than during any year since observations have been made, being reported from eight counties in the western part of the state - Cortland, Onondaga, Livingston, Wyoming, Yates, Genesee, Monroe, and Steuben, and causing an estimated loss of from 1 to 3 per cent. One field in Livingston County was observed with from 40 to 80 per cent in spots and another was seen in Wyoming County with 15 per cent reduction in yield.

In Maryland one spot from 15 to 20 feet in diameter was observed in one field in Queen Annes County. It was not at all prevalent in Maryland as shown by examinations in many fields.

In California, W. W. Mackie reported the disease occurring generally but mostly on the coast and in the Sacramento Valley.

Take-all was found and identified in Saskatchewan, Canada, in 1923 (1,2). In 1925 it was found on 225 quarter sections and only a small portion of the province was examined. Since 1923 it has been found also in Alberta, Manitoba, and Prince Edward Island.

Recent literature

1. Russell, R. C. "Take-all" - a destructive disease of wheat. Pamph. Canada Dept. Agr. n.s. 85. 8 p. 1927.

2. Sanford, G. B. Important soil-borne diseases of crops in western Canada. Scient. Agr. 7: 292-294. Apr. 1927.

BLIGHT CAUSED BY HELMINTHOSPORIUM SATIVUM PAM., KING, & BAK. AND HELMINTHOSPORIUM SP.

Pennsylvania, Maryland, Indiana, Wisconsin, Minnesota, North Dakota, Iowa, Missouri, and California reported seedling, and head blights, foot rots, etc. due to Helminthosporium species, particularly H. sativum. In Pennsylvania, R. S. Kirby reported that root rot was observed in 16.4 per cent of the 281 wheat fields surveyed and was at least moderately destructive in 8.2 per cent of the wheat fields. It was very destructive where wheat followed wheat, and moderately destructive where that crop followed oats or barley. An estimated loss of 0.6 per cent occurred. This is a much greater prevalence than usual for Pennsylvania. Other estimates of losses were North Dakota, 1.5 per cent; Indiana, 0.1 per cent; and Maryland, Wisconsin, Minnesota, Missouri, Kansas, and Idaho, each a trace.

Iowa: Losses from this disease have never been reported more than a trace. (Archer)

North Dakota: Prevalent in the eastern half of the state. Common in durum varieties. Not severe except in a few fields. (Brentzel)

Kansas: Although the season seemed very favorable this trouble did not seem to be more prevalent than usual. A Helminthosporium joint disease was more prevalent. (C. O. Johnston)

FOOT ROTS

Foot rot caused by Fusarium was reported as more prevalent than last year by Kirby in Pennsylvania.

Foot and basal stem rot caused by species of Helminthosporium and Fusarium was thought to have caused a loss of about 1 per cent in Minnesota.

Foot rots of undetermined cause resulted in traces of loss in Kansas according to C. O. Johnston but there seemed to be no marked increase in the disease. Idaho and Washington reported about the usual amount of trouble.

NEMATODE, TYLENCHUS TRITICI (STEIN.) BAST.

Only three cases of nematode infestation were reported to the Survey, one in Maryland and two in Virginia. The latter two were of slight and moderate severity. The Maryland infestation was reported as follows by R. W. Leukel:

"During the summer and fall of 1926, the wheat nematode was found on one farm near Lisbon, Howard County, Maryland, and on seven farms southwest of Gaithersburg, Montgomery County, Maryland, as the result of special surveys conducted in cooperation with the Extension Service of the University of Maryland and contracts with commercial agencies. The infestation was comparatively light except in one case in Montgomery County where it was rather heavy. This farm was visited after threshing had been done and it was found that the infestation had occurred on 48 acres, hence the total loss was rather heavy, probably approximating upwards of 250 bushels of wheat. In all cases where the disease was found the farmers greatly appreciated having the matter called to their attention and agreed to sell the infested wheat for milling purposes and to buy clean wheat for seed.

"In the spring of 1927, a case of nematode infestation was found southeast of Gaithersburg, on one farm about 6 1/2 miles east of Rockvill[e]. The farm was visited on April 29 by Dr. A. G. Johnson and R. W. Leukel, of the Office of Cereal Crops and Diseases, and F. W. Oldenburg and Dr. R. A. Jehle, of the Extension Service, University of Maryland, together with O. W. Anderson, County Agent of Montgomery County. Two fields of wheat, totaling 38 acres, were found heavily infested with the nematode. Approximately 40 per cent of the wheat plants were found to be infected. On examination of some of the unused wheat seed it was found that it contained about three per cent (by count) of nematode galls.

"The loss that will be sustained this year on this farm is estimated at from eight to ten bushels per acre, or a total of nearly 400 bushels."

OTHER DISEASES

Bacterium atrofaciens McCul. (Phytomonas atrofaciens (McCul.) Comm. S.A.B basal glume rot. Scattered occurrences noted in Pennsylvania, trace loss. In Illinois more than usual was noted occurring generally over the southern half of the state. In one field 7.6 per cent of the spikelets on 71.4 per cent of the heads, or 5.4 per cent of the spikelets in the field, were infected. The loss f[or] the state was only a trace.

Fusarium culmorum leteius Sherb., seedling blight. General in California according to Mackie.

Heterosporium spp. causing a sooty mold of the heads, reported by Heald from Washington.

Hormodendrum cladosporioides Sacc., a sooty mold of heads. Occurred in California in coastal areas to the crest of the Coast Range, according to Mackie

Typhula graminum Karst. (Sclerotium rhizodes Auer.) Reported from Idaho.

"Occurs early in spring when snow remains late in spring. Noted in wheat only in Fremont and Teton Counties at altitudes of 5,500 feet and above." (Hungerford)

Wheat - Other Disease

Crinkle joint (undet.) Specimens received from L. W. Osborn of Oklahoma. It occurred in many fields in Tillman County.

Distortion of heads (undet.) Specimens of White Winter wheat affected with the same disease as was reported last year (Pl. Dis. Reptr. Suppl. 53: 155. Aug. 1927) were sent in from Corvallis, Oregon by S. M. Zeller.

Sterile leaf spot was reported from Montana by P. A. Young as follows:

> "Three plots of Black Hull and one plot of Super Hard (closely related to Black Hull) wheat are suffering badly from a heavy infestation of a sterile leaf spot. I hope to determine the cause of this trouble, for it has been rather serious for some years. Mr. W. L. Popham, State Leader in Barberry Eradication has just returned from a trip into the western part of the state. He reports this sterile leaf spot to be present in many fields. It is interesting to note that in the Experiment Station plots of the Agronomy Department here this leaf spot occurs only in the four plots mentioned above and was absent from a plot of Kanred wheat."

Stripe (undet.) Same as usual in Pennsylvania. Very slight importance.

Terminal bleaching of leaves (undet.) Reported from Utah.

> "A physiological disturbance leading to the abrupt dying and bleaching of the apical portion of the uppermost leaf or leaves has been observed in irrigated wheat in several of the northcentral counties. The cause and importance of this trouble have not been determined." (Linford)

Recent literature on miscellaneous wheat diseases

1. Russell, R. C. A nematode discovered on wheat in Saskatchewan. Scient. Agr. 7: 385-386. June 1927.

2. Webb, R. W. Soil factors influencing the development of the mosaic disease in winter wheat. Jour. Agr. Res. 35: 587-614. Oct. 1, 1927.

RYE

STEM RUST CAUSED BY PUCCINIA GRAMINIS PERS.

Traces of stem rust were reported from several of the states north of the Ohio and Missouri River Valleys. The attack was very light and the losses practically negligible. It was first observed as follows: June 20, Madison, Wisconsin; June 22, Morristown, New Jersey; July 13, Branford, Connecticut; and July 23, State College, Pennsylvania.

LEAF RUST CAUSED BY PUCCINIA DISPERSA ERIKS.

Leaf rust was reported from the majority of states where rye is grown. In general it was about the same or rather more prevalent than usual or last year and was of slight to medium importance. The losses as estimated by collaborators are given in table 81.

Table 81. Estimated percentage loss from leaf rust of rye, as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
5	Indiana	0.5	Connecticut, Ohio
1.5	South Carolina	0.2	Illinois
1	Pennsylvania Maryland, Michigan Kansas	trace	New York, Virginia Tennessee, Alabam, Mississippi, Wiscos

In Illinois one field was observed where 100 per cent of the culms and 6 per cent of the leaf area were affected.

Dates of earliest appearance are given in table 82.

Table 82. Dates and places of first observation of leaf rust on rye, 1927.

Date	Place	County	State
April 11	Clemson College	Oconee	South Carolina
17	A. & M. College	Oktibbeha	Mississippi
26	University Farm	Ramsey	Minnesota
May 15	Muscatine	Muscatine	Iowa
25	Mt. Carmel	Wabash	Illinois
June 5	Madison	Dane	Wisconsin
17	Union	Tolland	Connecticut
17	State College	Center	Pennsylvania

In South Carolina, where some variety tests by the Agronomy Division wer made, the variety Rosen seemed most susceptible and one of Coker's selections fo Abruzzes was the least susceptible of the varieties planted. In Indiana, E. B. Mains reported certain inbred selections of Abruzzes very resistant.

ERGOT CAUSED BY CLAVICEPS PURPUREA (FR.) TUL.

Ergot was reported from Connecticut, New Jersey, Pennsylvania, Virginia, Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, and South Dakota. Reports of non-observation were received from a number of other states. Losses as estimated by collaborators are as follows: 1.5 per cent, Wisconsin ar North Dakota; 0.5 per cent, Ohio and Iowa; 0.1 per cent, Indiana; and trace, Pennsylvania, Virginia, Illinois, Michigan, Minnesota, and South Dakota.

In Illinois ergot was found in only one field where 0.7 per cent of the heads averaged 4.4 per cent infected spikelets or a total loss of .03 per cent of the spikelets for the entire field. In Muscatine County, Iowa, where rye is used extensively as a cover crop for vegetables ergot was very common. In gen eral about 10 per cent of the plants there were infected, commonly two to thre sclerotia being borne on a single head.

Dates of earliest observation were: July 1, Spooner, Wisconsin; July 8, Le Sueur, Minnesota; July 28, Wahpeton, North Dakota; July 11, Hunterston, New Jersey.

POWDERY MILDEW CAUSED BY ERYSIPHE GRAMINIS DC.

Very few states report any trouble from powdery mildew. The majority of states reporting mention that it was not observed. Massachusetts, New Jersey, Pennsylvania, Wisconsin, and Minnesota reported occurrence. In only one state was there evidence of much damage and this was in Massachusetts where W. H. Davis stated that in some orchards where rye was used for a cover crop as many as one-third of the leaves were killed by mildew.

STEM SMUT CAUSED BY UROCYSTIS OCCULTA (WALLR.) RABH.

Stem smut was reported only rarely in 1927. The only reports to the Survey were Pennsylvania (0.5 per cent loss); Wisconsin (trace); Minnesota (trace); and Iowa (trace). In the latter state smut was observed occurring abundantly in rye used as a cover crop for vegetables. One field showed 50 per cent infected plants and other fields showed as high as 10 per cent. July 10 at White Bear, Minnesota, and July 10, at Spooner, Wisconsin, were two dates of earliest observation submitted.

OTHER DISEASES

Gibberella saubinetii (Mont.) Sacc., scab. Traces of this disease were observed in Pennsylvania, Maryland, Wisconsin, and Missouri. In the latter state, according to I. T. Scott, it was found in two fields as a seedling blight rather than as an infection of the heads. About 2 per cent of the plants were infected and although they recovered partly they developed little or no grain.

Septoria secalis Prill. & Del., leaf blotch. Two states, Illinois and Iowa, reported this disease. In Illinois, according to Stout, it was only found once during the year. Three culms in one field showed one infected leaf each. In Iowa, however, this disease was general and severely attacked the leaves on the lower half of the plants often killing them and giving the fields a brownish color. Although this disease has doubtless occurred in Iowa many times before this seems to be the first official report of it from that state to the Plant Disease Survey.

Septoria sp. Traces reported from Sacramento Valley of California. (Mackie)

Tilletia laevis Kühn, bunt. In Kansas several thousand heads of rye grown from seed heavily inoculated with bunt were examined and three heads were found which were bunted. The rye was a mixture in badly smutted wheat seed and wheat plants grown from that seed were heavily smutted. (C. O. Johnston)

Ustilago tritici (Pers.) Rostr., head smut. Because of its rarity this disease is more or less a curiosity. It has been reported from several states from time to time in very small amounts. The only state reporting it in 1927 was Massachusetts where one specimen was found in a stool of volunteer rye near a wood. This seems to be the first report from Massachusetts.

Recent literature

1. Flachs. Aplanobacter Rathayi E. F. S. an Roggen. Illustr. Landw. Zeit. 47: 262. May 1927.

2. Zimmermann, F. Zur Bekämpfung der Fusariose des Roggens mit Trockenbeizmitteln. Zeitschr. Pflanzenkr. 37: 163-172. 1927.

B A R L E Y

COVERED SMUT CAUSED BY USTILAGO HORDEI (PERS.) KELL. & SW.

According to collaborators this smut, which is widely distributed over the country, occurred in about the usual amounts.

Table 83. Estimated percentage loss from covered smut of barley as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
6	Colorado	1	New York, Maryland,
4	Montana		Iowa, North Dakota
3	Tennessee		Texas, Utah, Idaho
2.5	Virginia	0.75	Minnesota
2	Michigan	0.5	Connecticut, Ohio
1.5	Kansas		Wisconsin
1.2	Pennsylvania	trace	South Dakota

In Iowa one field was found with as high as 35 per cent infected heads and in Utah, Virginia, and Minnesota, the maximum percentages were 15, 10 and 10 respectively.

C. O. Johnston makes the statement that in Kansas covered smut always occurs in greater amounts in the northwestern than in the eastern part of the state.

In California, the varieties Sacramento, California Mariout, and Lameset showed immunity to the covered smut.

Recent literature

1. Briggs, F. N. Dehulling barley seed with sulphuric acid to induce infection with covered smut. Jour. Agr. Res. 35: 907-914. Nov. 5, 1927.

2. Neill, J. G. Covered smut of barley and its control. New Zealand Jour. Agr. 34: 304-308. May 1927.

3. Porter, R. H. Seed disinfectants for the control of covered smut and stripe of hulless barley. (Abstract) Phytopath. 18:139. Jan. 1928.

LOOSE SMUT CAUSED BY USTILAGO NUDA (JENS.) Kell. & SW.

The states from which loose smut were reported are shown in the accompanying table of losses. In general collaborators state that the disease was of about the average prevalence although more occurred in Pennsylvania and North Carolina and much more was noted in Maryland.

The loss estimates are as follows:

Table 84. Estimated percentage loss from loose smut of barley as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
4	Maryland	1	South Carolina, Michigan, North Dakota, South Dakota, Kansas
3.4	Illinois		
3.3	Pennsylvania		
3	Montana		
2	New York, Tennessee	0.5	Connecticut, Virginia Ohio
1.5	Minnesota	trace	Wisconsin, Iowa Colorado, Idaho, California

Maximum losses of 8.5 per cent and 6.2 per cent were reported from Pennsylvania and Illinois respectively. In New York out of 40 fields inspected for certification there was an average of 1.25 per cent smut. This included both the loose and the covered smut. Since these are some of the best fields in the state the percentage of disease in them was naturally much below the state average.

The varieties Oderbrucker and Mammoth Winter were reported susceptible in Illinois and Alpha susceptible in New York and Pennsylvania.

A few hot water seed treatment demonstrations were conducted in New York with successful results. Six fields planted with Featherston (six-row) barley, the seed of which last year had 10 per cent smut and which this year was treated with wet formaldehyde, showed the following percentages of smut: 1.1, 1.4, 1.5, 2.5, and 3.

Recent literature

1. Tisdale, W. H., and M. A. Griffiths. Strains of Ustilago nuda and certain host relationships. (Abstract) Phytopath. 17: 42. 1927.

2. ______________________ Variants in Ustilago nuda and certain host relationships. Jour. Agr. Res. 34: 993-1000. June 1, 1927.

STEM RUST CAUSED BY PUCCINIA GRAMINIS PERS.

This disease was reported from the states given in the accompanying table of losses. Illinois, Minnesota, and North Dakota reported more than the usual amount in barley. The other states reported about the same.

Table 85. Estimated percentage loss from stem rust of barley as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
2	North Dakota	trace	New York, Pennsylvania
1.5	South Dakota		Maryland, Illinois,
1	Ohio		Minnesota, Iowa,
0.5	Wisconsin		Kansas, Colorado,
			Utah, Idaho
			California

Dates of earliest report of stem rust on barley were July 16, Clarion, Pennsylvania; July 23, Carroll Co., Illinois; June 26, St. Peter, Minnesota.

LEAF RUST CAUSED BY PUCCINIA ANOMALA ROSTR.

Leaf rust occurred rather generally although sparingly in barley fields east of the Great Plains and in California. It was more abundant in Illinois than usual and much more prevalent in Minnesota and Kansas than during average years. Only very slight losses occurred, however. They have been estimated by collaborators as follows: 1 per cent, Michigan; 0.6 per cent Illinois; 0.5 per cent, Ohio; and a trace each in New York, Pennsylvania, Maryland, Virginia, West Virginia, Tennessee, Minnesota, South Dakota, and Kansas.

Dates of earliest observation as reported to the Survey were June 26, St. Peter, Minnesota; June 30, Reading, Pennsylvania; July 23, Carroll Co., Illinois; and May 5, Blacksburg, Virginia. In Kansas, the variety Tennessee Winter was mentioned as especially susceptible. In Illinois leaf rust was observed only on Oderbrucker and in California the variety Sacramento was reported not attacked.

STRIPE CAUSED BY HELMINTHOSPORIUM GRAMINEUM RABH.

The states listed in the following table reported this disease in 1927.

Table 86. Estimated percentage loss from stripe of barley as estimated by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
4.8	Utah		South Carolina,
3	Tennessee,		North Dakota, South
	Colorado		Dakota
2.7	Illinois	trace	Maryland, Virginia
2	Wisconsin, Iowa	no loss	Texas, Oklahoma,
1	Pennsylvania,		Arizona, California
	North Carolina,		

In Wisconsin, Leukel and Dickson inspected about 75 barley fields comprising over 3,000 acres July 19 and 20. They found stripe occurring as a mere trace in a majority of fields, 2 to 6 per cent in about one-third of the fields, and 10 and 15 per cent in six fields. One field near Pardeeville had 20 per cent stripe. In Pennsylvania the disease was the worst that it has been noted durin recent years. It was seen in 75 per cent of the fields surveyed.

In Iowa, counts of infection were made in three experimental plots in different parts of the state. Among the varieties most susceptible in these plots were: Minsturdi, Manchuria (Iowa), and Caucassian, while some which showed resistance were Horn, Featherston, Bonami, Sandrel, Trebi CI 936, and Oderbrucker. In California, Mackie reports that the barleys most affected are the new variety Atlas, which was badly attacked everywhere, Coast and 4,000, related varieties.

Recent literature

1. Leukel, R. W., J. G. Dickson, and A. G. Johnson. Experiments with dusts for controlling stripe disease of barley. Phytopath. 17: 175-179. 1927.

2. Porter, R. H. Seed disinfectants for the control of covered smut and stripe of hulless barley. (Abstract) Phytopath. 18: 139. Jan. 1928.

SPOT BLOTCH CAUSED BY HELMINTHOSPORIUM SATIVUM PAM., KING, AND BAK.

The only states reporting this disease were Pennsylvania, Texas, Iowa, North Dakota, Kansas, Idaho, and California. It was apparently of very slight importance except in California where, according to Mackie, it was the worst barley disease of the year causing shriveling and reduction in grade of the grain. Much seedling injury (25 to 30 per cent of the crop) was reported from the coastal areas of California.

NET BLOTCH CAUSED BY PYRENOPHORA TERES (DIED.) DRECHS.

New York, Maryland, Wisconsin, Minnesota, Iowa, Idaho, and California were the only states reporting this disease in 1927. The most loss was reported from Iowa where 2 per cent reduction in yield was estimated. It also caused a considerable reduction in leaf area throughout the barley areas of California on early sown barley. The variety Sacramento was not injured according to Mackie in California. In Iowa counts in three barley plots showed that Colsess, Trebi (Colorado), Trebi C I 936, and Sandrel showed extremely high infection when compared with other varieties.

Helminthosporium californicum Mackie & Paxton, sooty blotch. Of much importance in California causing premature ripening and seed shriveling. (Mack

Rhynchosporium secalis (Oud.) Davis, scald. Wisconsin and California ar the only states reporting this in 1927. In the latter state, according to Mac it is of much importance causing much damage in early sown grain on summer fal The variety Sacramento appears to be less injured than other varieties.

Gibberella saubinetii (Mont.) Sacc., scab. Traces were reported on bar in Pennsylvania, Ohio, Tennessee, Wisconsin, and Iowa. In all cases the losse were practically negligible.

Claviceps purpurea (Fr.) Tul., ergot. A few collections on barley were made in Illinois, Wisconsin, Minnesota, and North Dakota.

Colletotrichum graminicolum (Ces.) Wils., anthracnose. Only two states Pennsylvania and Wisconsin, reported anthracnose. In Pennsylvania more was fo than last year although the total loss was only a trace. One field showed 5 p cent infection according to Kirby.

Erysiphe graminis DC., powdery mildew. Several states reported the pre alence of this disease but California seems to be the only one that reported much damage. In that state it severely injured late sown barley both on the c and in the interior valleys. The variety Sacramento seemed to be entirely imm to the disease, according to Mackie.

Bacterium translucens Jones, Johnson & Reddy, bacterial blight. Texas, Wisconsin, Iowa, and Utah reported bacterial blight. In the latter state it w reported to the Survey for the first time, it being found in 5 fields in the sa number of counties. In one field there was only a trace but in each of the ot losses of 4, 30, 75, and 95 per cent were estimated respectively. If these fi were representative of the entire state the average loss on account of the tro would be about 4 per cent. It is suspected, however, that these fields are no representative for the entire state and that the state average loss will probably be nearer 0.5 per cent.

Ophiobolus graminis Sacc., take all. Was again prevalent in California according to Mackie, but causing less damage than for the past few years. Considerable varietal resistance has been noted in barley.

Fusarium culmorum leteius Sherb., root rot. General in California but worse along the coast.

Scolecotrichum graminis Fckl. Collected in Utah, July 19, by M. B. Linford.

Recent literature

1. Eversmann, G. A. A., and J. H. Aberson. Weitere Untersuchungen über die Dorrfleckenkrankheit. Landw. Jahrb. 65: 649-673. 1927

2. Lebedeva, Mme L. A. ....(A fungus of the genus Marssonia parasitic on barley.) Abs. in Ann. State. Inst. of Exper. Agron., Leningrad, 5: 200. 1927.

SMUT CAUSED BY USTILAGO AVENAE (PERS.) JENS. AND U. LEVIS (K. & S.) Mag.

Considering the fact that the seed treatment method for controlling the oat smuts is so efficient, inexpensive, and so well known, it is somewhat surprising that more farmers did not take advantage of this method and prevent some of the losses, which were particularly high in 1927. In some of the states oat smut was outstanding in its importance. This applies particularly to North and South Carolina where reductions in yield of 20 and 35 per cent were estimated respectively. Concerning the situation in the former state, G. W. Fant writes:

> "A severe outbreak of oats smut occurred in 1927. Fall sown oats were more severely affected than spring sown. Infection running as high as 60 per cent was of fairly common occurrence this year."

In South Carolina, W. D. Moore states:

> "Heaviest infection in history of state so far as available records show. Many fields running about 90 per cent infection. The average for all counties in eastern half of state is about 38 per cent. Almost 100 per cent control in the few instances where seed was treated."

In Pennsylvania also an unusually high loss occurred. Nine per cent was the estimated state average loss and maximums of as high as 51, 41, and 33 per cent were noted in individual fields. Other maximum losses reported were: 60 per cent, Minnesota; 50 per cent, Missouri and Arizona; 40 per cent, Colorado; 31.5 per cent, Illinois; and 25 per cent, Iowa.

Table 87. Estimated percentage loss from oats smut as reported by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
35	South Carolina	4	Minnesota, Montana
20	North Carolina	3	Virginia, Michigan,
9	Pennsylvania		Wisconsin, Iowa,
7.6	Utah		South Dakota,
5.5	Ohio		Mississippi
5	New York, Maryland,	2.5	Florida
	West Virginia, Georgia,	2	Maine, Massachusetts,
	Missouri, Tennessee		North Dakota, Texas
	Colorado	1.5	Connecticut, New Jersey
4.8	Illinois		Idaho
		trace	Delaware, Louisiana

The varieties Kanota and Fulghum were resistant in northern Kansas while Kanota was susceptible in southeastern Kansas. This is explained by C. O. Johnston as possibly being due to a difference in the form of smut in the two localities of the state. In California, Mackie reports that Kanota is now replacing all other varieties as it is practically immune to the form of smut in that state and because of this it is not necessary to treat the seed.

Heald reports U. levis in eastern Washington and U. avenae as a prevalent form west of the Cascades.

In Ohio, two new dust treatments of oat smuts have been reported by Sayre and Thomas (6,7,8). Both of these give excellent results. One is formaldehyde dust made by mixing formaldehyde with infusorial earth. The other i iodine dust made by mixing finely ground iodine with infusorial earth. The iodine dust is also reported by Vaughan as giving good results in Wisconsin.

Recent literature

1. Gage, G. R. Studies of the life history of Ustilago avenae (Pers.) Jensen and of Ustilago levis (Kell. & Swing.) Magn. New York (Cornell) Agr. Exp. Stat. Mem. 109. 35 p. July 1927.

2. Dickinson, Sydney. Experiments on the physiology and genetics of the smut fungi. Seedling infection. Proc. Roy. Soc. Ser. B. 102: 174-176.

3. Johnston, C. O. Effects of soil moisture and temperature and of dehulling on the infection of oats by loose and covered smuts. Phytopath. 17: 31-36. 1927.

4. Raeder, J. M., and C. W. Hungerford. Dust treatments for the control of oat smut in Idaho. Phytopath. 17: 569-570. Aug. 1927.

5. Reed, G. M. Further evidence of physiologic races of oat smuts. Mycologia 14: 21-28. 1927.

6. Sayre, J. D., and R. C. Thomas. New dust treatments for oat smuts. Science n.s. 66: 398. Oct. 28, 1927.

7. ______________ New dust treatments for oat smuts. (Abstract) Phytopath. 18: 139. 1928.

8. ______________ Formaldehyde and iodine dusts for the control of oat smut. Ohio Agr. Exp. Sta. Bi-month. Bull. 13: 19-21. Jan.-Feb. 1928.

STEM RUST CAUSED BY PUCCINIA GRAMINIS PERS.

As in the case of stem rust of wheat this disease on oats was unusually prevalent in the spring wheat area, Minnesota and the Dakotas, where it assume epidemic proportions. It was also worse in Nebraska and Kansas. Most of the states reported about the usual amounts.

Early oats for the most part escaped but late oats suffered, in some cases very severely. In Illinois, Stout estimated about 3.4 per cent infection on early oats as compared with about 9.6 per cent on late oats. The situation was complicated with crown rust and weather conditions, the two diseases and the weather bringing about almost complete failure in many cases. In making estimates of losses it has been found very difficult to separate the damage caused by the two rusts.

Table 88. Estimated percentage loss from stem rust of oats as reported by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
15	Minnesota	0.5	Ohio, Wisconsin
12	South Dakota	trace	New York, Maryland
5	North Dakota		West Virginia, Illinois
2	Michigan		Missouri, Nebraska
1	Pennsylvania		Kansas, Wyoming, Colorado,
0.8	Iowa		Idaho

In Minnesota, the variety Anthony was reported as highly resistant (1).

Recent literature

1. Torrey, E. C. New plant varieties in Minnesota. Seed World 22 (10): 7-8. Nov. 4, 1927.

CROWN RUST CAUSED BY PUCCINIA CORONATA CDA.

In general crown rust was worse than usual throughout the central states from Georgia and Louisiana northward to Indiana and North Dakota. In Minnesota and Kansas it was said to have been the heaviest infection on record and in Idaho it was noted this year for the first time. In Virginia, it caused practical failures of the oat crop in Surry and Fairfax Counties.

Of the 33 states reporting this disease in 1927 about one-half of them reported more than usual. The other half reported either the same, less, or did not mention the prevalence.

Table 89. Estimated percentage loss from crown rust of oats as reported by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
25	Tennessee	2	Iowa
20	Louisiana	1	Pennsylvania,
15	Minnesota, Florida		Georgia, Michigan,
12	Mississippi		Wisconsin
5	Indiana, Nebraska	0.5	New York, Virginia
	Kansas		Ohio
3	Texas, North Dakota	trace	Maryland, West
			Virginia, Idaho

The variety Texas Red Rust Proof was said to be very susceptible in Georgia by Boyd. It was also heavily infected in Mississippi. Fulghum was noted as resistant in Virginia. The variety Lee was susceptible in Arkansas.

Dietz and Leach (1) have reported four effective methods of eradicating the alternate host of this rust - (1) Application of salt, (2) Application of kerosene, (3) Removal of top growth and application of salt, and (4) Removal of crown.

Recent literature

1. Dietz, S. M., and L. D. Leach. The effective methods of eradicating Rhamnus species susceptible to Puccinia coronata Cda. (Abstract) Phytopath. 18: 138. 1928.

2. Parson, H. E. Physiologic specialization in Puccinia coronata avenae. Phytopath. 17: 783-790. Nov. 1927.

3. Ruttle, M. L., and W. P. Fraser. A cytological study of Puccinia coronata Cda. on Banner and Cowra 35 oats. Univ. Calif. Publ. Bot. 14: 21-54. 1927.

BLAST OR STERILITY (UNDET.)

Illinois, Missouri, Kansas, and North Dakota reported more sterility than last year. In Illinois it was rated as the worst disease of oats. In Pennsylvania it was the second most important trouble, being exceeded only by smut. In Kansas it ranked alongside of crown rust in importance. Percentage losses were estimated as follows: 7.6, Illinois; 5, Minnesota and Kansas; 1.5 Pennsylvania; 1, New York and South Dakota; 0.5, Missouri.

In Illinois a loss of 29.7 per cent was noted in one field. This means that 33 per cent of the spiklets on 90.2 per cent of the panicles were blasted. In Arkansas sterility was noted on a number of varieties of winter oats. Among these varieties were some of the Arkansas selections and Kanota. In Kansas, Kanota seemed to be resistant while Red Texas and White oats were severely attacked. Kanota was also highly resistant in California and is replacing the Red Texas which is highly susceptible.

BACTERIAL STRIPE BLIGHT CAUSED BY BACTERIUM STRIAFACIENS ELLIOTT

Charlotte Elliott (1) has described the organism causing the bacterial stripe blight of oats, which occurs widely throughout the country. In has been collected in Ohio, Indiana, Illinois, Wisconsin, Minnesota, North and South Dakota, and the Pacific Coast States.

Recent literature

1. Elliott, Charlotte, Bacterial stripe blight of oats. Jour. Agr. Res. 35: 811-824, Nov. 1, 1927.

SMUT CAUSED BY USTILAGO ZEAE (BECKM.) UNG.

About the average amount of corn smut occurred in 1927, although Massachusetts, Florida, Ohio, and Colorado reported somewhat more than usual. Much less than the average amount was noted in Illinois.

Table 90. Estimated percentage loss from corn smut as reported by collaborators, 1927.

Percentage loss	States reporting	Percentage loss	States reporting
4	North Dakota, Kansas	1	New York, New Jersey, West Virginia, South Carolina, Tennessee, Texas
3	Pennsylvania, Ohio Iowa		
2.5	Connecticut, North Carolina	0.7	Minnesota
2	Florida, Missouri	0.5	Massachusetts, Delaware, Maryland
1.5	Wisconsin	0.2	Indiana, Illinois

Maximum percentages of infected stalks found in fields were: Minnesota, 66 (sweet corn); Iowa, 39; Arizona, 27; Pennsylvania, 20; Missouri, 15; Illinois, 10.4 and North Dakota, 10.

Percentages of infection were generally higher in sweet corn than in field corn. In New York, 2 to 3 per cent loss was estimated for this crop; in Minnesota, 2 per cent; and in Iowa, 7.5 per cent. Popcorn was mentioned as especially susceptible in Iowa and as it is an important crop there the loss was considerable, amounting to about 4 per cent. One field of popcorn was seen with 9 per cent of the ears infected. As usual considerable difference in susceptibility was noted in different lines of corn.

In Illinois, the Natural History Survey has been collecting data on the prevalence and destructiveness of corn smut for the past six years and G. L. Stout has furnished a table with accompanying data giving the results of the six-year survey (table 91). The counties included in the survey were distributed over the state with the exception of the years 1922 and 1927 when northern counties and the southern three-fifths of the state were inspected respectively. The inspection periods were: July 21 to August 15, 1922; July 17 to September 5, 1923; August 4 to September 22, 1924; July 17 to October 28, 1925; July 10 to November 18, 1926; July 22 to November 10, 1927.

Table 91. Summary of data on corn smut by years and for the six year period.

Year	Fields examined	Counties represented	Total acres examined	Average per cent plants infected	Average per cent of ears destroyed or inhibited	Per cent of infected plants showing ear loss
1922	7	4	105	4.2	1.0	23.8
1923	19	12	593	6.8	3.0	44.1
1924	117	57	4,402	5.5	1.9	34.5
1925	23	21	565	3.0	0.1	3.3
1926	84	70	1,569	2.9	1.8	62.0
1927	49	40	935	1.3	0.2	15.3
Total 6 yrs.	299		8,169			
Av. 6 yrs	49.8	34	1,361.5	3.9	1.3	33.3

EAR ROT CAUSED BY DIPLODIA ZEAE LÉV.

Although Diplodia acts as a root and stalk rot as well as an ear rot the following brief statement applies to the ear rot phase only. In 1927 Diplodia ear rot was reported rather widely over the eastern half of the country. Estimates of losses, however, were received from only a comparatively small number of states, as follows: 3 per cent, Maryland and Kansas; 2.5 per cent, Indiana; 2 per cent, Iowa; 1 per cent, Ohio, North Carolina, and South Dakota; 0.5 per cent, Delaware; and 0.3 per cent, Pennsylvania.

Most of the states reporting mentioned less than the usual amount of ear rot from this fungus and several of them mentioned that the dry, summery weathe of October which permitted corn to mature properly had considerable to do with this. In New Jersey, numerous isolations from rotted ears showed no Diplodia whatever but only Fusarium and Cephalosporium. In Iowa, where this ear rot is quite destructive it assumed a minor role when compared with Basisporium rot.

In Indiana, two strains of Butler corn are reported as resistant by R. R. St. John.

ROOT, STALK, AND EAR ROTS ASSOCIATED WITH GIBBERELLA, FUSARIUM, AND OTHER FUNGI.

The root, stalk and ear rot problem is very complicated owing to the man factors concerned. Among these factors may be mentioned unbalanced fertility, poor growing conditions, insects, and various fungi such as Fusarium, Gibberell, Diplodia, Pythium, etc. Since many of these factors are all operating at the same time it is very difficult to make any separations of these diseases on the basis of cause. In Iowa and Kansas last year oonsiderable root rot accompanied by lodging of the corn followed primary injury from corn root worm. In Missour, a Pythium was repeatedly isolated from decaying roots. Koehler, Dungan and Holbert (3) have reported that during the years 1924-26 more than 400 bushels of a yellow dent corn showed ear rot losses proportioned as follows among the three important disease-producing organisms: losses from _Fusarium moniliforme_, 8.63 per cent; from _Diplodia zeae_, 12.24 per cent; and from _Gibberella saubineti_, 14.73 per cent. Collaborators of the Plant Disease Survey were asked to estima losses from this group of diseases separating them into two groups, ear rots and root rots. It is realized, however, that both types of diseases may be brought about by the same causes, (table 92).

Table 92. Estimated losses from ear rot and root rot of corn as reported by collaborators, 1927.

State	Root rot	Ear rot	Total
Pennsylvania	4	5.3	9.3
Delaware	trace	1	1+
Maryland	10	4.5	14.5
Virginia	3	3	6
West Virginia	2	1	3
North Carolina	3	2	5
Ohio	0.5	1	1.5
Indiana	3	3	6
Illinois	-	-	3.5
Wisconsin	-	3	3
Iowa	0	7	7
Missouri	3.5	2	5.5
North Dakota	trace	trace	trace
South Dakota	2	1	3
Kansas	8	6	14
Tennessee	5	2	7
Mississippi	11	1	12
Louisiana	-	10	10
Montana	2	-	2
Idaho	trace	trace	trace

Practically all of the states agree that the ear rots were less prevalent than usual. The majority of states also reported less than the average amount of root rot.

Recent literature

1. Gregory, C. T. Cause and control of corn root rot. Better Crops 9 (5): 5-8, 54-55. Oct. 1927.

2. Kiesselbach, T. A. Field experiments with seed corn treatments and crop stimulants. Nebraska Agr. Exp. Stat. Bull. 218. 15 p. 1927.

3. Koehler, B., G. H. Dungan, and J. R. Holbert. Plant disease investigations at the Illinois Station. Illinois Agr. Exp. Sta. Rept. 1927: 51-56, 230-232, 234,239, 246-247. 1927.

4. Limber, D. P. Fusarium moniliforme in relation to diseases of corn. Ohio Jour. Sci. 27: 232-246. Sept. 1927.

5. Melhus, I. E., C. S. Reddy, W. P. Raleigh, and L. C. Burnett. Seed treatment for corn diseases. Iowa Agr. Exp. Sta. Circ. 108. 16 p. Jan. 1928.

RUST CAUSED BY PUCCINIA SORGHI SCHW.

This rust occurred widely. It is known to occur in all states except some of those in the Rocky Mountain area, namely Montana, Wyoming, Utah, Arizona, Nevada, Idaho, Washington, and Arizona. This year for the first time apparently it was collected in Utah where M. B. Linford found what appeared to be a single uredinium of this rust on one leaf in one field.

More than the average amount was reported from Massachusetts, West Virginia, Illinois, Missouri, and Kansas. In the latter state it assumed epidemic proportions on both field and sweet corn. C. O. Johnston reported the heaviest infection that he has ever seen. Many leaves dried up prematurely especially toward the end of the season. In spite of this outbreak, however, he estimates the loss for Kansas as only a trace. Loss for the United States was very slight as the disease usually comes on late and is ordinarily not severe. However, a loss of 2 per cent was reported on sweet corn in Iowa. Dates of earliest appearance were reported as follows: Amherst, Massachusetts, September 2; Manchester, Ohio, August 4; University Farm, Minnesota, July 11 (sweet corn), July 16 (field corn); Lucas, Iowa, August 4.

Some inbred lines are reported resistant in Indiana by Mains (1). He also reports the presence of physiologic forms of the rust with the consequent resistance of some varieties to one form and their susceptibility to others.

<u>Recent literature</u>

1. Mains, E. B. Inheritance of resistance to Puccinia sorghi in maize. (Abstract) Phytopath. 18: 138. 1928.

2. Wellensiek, S. J. The nature of resistance in Zea mays L. to Puccinia sorghi Schw. Phytopath. 17: 815-825. Dec. 1927.

BACTERIAL WILT CAUSED BY APLANOBACTER STEWARTII (EFS.) McCUL.

Only eight states, Massachusetts, New Jersey, Maryland, Virginia, West Virginia, Ohio, Illinois, and Indiana, reported the presence of this disease, usuall in rather small quantities. Collaborators in Ohio estimated that as much as 1 per cent of the sweet corn crop was lost while those from other states did not report more than a trace. Dates of first observation were: September 7, Amherst, Mass; August 3, New Brunswick, New Jersey; and June 15, Lafayette, Indiana. As usual th Golden Bantam seemed to be the most commonly and severely attacked.

BROWN SPOT CAUSED BY PHYSODERMA ZEAE-MAYDIS SHAW

Nine states reported the occurrence of brown spot in 1927, Tennessee, Nort Carolina, South Carolina, Georgia, Florida, Mississippi, Louisiana, Illinois, and Kansas. Georgia with 1 per cent was the only state estimating the loss as over a trace and Louisiana was the only state that reported more than usual prevalence June 9 at Tifton, Georgia, July 1 at Satartia, Mississippi, and August 4 at Manchester, Illinois, were the dates of earliest reports. During 1927 an old specim of this disease collected in July, 1898, at Arcadia, Louisiana, was found among u- determined specimens in the Mycological Herbarium, Bureau of Plant Industry. Prio to this finding the earliest collection had been considered as that of E. C. Johnson from Atlanta, Georgia, September 10, 1910.

OTHER DISEASES

Phytomonas dissolvens (Rosen) Comm. S.A.B., stalk rot. Reported from Louisiana where E. C. Tims stated that a very severe outbreak occurred on one plantation causing from 10 to 40 per cent loss. A bacterial stalk rot is also becoming more prevalent in Mississippi, according to Neal. In Missouri, one case of root and stalk rot caused by an undetermined bacterium with 10 per cent of the plants affected was reported. A bacterium was isolated but not definitely identified.

Basisporium gallarum Moll., ear rot. Wisconsin, Iowa, and Missouri reported trouble from this fungus. In Iowa, a 4 per cent loss or more than half the loss from all ear rots was estimated. In Missouri, only a small percentage of the corn in one field was noted as affected with this disease. In Wisconsin, 2 per cent loss was estimated and the disease appeared to be general.

Cephalosporium acremonium Cda., black bundle. This fungus was the cause of considerable loss in a number of states as follows: Pennsylvania, 1 per cent; Illinois, 2.2 per cent; Wisconsin, 6 per cent; and Iowa, 0.5 per cent. It was also reported from Montana apparently for the first time. Although it has undoubtedly occurred in Iowa for a more or less indefinite period this is the first report to the Plant Disease Survey. In Wisconsin, as high as 12 per cent infection was noted in one case and the statement is made by the collaborator, R. E. Vaughan, that not enough attention is being paid to this disease. An infection of 7.2 per cent was observed in Illinois and 7 per cent in Pennsylvania.

Mosaic (undet.) Generally distributed in southern Louisiana but causing little damage according to E. C. Tims. Stoneberg (9) studied this disease in Indiana comparing diseased plants with healthy ones and found that the yield from diseased plants was only about 10 per cent less than the yield from healthy plants. On the basis of his data he concludes that this disease was only slightly deleterious to the yield and quality of corn in that state.

Ophiobolus heterostrophus Drechs; foot rot. Lafayette, Indiana, June 23. (Trost)

Pseudomonas holci Kend., bacterial spot. Occurred generally in Iowa causing some damage. A bacterial leafspot of undetermined cause reported by Taubenhaus in Texas.

Rhizopus sp., scutellum rot. More than usual in Minnesota. Extremely moist weather retarded germination and favored this rot.

Sclerospora graminicola (Sacc.) Schröt., downy mildew. Iowa - Observed abundantly on Setaria and in one instance on Golden Bantam sweet corn.

Sorosporium reilianum (Kühn) McAlp., head smut. Reported only from Idaho.

Sheath spot. (Fusaria and other fungi) Although undoubtedly common in many states the only actual report to the Survey was from Utah where it was observed occurring very widely but doing little if any damage.

Recent literature

1. Bertus, L. S. A sclerotial disease of maize (Zea mays L.) due to Rhizoctonia solani Kühn. Yearbk. Dept. Agr. Ceylon 1927: 44-46. 1927.

2. Darragh, W. H. Mercury-phenol compounds for treating seed maize. Agr. Gaz. New South Wales 38: 672-674. Sept. 1927.

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3. Funk, E. D. Corn disease investigations in prose and pictures. Rev. 3d ed. Springfield, Ill. Illinois Farm. Inst. 1927.

4. Geschele, E. E. ....(Biological peculiarities of Ustilago reiliana.) Abs. in Ann. State Inst. of Exper. Agron., Leningrad, 5: 202. 1927.

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R I C E

Piricularia oryzae Br. & Cav., blast. Traces noted in Florida, Louisiana, Texas, and Arkansas. No estimate of any particular damage was received.

Sclerotium oryzae Catt., stem rot. Reported only from Arkansas where it was more prevalent than usual. According to V. H. Young this is the most important rice disease in the state and is spreading slowly.

Straight head, undet. Reported from Texas and Arkansas. In the former state Taubenhaus estimates a 2 per cent loss and in Arkansas V. H. Young says that it is common on new land or when much vegetable matter is turned under with no opportunity for decay.

Tilletia horrida Tak., smut. Arkansas is the only state reporting this smut. Never more than a trace was found. Many samples showed a few spores in washings. It has been seen on long- and short-grained types, the long-grained being most susceptible. The variety Fortuna seemed to be most susceptible.

Recent literature

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F L A X

Fusarium lini Bolley, wilt. Wisconsin, Minnesota, Iowa, North Dakota, and South Dakota. It apparently occurred in about the same amounts as usual. The use of resistant varieties has greatly reduced destructiveness. In Iowa, according to Archer, the flax production which 20 years ago was considerable has dwindled to practically nothing until recent years when wilt resistant varieties were introduced. Now the acreage is on the increase. In some fields where resistant seed was not planted 50 per cent loss was observed. The loss in Wisconsin is estimated as a trace; Minnesota, 0.5 per cent; Iowa, 5 per cent; North Dakota, 10 per cent; and South Dakota, 1 per cent.

Melampsora lini (Pers.) Desm., rust. Wisconsin, Minnesota, North Dakota, and South Dakota. More than usual was reported from Minnesota and much more than usual from North Dakota. The other two states reported about the average amount. Losses were a trace in all of the states except North Dakota which reported 3 per cent. As high as 30 per cent loss was experienced by some growers in North Dakota.

It may be of interest to know that this rust was reported from New Zealand for the first time in 1926 (Cunningham 2). The crop is becoming widely grown there and this rust may prove to be a troublesome disease.

Canker (non-par.) North Dakota and South Dakota are the only states reporting this canker ordinarily attributed to heat. In North Dakota about the usual amount occurred and probably caused a loss of 3 per cent, according to W. E. Brentzel. In South Dakota, the loss was estimated as a trace.

Phlyctaena linicola Speg., pasmo. Minnesota and North Dakota reported traces with no particular damage.

Recent literature

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4. Salmon, E. S., and W. M. Ware. The powdery mildew of flax. Gard. Chron. III, 82: 34-35. 1927.

SORGHUM

Bacterium andropogoni EFS., stripe. Reported from Texas and Kansas. In the latter state it was said to be very common, especially on certain varieties such as Feterita, Kansas Orange, and hybrids of these two varieties. Milos and kafirs were either free from the disease or only lightly attacked, according to C. O. Johnston.

Cercospora sp. Reported from Arkansas apparently for the first time.

Mosaic (undet.) Noted in southern Louisiana in at least three parishes. First observation June 27 at Raceland.

Pseudomonas holci Kend., Holcus spot. Iowa - one plant showed 50 per cent of plants with slight infection.

Puccinia purpurea Cke., rust. Indiana, Missouri, and Kansas reported the disease for the first time to the Survey. In Indiana it was found on the variety known as Sagrain, seed of which was imported from Texas. In Missouri it was collected in two places, one infection was very severe. In Kansas, according to C. O. Johnston, it was very prevalent on lower leaves of sorghums in the vicinity of Manhattan. Feteritas seemed to be particularly susceptible and many of the leaves dried up prematurely on account of rust.

Sphacelotheca cruenta (Kühn)Potter, loose kernel smut. Texas and Louisiana. In both states it seemed to be of moderate importance.

Sphacelotheca sorghi (Lk.) Clint., covered kernel smut. Texas (prevalent), Colorado (very abundant, considerable damage), California (general, but less than formerly because of use of Heilman milo which has been immune until recently when slight attacks were noted.) Tisdale, Melchers, and Clemmer (5) have recently reported physiologic strains of this smut, one of which is pathogenic to milo, White Yolo, and hegari (sorghums hitherto resistant) as well as to sorghums susceptible to the ordinary covered kernel smut.

Sorosporium reilianum (Kühn) McAlp., head smut. Texas, Kansas, Utah, California. In Kansas it occurred particularly in the western half of the state in small amounts on certain varieties. It was found this year at Manhattan, where it usually does not occur, in promising Blackhull Kafir x Sourless hybrid. In general this smut was unimportant in the places from which it was reported.

Bacterial disease (undet.) Kansas - "An undetermined bacterial disease was found killing milo plants in plots at the Garden City Substation by J. H. Martin, H. N. Vinall and J. H. Parker. Diseased plants were dwarfed and badly discolored and often rotted at the crown. The discolored vascular system is very noticeable. Other varieties of sorghum do not seem to be attacked." (C. O. Johnston)

Recent literature

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3. Martin, J. H., and G. T. Ratliffe. Loose kernel smut on feterita. Phytopath. 17: 338-339. 1927.

4. Reed, G. M., Marjorie Swabey, and Laura A. Kolk. Experimental studies on head smut of corn and sorghum. Bull. Torrey Bot. Club 54: 295-310. 1927.

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B U C K W H E A T

Mosaic-like disease. A disease showing mottling and other symptoms of mosaic was reported by Chupp from New York and the Department of Plant Pathology in New Jersey. In the former state it was observed August 29 in Schuyler County. The plants blossomed but the flowers did not produce seed. This is somewhat similar to the disease observed in New Jersey last year, according to Chupp. In that state the Department of Plant Pathology reported that the disease was observed in the same field where it was seen in 1926 but it was not so abundant.

S E S A M E (Sesamum orientale)

Sclerotium sp. A disease apparently caused by a species of Sclerotium was reported causing a trace of loss on this host in the Sacramento Valley in California by Mackie.

DISEASES OF FORAGE CROPS

ALFALFA

LEAF SPOT CAUSED BY PSEUDOPEZIZA MEDICAGINIS (LIB.) SACC.

This leaf spot probably occurred in all states where alfalfa is grown. Practically all of the states reporting mentioned its general distribution. In prevalence it was about the same as usual, although Indiana, Illinois, and Missouri reported more than normal amounts. Losses were estimated as follows: Kansas, 5 per cent; Iowa, 3 per cent; Maryland and Mississippi, 1 per cent; Utah, 0.3 per cent; other states reporting a trace. The maximum period of injury varies with the season. Missouri, Kansas, and Colorado reported more damage early in the season this year while Mississippi, Louisiana, Wisconsin, and Minnesota reported damage in mid-season and in Utah late occurrence was noted. In that state the disease could be found in almost all fields examined after th middle of July. It reached its most conspicuous development in alfalfa seed fields where nearly every field was heavily infested long before the seed was mature. This resulted in early defoliation which naturally must have had some effect on the setting and maturing of the seed. Linford, who reported this, states that the effect of the disease on seed production should be investigated

YELLOW LEAF BLOTCH CAUSED BY PYRENOPEZIZA MEDICAGINIS FCKL.

Iowa, Kansas, and Utah were the only states reporting this disease in 1927. In Iowa, it occurred only in a few scattered localities but when it did occur it often caused severe damage. The most severe case noted showed fully one-fourth of the leaves gone from the plants with the remaining three-fourths heavily infected. The loss for the state is estimated as a trace. In Kansas, 1 per cent reduction in yield is estimated by Weimer. In Utah, Linford reporte wide-spread occurrence but minor importance. Five per cent was the maximum defoliation observed. In abandoned orchards and on ditch-banks much more sever injury was noted than in cultivated fields.

LEAF AND STEM NEMATODE, TYLENCHUS DIPSACI (KÜHN) BAST.

M. B. McKay of Oregon was the only collaborator reporting the observati of this nematode on alfalfa in 1927. In that state it was found in a new locality on three farms in Jackson County and in general more infestation occur red in the state as a whole. The reduction in yield was estimated at 0.1 per cent and the maximum infection in any one field, 30 per cent. The disease was observed in only two areas. It may be responsible for some of the trouble attributed to winter injury in the past.

BACTERIAL ROOT ROT CAUSED BY APLANOBACTER INSIDIOSUM McCUL.

Ten states, Mississippi, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Colorado, and Utah reported the occurrence of this disease. In most of the states it seemed to be of comparatively slight importance, occurring locally for the most part, however, it may be more widespread and destructi than is realized. In Kansas, J. L. Weimer who has been studying this trouble states that it is by far the most important disease of alfalfa. It has reduced many stands greatly but the exact percentage of loss is hard to estimate. In some Kansas fields, 50 per cent loss undoubtedly occurred; in others only a trace. Fifteen per cent loss for Kansas is estimated. In Missouri, much loss is being experienced because of a combination of wilt, crown rot, and root rot, the causes of which are difficult to distinguish. Isolations from many of these diseased plants have yielded Aplanobacter insidiosum. In Iowa, the disease is quite widely distributed and undoubtedly causing much damage. As high as 90 per cent infection has occurred in at least one field and the loss from bacterial root rot and crown rot together for the state was estimated at 25 per cent. Undoubtedly much of the damage from wilt has been attributed in the past to winter killing, improper soil conditions, etc. For further information on the prevalence of this disease in Iowa and Utah see Plant Disease Reporter (Supplements 58: 17-18 and 59: 70)

CROWN AND ROOT ROT PROBABLY CAUSED BY WINTER INJURY

Crown and root rots caused probably by winter injury and also associated with various fungi are responsible for much thinning out of alfalfa stands. Losses from these causes undoubtedly occurred in all the states in 1927 but were specifically reported to the Survey only from Michigan, Wisconsin, Missouri, Iowa, Kansas, and Utah. In Wisconsin, the stand of one field was reduced 25 per cent. In Kansas, 10 per cent loss for the state is estimated. In Iowa, this along with the bacterial wilt probably caused 25 per cent loss and as high as 90 per cent reduction in stand was noted. In Utah the losses were said to be very heavy.

Weimer states that in Kansas the Grimm and Kansas Common varieties seem to be about as satisfactory as any. In Iowa, Archer reports the finding of two strains of alfalfa which showed considerable resistance to winter injury. For further information concerning the situation in Iowa and Utah, see Plant Disease Reporter Supplements 58 and 59.

BACTERIAL BLIGHT CAUSED BY BACTERIUM MEDICAGINIS (SACK.)EFS.

Kentucky, Indiana, Iowa, Kansas, Colorado, Utah, Idaho, and Washington reported bacterial blight. The reports from Kentucky and Iowa seem to be the first to the Plant Disease Survey from those states. In Kansas, Weimer reported that it followed frost injury and was not important after the first cutting. The loss from the first cutting, however, was estimated at 5 per cent.

DOWNY MILDEW CAUSED BY PERONOSPORA TRIFOLIORUM D BY.

Sixteen states reported downy mildew and of these Tennessee, Louisiana, and Indiana reported more than the usual amount. Utah was the only state reporting over a trace of loss. In that state, 1 per cent loss was estimated and losses from 2 to 5 per cent in the first cutting were frequently observed. The maximum loss observed in any one field was 15 per cent.

Alfalfa - Downy Mildew

This disease seems to be favored by cool weather and several collaborators mention its occurrence either in the early or the late parts of the season. In Wisconsin, it was quite bad during June but recovered with higher temperature and more sunlight. In Kansas, Weimer mentions that it attacks young stands especially and in Utah, Linford mentioned the most severe injury at the higher altitudes. Dates of earliest observation were: January 28, Louisiana; April 19, Seymour, Indiana; May 3, Montgomery County, Iowa; May 19, New Jersey; June 1, Madison, Wisconsin; June 7, Stillwater, Oklahoma.

OTHER DISEASES

Ascochyta medicaginis Pk., leaf spot. New York and Utah. In the latter state two types of leaf spot apparently caused by Ascochyta were observed by Linford.

Bacterial leaf spot (undet.) This seems to be an undescribed disease.

Cercospora medicaginis Ell. Ev., leaf spot. Texas and Utah.

Cuscuta sp., dodder. Texas, New Mexico and Utah. Some fields suffered severely.

Fusarium sp., root rot. Virginia, Mississippi and Missouri. Confused with bacterial wilt and winter injury.

Caconema radicicola (Greef) Cobb, root knot. Important where Hairy Peruvian variety is not grown.

Macrosporium sp., leaf blotch. Traces reported from Missouri and Iowa.

Mosaic-like disease. Specimens resembling mosaic were sent in from Tennessee by C. D. Sherbakoff. P. A. Young in Montana observed what appeared to be a slight infestation in a plot of Turkish alfalfa and Linford in Utah also reported a mosaic or calico disease affecting scattered plants throughout the state.

Phymatotrichum omnivorum (Shear) Dug., Texas root rot. Texas (10 per cent loss) and Arizona.

Rhizoctonia crocorum (Pers) D.C., violet root rot. Virginia - about 20 spots from 2 to 6 feet in diameter observed in a field at Appomattox. Michigan - two new locations found this year in Cass and St. Joseph's Counties. Disease in Cass County field confined to area six feet in diameter. This field not more than one-half mile from the St. Joseph County field in which diseased areas are scattered throughout.

Root pitting (cause unknown). In Indiana, Gardner reported a condition resembling that described by Stewart, French and Wilson in 1908 and Weimer in 1927.

Smelter injury. Washington.

Sclerotinia trifoliorum Eriks, wilt. Only report from Washington.

Uromyces medicaginis Pass., rust. New Jersey, Louisiana, Texas, Iowa, Kansas, and Utah. No particular damage.

Urophlyctis alfalfae (Lagh.) Magn., crown wart. Utah and Oregon are the only states reporting this disease. One-half per cent loss is estimated for Utah and 2 per cent from Oregon. In the latter state, according to McKay, it occurs rather generally in the southern and eastern parts and is probably becoming more prevalent. The damage is probably overlooked because the effect is a gradual thinning of the stand.

White spot (non-par.) New York, Utah, and Washington. In Utah Richards (2) finds that this disease is associated with the application of irrigation water.

Yellows (undet.) Massachusetts, Virginia, West Virginia, Kentucky, Tennessee, Mississippi, Wisconsin, Iowa, South Dakota, and Kansas reported this disease. The losses were not said to be more than a trace. In Kentucky, comparative study of the susceptibility of legumes to this trouble gives various results. Very susceptible - Italian clover and alfalfa; moderately susceptible - alsike clover; very resistant - a Kentucky strain of red clover; nearly immune - Korean clover and sweet clover.

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2. Monteith, John Jr. Leafhopper injury to legumes. (abstract) Phytopath 18: 137. Jan. 1928.

3. Richards, B. L. Irrigation as a cause of white spot of alfalfa. (abstract) Phytopath. 18: 136-137. Jan. 1928.

4. Weimer, J. L. A wilt disease of alfalfa caused by Fusarium sp. Phytopath. 17: 337-338. 1927.

RED CLOVER

Bacterium trifoliorum Jones et al, leaf spot. Widespread in Iowa, occurring commonly on volunteer and cultivated red clover plants. In some fields in the northern part of the state during September extensive killing of leaves and stalks took place.

Cercospora zebrina Pass., leaf spot. New York on alsike and hop clover, and Utah on white clover. In New York, Horsfall found one 20-acre field of alsike clover in which the disease was doing considerable damage. About 80 per cent of the leaves seemed to be affected and the loss in yield probably amounted to from 5 to 10 per cent. The report on white clover in Utah, where it occurred on about 4 per cent of the leaves in one field, seems to be the first from that state.

Colletotrichum trifolii Bain. Delaware, Virginia, Indiana, Kentucky and Tennessee reported this disease. In Virginia it was said to be severe on certain strains of imported seed. In Indiana it was destructive in the southern part of the state. As high as 50 per cent infection was observed in one field. The estimated loss for that state is 1 per cent. In Tennessee the estimated loss, according to S. H. Essary was 25 per cent with the disease about as prevalent as usual. Differences in varietal susceptibility were reported from that state.

Erysiphe polygoni DC., powdery mildew. Was of general occurrence again but most of the states reporting mentioned that it was less prevalent than usual and in general only traces of loss were reported. Dates of earliest observation were as follows: April 1, Clemson College, South Carolina; May 15, Somerville, New Jersey; June 12, Lafayette, Indiana; June 13, Illinois, and Saybrook, Connecticut; June 17, Milton, Delaware; July 1, Muscatine County, Iowa, and Bozeman, Montana;

July 2, Amherst, Mass.

At Amherst, Massachusetts, on July 2, W. H. Davis first observed one diseased plant in the midst of a heavy stand of Plantago major. None of these showed the mildew at that time but they were heavily infected in the fall of 1926. The inference is that the fungus may have overwintered on the Plantago.

Gloeosporium caulivorum Kirchner, anthracnose. This anthracnose was reported from Massachusetts, New York, New Jersey, Delaware, Virginia, Kentucky Indiana, and Wisconsin. In New York this is the destructive anthracnose according to Chupp, who estimated a loss of 5 per cent. As high as 90 per cent infection was observed in that state. In Indiana this was more important in the northern part of the state whereas Colletotrichum trifolii was more prevalent in the southern part. In Kentucky strains of red clover from Oregon, Minnesota, Michigan, Ohio, and Kentucky were resistant while other strains from Tennessee and Virginia were susceptible. The Tennessee Anthracnose Resistant was susceptible to northern anthracnose at Lexington.

Macrosporium sarcinaeforme Cav., leaf spot. New York, 0.5 per cent loss. In one Tioga County field of about 20 acres there was a 10 per cent reduction in yield. (Chupp)

Mosaic (undet.) New York, New Jersey, Iowa, and Montana. Only traces observed in each of these states.

Phyllachora trifolii (Pers.) Fckl., sooty spot. New York, on red and alsike. Utah, on white and alsike. Collected on white clover in Delaware, Indiana, and Missouri. Of no economic importance in any case.

Pseudopeziza trifolii (Biv.) Fckl., leaf spot. Generally distributed in New York and probably causing about 1 per cent loss.

Rhizoctonia crocorum (Pers.) DC., violet root rot. Found in Oregon by M. B. McKay on red clover in fields where carrots and potatoes were affected. This is the first report of this disease on clover to the Plant Disease Survey.

Sclerotinia trifoliorum Rostr., stem rot. Virginia and Washington are the only states reporting this in 1927. In Virginia, scattered reports from all sections of the state were received and as high as 33 per cent affected plants were found in a single field. One report in the state of Washington was received

Sphaerulina trifolii Rostr., leaf spot. Found on red, white, and alsike clover in New York.

Tylenchus dipsaci (Kühn.) Bast., stem nematode. Idaho and Oregon are the only states reporting this disease. A loss of 0.5 per cent was estimated from Idaho and a trace of loss from Oregon. In the latter state it was noted for the first time in two fields in Yamhill County. The community paid the growers $600 to plow under the crop in an effort to eradicate the organism.

Uromyces trifolii (Hedw. f.) Lév. (U. hybridi Davis) on alsike clover. Massachusetts - more observed than at other time during last three years. (Davis) Connecticut - About average. (Bender). New York - 5 per cent reduction in yield in one 20-acre field (Horsfall). Illinois - Livingston County farmers, being in need of more diversification of crops and particularly of more legumes, have begun this season the growing of alsike clover. This crop now is nearly ready to harvest for seed, but a potential seed yield of three bushels per acre is being reduced to a probable yield of one and one-half bushels per acre because of the attack of rust. It is so severe that practically all leaves are turning red, shrivelling, dying, and falling off. Only the earliest blossom heads are maturing satisfactory seed. (Tehon). Iowa - general, damage rather slight. (Archer.)

Uromyces trifolii (Hedw. f.) Lév. (U. trifolii repentis (Cast.) Liro) rust on white clover. Connecticut - four reports (Bender). Iowa - observed in several localities. (Archer).

Uromyces trifolii (Hedw. f.) Lév. rust on red and Mammoth clover. Connecticut - eleven reports. (Bender). New York - probably causes a loss of 1 or 2 per cent around Ithaca. Have made no observations elsewhere. Much worse on second cutting. (Horsfall)

Uromyces fallens (Desm.) Kern. on red clover. New Jersey, Iowa.

Yellows caused by leafhoppers. Although this disease undoubtedly occurred in many states the only definite report was from Virginia.

Recent literature

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2. Sampson, K. Anthracnose of red clover. Gard. Chron. III, 81: 169, Mar. 5, 1927.

3. Van Beyma Thoe Kingma, F. H. Ueber eine Botrytis-art auf Rotkleesamen, Botrytis trifolii nov. spec. Meded. Phytopath. Lab. 'Willie Commelin Scholten', Baarn (Holland), 10: 37-39. 1927.

S W E E T C L O V E R

Cercospora davisii Ell. & Ev., leaf spot. General in Iowa on both volunteer and cultivated plants of white sweet clover with conspicuous defoliation. (Archer)

Mosaic (Undet.) Observed by J. H. Muncie near Freemont, Nebraska.

Mycosphaerella lethalis Stone, stem spot. Reported from Iowa for the first time. Slight damage in one field. (Archer)

Stagonospora meliloti (Lasch) Petr., leaf spot. Collected in Iowa in a single field. (Archer)

White spot (undet.) In Utah, sweet clovers developed a spotting similar to white spot of alfalfa under the same conditions which favored the alfalfa disease (see page 346). It was of very minor importance last year.

Winter injury (freezing). In Kansas, J. L. Weimer reports cankers at the crown and on the upper part of tap root similar to those described as collar rot of alfalfa. It was reported in several counties in eastern Kansas causing loss from a trace to 50 per cent.

C O W P E A

Amerosporium oeconomicum Ell. & Tr., leaf spot. Delaware and Virginia. In Delaware there was more than last year but it was of slight importance compared with Cercospora leaf spot. In parts of the coastal plain area of Virginia this was the commonest disease of blackeyed pea, according to F. P. McWhorter.

Bacterium vignae Gardner & Kendrick, bacterial leaf spot. Kansas.

Cercospora cruenta Sacc., leaf spot. Delaware, Virginia, Kansas, and Texas. In Delaware it caused heavy infection generally reducing the yield of hay but probably not affecting the yield of seed very much. In Virginia it was thought not to be of much economic importance and only small amounts locally were observed in Kansas. Taubenhaus reports it fairly prevalent in Texas.

Cladosporium vignae M. W. Gardner, leaf spot. Virginia, Mississippi, and Arkansas. It was observed as very severe in one field of Blackeye variety in Charlotte County, Virginia.

Erysiphe polygoni DC., powdery mildew. Observed in Muscatine, Iowa, and at Manhattan, Kansas.

Fusarium vasinfectum tracheiphilum EFS., wilt. Mississippi, and Texas.

Mosaic (undet.) Indiana, in experimental plots at Lafayette, Iowa, 10 per cent infection observed in one field. Kansas.

Phymatotrichum omnivorum (Shear) Dug., Texas root rot. Texas. This host very susceptible and the loss is estimated at 10 per cent, according to Taubenhaus and Bach.

Sun scald. Delaware.

Uromyces vignae A. Barclay, rust. Prevalent in parts of Texas, according to Taubenhaus. Also reported from Arkansas apparently for the first time.

SOYBEAN

Bacterium phaseoli sojense Hedges, bacterial leaf spot. Delaware - common and more than usual. Failed to respond to seed treatment. Virginia - very severe in a number of fields near Williamsburg. Mississippi, Kansas - general with the crop. Iowa - found in two localities, slight infection, first report for state.

Bacterium sojae Wolf, leaf spot. Virginia and Louisiana. In the Norfolk section of Virginia McWhorter states that this is really the only serious disease of soybean. It was found in every field examined and in some of them it was the active agent of defoliation. In Kansas, a bacterial blight was observed but no attempt was made to determine whether this was due to the Bacterium sojae Wolf or B. glycineum Coerper.

Cercospora cruenta Sacc., leaf spot. Mississippi.

Cercospora kikuchii Mat. & Tom., purple seed stain. Indiana - "this disease has been found in seed beans every year since 1924 and is important because seed growers and buyers object to the presence of any discolored seed. This disease has not been reported elsewhere in this country to my present knowledge. It is recorded in Indiana Plant Diseases, 1924, p.253, and illustrated in the 1925 account on p.242." (Gardner)

Cercospora sp., leaf spot. Louisiana - more than last year. Laredo very susceptible.

Diaporthe sojae Lehman, stem blight. Indiana.

Fusarium sp., wilt. Virginia.

Peronospora manshurica (Naoumoff) Syd. (P. sojae Lehman & Wolf), downy mildew. Virginia, July 1.

Mosaic (undet.) Indiana.

Septoria glycines Takewo Hemmi, leaf spot. Delaware - the most generally prevalent leaf disease of soybeans in 1927. Seed disinfection failed to show any reduction in the amount of this trouble. Indiana - collected October 2.

Sclerotium rolfsii Sacc., southern blight. South Carolina, Mississippi, and Louisiana. In South Carolina some fields suffered very severe losses in stand, even as high as 90 and 100 per cent. Other fields had 50 per cent stands with no beans formed in the pods. Probably a 30 per cent loss occurred in the state, according to L. M. Fenner. Interesting observations on the differences in susceptibility of varieties at the South Carolina Experiment Station were reported by D. B. Rosenkrans (Pl. Dis. Reptr. 11: 146-147, Oct. 15, 1927)

Recent literature

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2. Owen, F. V. Hereditary and environmental factors that produce mottling in soybeans. Jour. Agr. Res. 34: 559-587. 1927.

K U D Z U

Bacterium pueriae Hedges, leaf spot. Reported from South Georgia by Boyd. (Pl. Dis. Reptr. 11: 31. June 15, 1927) and from Indiana by Gardner.

G U A R

Phymatotrichum omnivorum (Shear) Dug. Texas root rot. Texas - one of the most resistant legumes to Texas root rot.

Sclerotium rolfsii Sacc., southern wilt. Texas - trace.

S U N F L O W E R

Erysiphe cichoracearum DC., powdery mildew. Connecticut.

Plasmopara halstedii (Farl.) Berl. & DeToni, downy mildew. Montana - Heavy infestation in field of Mammoth Russian variety on the Experiment Station. Young and Morris (1) planted seeds from diseased White Beauty sunflowers in a greenhouse and seedlings from these showed the disease in severe form. They are practically certain that the fungus overwinters in diseased seeds.

Puccinia helianthi-mollis (Schw.) Jack., rust. Connecticut, New Jersey, and Indiana.

An undetermined leaf spot reported from Virginia Beach, Virginia, by F. P. McWhorter during August.

An undetermined wilt. California. O. A. Pratt in letters dated June 13 and September 23, 1927, reports a wilt and crown rot of wild sunflowers in the Imperial Valley of California. In some places 50 per cent of the sunflowers were infected.

Recent literature

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2. Craigie, J. H. Discovery of the function of the pycnia of the rust fungi. Nature 120: 765-767. Nov. 26, 1927.

GRASSES

BROWN PATCH CAUSED BY RHIZOCTONIA SPP.

This disease occurred rather widely but the only states reporting it to the Survey this year were Maine, Massachusetts, Connecticut, Delaware, and Washington. Considerable work has been done of late in the control of this disease by Monteith and others. Monteith and Dahl (5) report successful control with a considerable number of both organic and inorganic mercury compounds.

Recent literature

1. Monteith, John, Jr. 1927 experiments on brown patch control. Bull. U. S. Golf Assoc. Green Sect. 7: 210-216. Nov. 1927.

2. ________________ Can you identify brown patch? Nat. Greenkeeper 1 (6): 7-11, 31. June 1927.

3. ________________ When brown patch appears. Nat. Greenkeeper 1 (8): 18-21, 31. Aug. 1927.

4. Monteith, John Jr. Testing new chemicals on greens. Bull. U. S. Golf Assoc. Green Sect. 7: 95-98. May 1927.

5. Monteith, John, Jr., and A. S. Dahl. Mercury as a control for turf diseases. (Abstract) Phytopath. 18: 137. Jan. 1928.

6. Patterson, R. H. Brown patch immunity? Bull. U. S. Golf Assoc. Green Sect. 7: 130-133. July 1927.

7. Shepherd, H. W. A control for brown patch. Pacific Rural Press 114: 322. Sept. 24, 1927.

SLIME MOLDS

A number of states, Connecticut, Delaware, New Jersey, Ohio, and Kansas reported the occurrence of slime mold (*Physarum* or *Fuligo* sp.) on lawns. Several collaborators reported it occurring in the form of rings. The grass was not materially injured except in appearance and cleanliness.

OTHER DISEASES

Bacterium coronafaciens atropurpureum Reddy & Godkin
  Agropyron repens - Iowa.
Claviceps purpurea (Fr.) Tul.
  Bromus sp. - North Dakota.
  Chaetochloa viridis - New Mexico.
Claviceps sp.
  Dallis grass - South Carolina.
Colletotrichum graminicolum (Ces.) Wils.
  Holcus sorghum sudanensis - Mississippi
Colletotrichum lineola Cda.
  Holcus halepensis - Texas.

Entyloma lineatum (Cke.) Davis
Zizania aquatica - Connecticut.
Erysiphe graminis DC.
Poa pratensis - Iowa, Missouri, Utah.
Heterosporium phlei Gregory.
Phleum pratense - New York.
Ovularia pulchella (Ces.) Sacc.
Agrostis palustris - Utah.
Piricularia grisea (Cke.) Sacc.
Grass - New Jersey.
Pseudomonas holci Kend.
Holcus sorghum sudanensis - Iowa.
Puccinia epiphylla Wetts. (P. poarum Nielsen)
Poa pratensis - Iowa, Kentucky, Utah.
Puccinia graminis (Pers.) Fckl.
Agropyron repens - Iowa.
Hordeum jubatum - Iowa.
Phleum pratense - Connecticut, New York, Minnesota, Iowa, New Mexico.
Puccinia purpurea Cke.
Holcus halepensis - Texas.
Sclerotium rhizodes Auers.
Agrostis palustris and other grasses - Massachusetts.
Scolecotrichum graminis Fckl.
Phleum pratense - Iowa.
Dactylis glomerata - Kentucky.
Septoria sp.
Poa pratensis - Iowa.
Sphacelotheca occidentalis (Seym.) Clinton
Andropogon furcatus - Oklahoma.
Tilletia anthoxanthemi Blytt
Anthoxanthum odoratum - Connecticut.
Ustilago coicis Bref.
Coix lachryma-jobi - Philippine Islands. (6) "A smut disease of Coix lachryma-jobi (Ustilago coicis) was intercepted on Coix seed from the Philippines. Coix lachryma-jobi, or Job's tears, is one of the important grain crops of the Orient and is a near relative of corn."
Ustilago echinata Schröt.
Phalaris arundinacea - Michigan.
Ustilago rabenhorstiana Kühn.
Syntherisma sanguinalis - New Jersey.
Ustilago striaeformis (West.) Niessl.
Agrostis palustris - Connecticut.
Phleum pratense - New York, Minnesota, Iowa.
Poa pratensis - Iowa.

Recent literature

1. Craigie, J. H. Discovery of the function of the pycnia of the rust fungi. Nature 120: 765-767. Nov. 26, 1927.

2. Davis, W. H. Two physiological forms of Ustilago striaeformis (Westd.) Niessl. (Abstract) Phytopath. 18: 149. Jan. 1928.

3. Melchers, L. E. Studies on the control of millet smut. Phytopath. 17: 739-741. Oct. 1927.

4. Monteith, John Jr. Winter injury of turf. Bull. U. S. Golf Assoc. Green Sect. 7: 62-76. Apr. 1927.

5. _______________ Preventing snow-mold injury on greens. Bull. U. S. Golf Assoc. Green Sect. 7: 193-194. Oct. 1927.

6. U. S. Dept. Agr. Annual Letter of Information. No. 39. Notes on Pathological Interceptions, Jan. 1 - Dec. 31, 1926.

THE PLANT DISEASE REPORTER

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Supplement 63

Preliminary List of Fungi and Diseases of Roses in the United States

August 15, 1928

BUREAU OF
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

PRELIMINARY LIST OF FUNGI AND DISEASES OF ROSES IN THE UNITED STATES

Prepared by

G. Hamilton Martin, Assistant Pathologist, and Anna E. Jenkins, Associate Pathologist, Office of Mycology and Disease Survey.

Plant Disease Reporter
Supplement 63

Date
August 15, 1928

IMPORTANCE OF ROSE PLANT PRODUCTION

Of all the ornamental flowers grown both in greenhouse and garden, the rose seems to be the universal favorite. Large quantities of rose plants are produced in the United States, and many are imported each year. Statistics for the latter appeared in the American Rose Annual (1) for 1927 as follows:

> "During the fiscal year ended June 30, 1926, some 28,556 finished rose plants came in under special permits. The inclusive total of such importations since the beginning of the quarantine in 1919 is 110,997.
>
> "Of rose stocks there came during the fiscal year a total of 10,884,920. This was 2,545,395 more than for the previous year or more than 30 per cent of an increase in foreign-grown stocks for roses.
>
> "Of this large total, England supplied 3,994,900, France 1,816,250, and Holland 4,805,470. The largest quantities came to New York City as 3,220,636; to New Jersey 1,110,509, and to Ohio, 1,370,025."

An important rose grower has stated that ten million plants would be a conservative estimate of the number of outside-grown rose plants produced in the United States and that about the same number is grown for greenhouse purposes. The revenue received in New York City alone from the sale of roses is said to average from ten to fifteen million dollars annually.

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(1) Editors Notes: Importation of rose stocks and roses. Amer. Rose Annual for 1927. p. 229.

SCOPE OF LIST

This list comprises the fungi, bacteria, and a few undetermined troubles occurring on the rose which have been reported to the Office of Mycology and Disease Survey, Bureau of Plant Industry. Saprophytic as well as parasitic organisms have been included. The list gives the distribution of the diseases by States, varieties of roses affected where known, and year of first report to the Plant Disease Survey or first date of publication, or date of collection in the case of a specimen. Where available at least one selected literature reference has been cited for each disease. These are not necessaril[y] references of first description but are intended to give readers a starting poi[nt] in case they wish to look up the literature more fully.

A general request for specimens and other data pertaining to rose diseases which was sent out to collaborators and those interested in roses aided in making the information more complete. During the past two years the writers have done considerable collecting of rose diseases in the District of Columbia and in some of the States, thereby also adding more information to the report. Where specimens are found in the mycological collections they are noted by an asterisk (*) but this does not mean that they all have been examined by the writers.

LIST OF FUNGI AND DISEASES

Actinonema rosae (Lib.) Fr. - see Diplocarpon rosae Wolf.

Alternaria sp.
Rosa sp., R. hugonis, R. serrulata.
*Ala (1875), *Ga. (1926), *Me. (1926), *Mich. (1926), *Miss. (1926), *Va. (1923).

Ameris rosicola (Ell. & Ev.) Arth. - see Uromyces rosicola Ell. & Ev.

Apiosporella rhodophila (Sacc.) v. Hoehn., canker. Rehm, H. Ann. Myc. 13: 2. 1915.
Rosa setipoda, *Md. (1926).

Armillaria mellea (Vahl) Quel., root rot. Sacc. Syll. Fung. 5: 80.
Rosa sp., Oreg. (1913).

Aspergillus terreus Thom. Thom, Chas. and Margaret B. Church, Amer. Jour. Bot. 5: 85. 1918.
Rosa sp., *Va. (1923).

Asteroma rosae Lib. - see Diplocarpon rosae Wolf.

Bacillus amylovorus (Burr.) Trev., blight. Waite, M. B. U. S. D. A. Off. Rec. 4 (31): 5. 1925.
Rosa sp., by inoculation. Has not been found out of doors.

Bacterium tumefaciens EFS. & Town., crown gall. Smith, E. F. and C. O. Townsend. Science, n.s. 25: 672. 1907.
Rosa spp., R. manetti, R. rugosa and varieties Golden Emblem and Ophelia
Ariz. (1926), *Calif. (1925), Conn. (1916), *D. C., Fla. (1923), Ga. (1925), Ill. (1906), *Ind. (1921), La. (1923), Md. (1909), Mass. (1915), Mich. (1915), Minn. (1913), Miss. (1923), Mo. (1907), N. H. (1916), N. J. (1913), N. Mex. (1916), N. Y. (1906), N. D. (1923), Ohio (1915), *Pa. (1917), S. C. (1922), Texas (1926), *Wash. (1915).

Blastocladia tenuis Kanouse. Kanouse, B. B. Am. Jour. Bot. 14: 301. 1927.
Rosa sp., Mich. (1927).

Botryosphaeria ribis Gross. & Dug., cane blight. Grossenbacher, J. G. and B. M. Duggar. New York Agr. Exp. Sta. Bull. 18: 183. 1911.
Rosa adenosephala, R. banksiopsis, R. bella hyb., R. bella x moyesii, R. bracteata, R. caudata, R. l'heritierana, R. moyesii x canina, R. multibracteata, R. pratincola, R. rugosa x Victor Hugo, R. setipoda hyb., R. suffulta, R. willmottea, R. woodsi, and variety Columbia (pink).
*Md. (1922), *Va. (1923).

Botrytis sp., cinerea type, bud blight.
Rosa spp., hybrid teas and perpetuals, and variety Radiance; common on certain white flowered varieties.
Calif. (1926), Dela. (1910) *D. C. (1922), Fla. (1925), Ga. (1925), *Ind. (1918), Me. (1926), *Md. (1909), *Mass. (1916), Mich. (1915), *Miss. (1923), Mont. (1924), N. J. (1920), N. Y. (1915), Ohio (1913), *Pa. (1924), *R. I. (1926), S. C. (1923), Texas (1915), *Va. (1924), *Wash. (1916).

Caconema radicicola (Greef) Cobb, root knot. Bessey, U.S. Dept. Agr., B.P.I. Bull. 217.
Rosa spp., R. multiflora.
Ala. (1905), D. C. (1927), Ga. (1926), Mich. (1920), Nebr. (1905), N. J. (1923), Ohio, Texas (1926), W. Va. (1906).

Cercospora rosicola Pass., leaf spot. Sacc. Syll Fung. 4: 460.
Rosa spp., R. arkansana, R. blanda, R. indica, R. lucida, R. nitida, R. nutkana, R. pratincola, R. setigera, R. suffulta, and varieties Crimson Rambler and Silver Moon.
*Ala. (1901), *Conn. (1902), *D. C. (1887), *Fla. (1882), *Ga. (1915), *Ill. (1886), *Ind. (1890), *Iowa (1905), *Kans. (1888), *La. (1886), *Me. (1900), *Mass. (1926), *Mich. (1923), Minn. (1920), *Miss. (19[illegible]), *Mo. (1887), *Nebr. (1890), N. J. (1918), *N. Y. (1913), *Pa. (1924), *S. C. (1923), *Tenn. (1926), *Texas (1908), *Wash. (1892), W. Va. (1910), Wis. (1914).

Cercospora rosicola Pass. var undosa Davis, leaf spot. Davis, J. J. Trans. Wisconsin Acad. Sci. 20: 405. 1921.
Rosa humilis, Wis. (1922).

Cercospora rosigena Tharp, leaf spot. Tharp, B. C. Mycol. 9: 114. 1917.
Rosa sp., *Texas (1915).

Cladosporium fuscum Link, leaf spot. Sacc. Syll. Fung. 4: 352.
Rosa sp., Miss. (1906).

Cladosporium sp., leaf spot.
Rosa sp., R. gentiliana, R. hugonis, *Ind. (1923), *Md. (1926), *Minn. (1926), *Miss. (1927).

Comandra umbellata (L.) Nutt. Jour. Agr. Res. 5: 134. 1915.
Rosa blanda, R. canina.

Coniosporium limoniforme Syd. Sydow, H. and P. Sydow. Ann. Mycol. 6: 484. 1908.
Rosa sp., Utah (1908).

Coniothyrium fuckelii Sacc., cane blight - see Leptosphaeria coniothyrium (Fckl.) Sacc.

Coniothyrium rosarum Cke. & Hark., graft canker. Sacc. Syll. Fung. 3: 307.
Rosa spp. and varieties Mrs. Charles Russell and Milady.
Calif. (1884), Iowa (1916), *N. J. (1923).

Coniothyrium wernsdorffiae Laub., brand canker. Jenkins, Anna E. and G. Hamilton Martin. U. S. Dept. Agr. Off. Rec. 5 (25): 3. 1926.
Rosa spp., R. multiflora, R. setigera, R. wichuraina and varieties Adelaide Moullé, Aglaia, Aviateur Blériot, Blush Rambler, Caroubier, Christine Wright, Coquina, Dawson, Daybreak H. Nois, Dazzling Red, Delight, Dr. Huey, Evangeline, Excelsa, Farquhar, Flower of Fairfield, Francois Poisson, Freedom, Geisha, Hauff, Hiawatha, Lessing, Louis Sauvage, Manda's Triumph, May Queen, Minnehaha, Miss G. Messmann, Mosel, Euphrosine, Multiflora grandiflora, Paradise, Pink Pearl, Pink Roamer, Purity, Roserie, Rubin, Ruby Queen, Seven Sisters, Source d'Or, South Orange Perfection, Tausendschön, Victory, Wartburg, Wedding Bells, White Dorothy, White Rautenstrauch.

*Minn. (1916), *N. Y. (1926), *Pa. (1915).

Coniothyrium sp., cane blight and canker.
Rosa alba rubrifolia, R. gentiliana, R. hugonis, R. odorata, R. rugosa, and varieties Columbia, Crimson Champion, Gunston Hall, J. B. Clark, Madam Butterfly, Madam E. Herriot, Paul Richaut, Premier, Radiance (Pink and Red), Templar.
*D. C. (1926), *Fla. (1927), Ga. (1923), *Ind. (1926), La. , *Md. (1923), N. Y. (1923), *N. J. (1927), *N. C. (1926), *Ohio (1927), *Pa. (1926), S. C. , *Tenn. (1927), *Va. (1923), *W. Va. (1926).

Corticium stevensii (Noack.) Burt. Burt. E. A. Ann. Missouri Bot. Gard. 5: 125. 1918.
Rosa sp., Fla. (1925).

Coryneum microstictum Berk. & Br., canker. Sacc. Syll. Fung. 3: 775.
Rosa sp., Ala. (1874), *Pa. (1924).

Coryneum sp., stem canker.
Rosa spp., Idaho (1915), *Wash. (1915), *Va. (1926).

Cucurbitaria rosae Wint. & Sacc. (?) Sacc. Syll. Fung. 2: 319.
Rosa sp., N. Mex. (1916).

Cuscuta indecora Choisy, Heald, F. D. and F. A. Wolf. U.S.D.A., B.P.I. Bull. 226: 112. 1912.
Rosa sp., *Texas (1909).

C. paradoxa Raf.
Rosa sp., Fla. (1925).

Cylindrocladium scoparium Morgan, crown canker, black leg. Anderson, P. J. Massachusetts Agr. Exp. Sta. Bull. 183. 1918.
Rosa spp. and varieties American Beauty, Columbia, Hadley, Hoosier Beauty, Killarney, Madam Butterfly, Ophelia, Premier, Russell, Schoyer, and many seedlings.
Ga., *Ind. (1917), *Iowa (1922), Mass. (1912), Mich. (1917), Mo. (1916), N. J. (1926), N. Y. (1917), *Ohio (1927), *Pa. (1917).

Cylindrosporium sp.
Rosa sp., Md. (1925).

Cytospora sp.
Rosa sp., and variety Crimson Rambler, *Pa., (1926), *Va. (1919), Wash. (1926).

Diaporthe oligocarpoides Rehm, Sacc. Syll. 9: 719.
Rosa sp., N. Mex. (1916).

Diaporthe umbrina Jenkins, brown canker. Jenkins, Anna E. Am. Rose Ann. 1927: 161-182.

Tea
- Dr. Grill
- Dutchess de Brabant
- Enfant de Lyon
- E. Veyrat Hermanos
- Frances Willard
- Lady Hillingdon
- Mme. Berard
- Mme. Camille
- Mme. Lambard
- Marion Brunell
- Myles Kennedy
- Safrano
- William R. Smith
- White Maman Cochet
- Winter Gem

Hybrid Tea
- Alexander Hill Gray
- America
- Apotheker Georg Hofer
- Baldwin
- Bessie Brown
- Bertram J. Walker
- Black Prince
- Cecho-Slavia
- Chateau de Clos Vougeot
- Champ Weiland
- Cl. LaFrance
- Cl. Killarney
- Cl. Morning Guillot
- Cl. My Maryland
- Cl. Sunburst
- Cl. Winnie Davis
- Col. R. S. Williamson
- Columbia
- Comte G. de Rochemur
- Countess of Gosford
- Defiance
- Dr. Helferich
- Dorothy Page-Roberts
- Dutchess of Wellington
- Duke of Westminister
- Escarlate
- Edel
- Ellen Willmott
- Emma Wright
- Etoile de France
- Florence Pemberton
- Francis Scott Key
- Frau Ida Munch
- Fraulein Pres. Von Grout

Hybrid Tea (con.)
- Freiberg
- Gainsborough
- George C. Waud
- General-Superior Arnold Janssen
- Golden Spray
- Grace Darling
- Grace Molyneux
- Grossherzog Friedrich
- Gruss an Teplitz
- Gustav Grunerwald
- Hadley
- Hawlmark Crimson
- Henrietta
- Isabella Sprunt
- Johanes Frogan
- John Cook
- John Davison
- Kaiserin Auguste Viktoria
- Killarney
- Killarney Queen
- Kootenay
- La Tosca
- Lady Alice Stanley
- Lady Ashtown
- Lady Pierrie
- Lady Ursula
- Laurent Carle
- Los Angeles
- Lucien Chauré
- Mary, Countess of Ilchester
- Meteor
- Miss Cynthia Forde
- Mme. Abel Chatenay
- Mme. Butterfly
- Mme. Caroline Testout
- Mme. Berthe Fontaine
- Mme. Driout
- Mme. Hector Leuillot
- Mme. Jenny Gillemot
- Mme. Leon Paine
- Mme. Maurice de Luze
- Mme. Paul Euler
- Mme. Segond Weber
- Mme. Simone Beaumez
- Mrs. Aaron Ward
- Mrs. George Gordon
- Mrs. Hubert Taylor
- Mrs. Wakefield Christie-Miller
- Nederland
- Nerissa

Hybrid Tea (con.)
- Norma
- Ophelia
- Pilgrim
- Radiance
- Prince de Bulgarie
- Prince Engelbert Charles d'Arenberg
- Priscilla
- Red Columbia
- Red-letter Day
- Red Radiance
- Rev. F. Page-Roberts
- Rivoire
- Rubezahl
- Sensation
- Sunburst
- Weddington
- Wellesley
- White Killarney

Hybrid Perpetual
- American Beauty
- Baroness Rothschild
- Captain Christy
- Clio
- Countess of Roseberry
- Dr. William Gordon
- Francois Levet
- Frau Karl Druschki
- General Jacqueminot
- Glorie de Chedane-Guinoisseau
- Glorie Lyonnaise
- Her Majesty
- Hugh Dickson
- J. B. Clark
- John Hopper
- John Keynes
- Mabel Morrison
- Magna Charta
- Maharajah
- Marchioness of Dufferin
- Marchioness of Londonderry
- Margaret Dickson
- Mme. Gabriel Luizet
- Mrs. John T. Laing
- Mrs. R. G. Sharman-Crawford
- Oakmont
- Paul Neyron
- President Lincoln
- Souv. de George Beckwith
- Vick's Caprice
- Victor Verdier

Pernetiana
- Souvenir de Claudius Pernet

Pernetiana (con.)
- Soleil d'Or
- Willowmere

Bengal or China
- Champion of the World
- Hermosa

Hybrid Sweet Briar
- Catherine Seyton
- Refulgence

Dwarf Polyantha
- Erna Teschendorff
- Mme. Norbert Levavasseur
- Mosella

Tea Polyantha
- Leonie Lamesch

Multiflora Hybrid
- Andreas Hofer
- Crimson Rambler

Wichuraiana Hybrid
- Bridal Wreath
- Dr. W. Van Fleet
- Paul's Scarlet Climber

Noisette
- Mme. Jules Gravereaux
- Celine Forestier
- Allister Stella Gray (Golden Rambler)
- William Allen Richardson

Noisette Hybrid
- Croquette des Alpes
- Fellenberg
- Perles des Blanches

Rose Species
- Rosa arvensis sylvestris
- R. brunoni
- R. canina
- R. caudata
- R. centifolia
- R. coriifolia
- R. corymbulosa
- R. fedtschenkoana
- R. gentiliana
- R. glauca
- R. helenae
- R. Moschata
- R. nutkana

Rose Species (con.)
R. odorata
R. moschata nastarana
R. multibracteata
R. Pisocarpa
R. pouzini

Rose Species (con.)
R. rubella
R. rubiginosa
R. setigera
R. soulieana

*Ala. (1926), *Conn. (1917), *Dela. (1921), *D. C. (1903), *Fla. (1925), *Ga. (1917), *Ky. (1920), *Md. (1902), *Mass. (1921), *Mich. (1925), *Miss. (1919), *N. J. (1917), *N. Y. (1923), *N. C. (1924), *Pa. (1922), *R. I. (1922), *Texas (1927), *Va. (1917), *W. Va. (1904).

Diaporthe sp. (not D. Umbrina Jenkins), blossom blight.
Rosa sp., La. (1924).

Diatrype tristicha De Not. - see Valseutypella tristicha (DeNot.) v. Hoehn.

Dicoccum rosae Bon. - see Diplocarpon rosae Wolf.

Didymella nigrificans Karst. Sacc. Syll. Fung. 9: 668.
Rosa sp., N. Mex. (1916).

D. rauii (Ell. & Ev.) Berl. & Vogl. Sacc. Syll. Fung. 9: 668.
Rosa sp., *Pa. (1883).

Diplocarpon rosae Wolf, black spot. Massey, L. M. Phytopath. 8: 20-23. 1918. Wolf, F. A. Bot. Gaz. 54: 231. 1912.
Rosa spp.
Reports of its occurrence have been received from all states except Ariz., Nev., Wyo. First report of its occurrence was in 1878 from California.

Diplodia rosae B. & C. Sacc. Syll. Fung. 3: 338.
Rosa sp., R. californica, Calif., *S. Car. (about 1870).

D. sp.
Rosa sp., R. sericea, R. setigera, Fla. (1923), *Va. (1926).

Discosia artocreas (Tode) Fr., blossom blight, stem canker. Sacc. Syll. Fung. 3: 653.
Rosa spp., *La. (1924), *Miss. (1927), *Mo. (1926).

Dothidea rosae S. - see Phyllachora rosae (Schw.) Sacc.

Dothiorella sp., blossom blight.
Rosa sp., R. setigera, and variety La Guirlande.
*La. (1924), *Va. (1926).

Earlea speciosa (Fr.) Arth., - see Phragmidium speciosum Fr.

Fusarium roseum Link, Sacc. Syll. Fung. 4: 699.
Rosa sp., S. C. (1906).

Fusarium sp.
Rosa sp., *Conn.(1927), *Ala. (1917), *Miss. (1927).

Fusicoccum sp.
Rosa sp., Va. (1925).

Gloeosporium rosae Hals., twig blight. Halsted, B. D. New Jersey Agr. Exp. Sta. Rept. 1892: 280, 1893: 401, 1894: 383.
Rosa spp., Miss. (1916), N. J. (1892), Ohio (1913), Okla. (1915), *Pa. (1914), S. C. (1922), Texas (1915).

Gloeosporium sp.
Rosa spp., and varieties La Guirlande, W. E. Lippincott, Marguerite Dickson, Prince D'Areberg, Radiance, White Killarney.
*D. C., *Ind. (1927), *La. (1924), *Md. (1909), *Pa. (1915), Va. (1914), W. Va. (1914).

Glomerella cincta (B. & C.) S. & S. Schrenk, H. von, and P. Spaulding. U. S. B.P.I. Bull. 44: 29. 1903.
Rosa sp., N. J. (1918).

Gymnoconia rosae gymnocarpae Arth., rust. Arthur, J. C. Bot. Gaz. 58: 508. 1917.
Rosa gymnocarpa, Calif. (1912).

Hainesia lythri (Desm.) v. Hohn. - see Pezizella lythri (Desm.) Shear & Dodge.

Hendersonia hypocarpa Fairman. Fairman, C. E. Mycol. 5: 246. 1913.
Rosa sp. var. Persian Yellow, N. Y. (1910).

Heterodera radicicola (Greef) Muell. - see Caconema radicicola (Greef) Cobb.

Kabatiella sp. - see Polyspora sp.

Kunkelia rosae gymnocarpae (Diet.) Arth. - see Gymnoconia rosae-gymnocarpae Arth.

Leptosphaeria coniothyrium (Fckl.) Sacc., cane blight. Sacc. Syll. Fung. 2: 29.
Rosa spp., R. alba rubrifolia, R. rugosa x Victor Hugo, and varieties Golden Emblem, Premier.
Ark. (1926), Calif. (1926), Colo. (1922), *D. C. (1903), *Ind. (1921), Kans. (1925), *Md. (1925), *Mass. (1926), Mich. (1917), Miss. (1923), *N. J. (1914), N. Y. (1926), N. C. (1915), Ohio (1911), *Pa. (1913), S. C. (1903), * Texas (1909), *Va. (1906), W. Va. (1914).

Leptothyrium rosarum Cke. - see Pezizella lythri (Desm.) Shear & Dodge.

Lophiostoma auctum Ells. & Ev. Ellis & Everhart. N. Am. Pyreno. p. 233.
Rosa sp., N. Y. (about 1890)

Macrophoma sp.
Rosa sp., and variety Sunburst, *La., *Va. (1921).

Macrosporium chevianthi (Lib.) Fr. - see Alternaria sp.

M. sp.
Rosa sp., *Okla. (1921), *Pa. (1924).

Marsonia rosae Trail - see Diplocarpon rosae Wolf.

M. rosae Br. & Cav. - " " " "

Mollisia cinerea (Batsch.) Karst. Sacc. Syll. Fung. 8: 336.
Rosa sp., *N. Y.

Mycosphaerella rosigena Ell. & Ev. - see Sphaerella rosigena Ell. & Ev.

Myxosporium rosae Fckl., as found in Pa. and W. Va. - see Diaporthe umbrina Jenkins.

Olpitrichum macrosporium (Farl.) Sumstine. Sumstine, D. R. Mycol. 3: 55. 1911.
Rosa gentiliana, *Md. (1923).

Ozonium omnivorum Shear, root rot. Shear, C. L. Bull. Torr. Bot. Club 34: 305-317. 1907.
Rosa sp., *Texas (1915), Ariz. (1927).

Peristomium sp., in process of publication.
Rosa sp., Pa. (coll. 1916; det. 1928).

Peronospora sparsa Berk., downy mildew. Sacc. Syll. Fung. 7: 263.
Rosa sp., R. californica, and variety Golden Emblem.
Calif., *N. Y. (1892), *Ohio (1905), *Pa.

Pestalozzia bullata B. & Br.
Rosa sp., S. C.

P. compacta Sacc. Sacc. Syll. Fung. 3: 798.
Rosa sp., Fla. (1922).

P. discosioides Ell. & Ev. Ellis, J. B. and B. M. Everhart. Jour. Myc. 4: 51. 1888.
Rosa sp., *Del. (1888), *Mich. (1915).

P. foliorum Ell. & Ev. Ellis, J. B. and B. M. Everhart. Fungi Columbiani No. 1552.
Rosa sp., *Ala. (1900).

P. guepini Desm. Sacc. Syll. Fung. 3: 794.
Rosa variety Devoniensis, *La. (about 1900).

P. rosae Westd. Sacc. Syll. Fung. 3: 786. Schwarze, C. A. New Jersey Agr. Exp. Sta. Bull. 313: 114. 1917.
Rosa sp., and variety Sunburst, N. J. (1918), *Va. (1927).

P. suffocata Ell. & Ev. Sacc. Syll. Fung. 10: 485.
Rosa sp., Pa. (1886).

Pestalozzia sp.
Rosa sp., R. odorata, Ind. (1924), Md. (1924), *Miss. (1927).

Pezicula rosae Sacc. Brenckle, J. F. Mycol. 9: 276-293. 1917.
Rosa sp., N. D. (1914).

Pezizella lythri (Desm.) Shear & Dodge. Shear, C. L. and B. O. Dodge. Mycol. 13: 165. 1921.
Rosa sp., R. gentiliana, *Md. (coll. 1927, det. 1928), *Mo. (coll. 1926, det. 1928), *N. J. (coll. 1917, det. 1928), S. C. (about 1870).
R. rugosa, R. setipoda, *Va.

Phoma rhodocarpa Sacc., bark blight. Saccardo, P. A. Ann. Mycol. 9: 251. 1911.
Rosa var. Persian Yellow, N. Y. (1911).

P. sepincola (Michx.) Sacc. Sacc. Syll. Fung. 3: 77.
Rosa suffulta, *Nebr. (1911).

P. sp. disease of thorns and bark.
Rosa spp., *D. C. (1926), *Ind. (1928), *Md. (1909), Pa. (1924).

Phomatospora rosa Rehm. Rehm, H. Ann. Myc. 11: 397. 1913.
Rosa sp., *N. D. (1913).

Phomopsis sp., canker.
Rosa spp., Teas, Hybrid Teas and Hybrid Perpetuals.
*Ark. (1928), *Calif. (1926), *D. C. (1926),
*Ga. (1925), *Ind. (1928), *Ky. (1924), *Md. (1925), *Mo. (1926), *N. Y. (1926), *Pa., *Va. (1925), *W. Va. (1928).

Phragmidium americanum Diet., rust. Arthur, J. C. N. Am. Flora 7, 3: 167. 1912.
Rosa spp., R. acicularis bourgeanania, R. arkansana, R. blanda, R. humilis, R. lucida, R. virginiana.
Colo. (1877), Del. (1912), D. C. (1912), Ind. (1912), *Iowa (1885), Ky. (1912), Me. (1889), Mass. (1912), *Nebr. (1908), N. J. (1912), N. Y. (1912), *N. D. (1908), R. I., Vt. (1912), *W. Va. (1910), *Wis. (1911).

Phragmidium disciflorum (Tode) James, rust. Arthur, J. C. N. Am. Flora 7, 3: 171. 1912.
Rosa spp., R. acicularis, R. alba, R. blanda, R. damascena, R. eglanteria, R. gallica, R. laxa.
*Calif. (1889), *Colo. (1880's), Conn. (1912), Del. (1912), *Ill. (1881), *Ind. (1915), *Iowa (1889), *Kans. (1891), Me. (1918), *Md. (1923), *Mass., Mich. (1912), *Nebr. (1911), *N. Y. (1923), *Pa. (1883), *Texas (1909), Vt. (1912), *Va. (1919), W. Va. (1912), Wis. (1914).

P. montivagum Arth., rust. Arthur, J. C. N. Am. Flora 7, 3: 169. 1912.
Rosa spp., R. acicularis bourgeaniana, R. acicularis engelmanni, R. aciculata, R. aciculata crockerell, R. bakeri, R. douglasii, R. engelmanni, R. fendleri, R. grosse-serrata, R. gymnocarpa, R. gymnocarpa pubescens, R. macounii, R. manca, R. maximiliani, R. neomexicana, R. nutkana, R. puberulenta, R. underwoodii, R. woodsi, R. woodsi fendleri.
*Ariz. (1917), Calif. (1912), *Colo. (1908), *Idaho (1917), *Mont. (1888), Nev., N. Mex., *N. D. (1917), Oreg., *S. D. (1912), *Utah (1909), Wash., *Wyo, (1911).

P. mucronatum (Pers.) Link. - see P. disciflorum (Tode) James.

P. mucronatum americanum Pk. - see P. americanum Diet.

P. occidentale Arth., rust. Arthur, J. C. N. Am. Flora 7, 3: 166. 1912.
Rosa acicularis engelmanni, *Colo. (1909).

Phragmidium rosae-acicularis Liro, rust. Arthur, J. C. N. Am. Flora 7, 3: 168. 1912.
Rosa spp., R. acicularis, R. acicularis bourgeaniana, R. acicularis engelmanni, R. engelmanni, R. hemisphaerica, R. heliophila, R. macdougali, R. nutkana, R. nutkana macdougali, R. pisocarpa, R. rugosa, R. suffulta.
*Colo. (1925), Idaho (1912), *Mich. (1889), Minn. (1912), *Mont. (1912), *N. D. (1912), *Wis. (1924).

P. rosae arkansanae Diet., rust. Arthur, J. C. N. Am. Flora 7, 3: 170. 1912.
Rosa spp., R. acicularis bourgeaniana, R. acicularis engelmanii, R. blanda, R. engelmanni, R. fendleri, R. heliophila, R. lucida, R. maximiliani, R. pratincola, R. subnuda, R. suffulta, R. woodsi.
*Calif., *Colo. (1889), Del., *Ill. (1889), Iowa (1912), *Kans. (1893), Miss., *Mo. (1917), *Nebr. (1909), N. H., N. Y., *N. D. (1911), S. D. (1917), Wis., *Wyo. (1912).

P. rosae-californicae Diet., rust. Arthur, J. C. N. Am. Flora 7, 3: 170. 1912.

Rosa spp., R. californica, R. chrysocarpa, R. gymnocarpa, R. gymnocarpa pubescens, R. nutkana, R. pilifera, R. pisocarpa. *Calif. (1892), D. C., *Oreg. (1914), *Wash. (1901).

P. rosae-pimpinellifoliae Diet. - see P. subcorticinum.

P. rosae-setigerae Diet., rust. Arthur, J. C. N. Am. Flora 7, 3: 167. 1912.
Rosa spp., R. carolina, R. humilis, R. palustris, R. rubiginosa, R. setigera.
Conn., D. C. (1889), Ill. (1912), *Ind. (1916), *Kans. (1892), Md. (1912), Miss. (1912), *Mo. (1917), *Mont., *Nebr. (1912), N. H. (1912), *N. Y. (1904), Ohio, *Wis. (1906).

Phragmidium speciosum Cke., rust. Sacc. Syll. Fung. 7: 744.
Rosa spp., R. acicularis bourgeaniana, R. arkansana, R. blanda, R. carolina, R. foliosa, R. heliophylla, R. humilis, R. lucida, R. macounii, R. maximiliani, R. nitida, R. palustris, R. parviflora, R. pecosensis, R. pisocarpa, R. rubiginosa, R. rugosa, R. setigera, R. suffulta, R. woodsi, R. woodsi fendleri.
*Ark., *Calif. (1898), *Colo. (1906), Conn., Del., *Idaho (1894), Ill., *Ind. (1890), *Iowa (1883), *Kans. (1883), *La. (1901), *Md. (1924), Mass., Minn., *Miss. (1892), *Mo. (1884), *Mont. (1917), *Nebr. (1889), N. J., *N. Mex. (1903), *N. Y. (1892), N. D. (1909), *Ohio, Pa., *S. D. (1894), *Texas (1907), *Vt. (1894), *Va. (1922), *Wash. (1894), *W. Va. (1889), *Wis. (1881), *Wyo. (1917).

P. subcorticinum (Schrank) Wint., rust. Arthur, J. C. N. Am. Flora 7, 3: 172. 1912.
Rosa spp., R. acicularis bourgeaniana, R. alba, R. arkansana, R. blanda, R. californica, R. eglanteria, R. hemisphaerica, R. humilis, R. lucida, R. multifida, R. nutkana, R. pisocarpa, R. rubiginosa, R. spinosissima, R. virginiana.
Ala. (1897), *Calif. (1889), *Colo. (1887), Conn., *Idaho (1892), *Ill. (1881), *Ind. (1890), *Iowa (1888), *Kans. (1888), *Ky. (1882), *La. (1901), *Me. (1903), *Md. (1891), *Mass. (1883), *Mich. (1902), *Minn. (1891), Miss., *Mo. (1886), *Mont. (1884), *Nebr. (1905), *Nev. (1891), N. H., *N. J. (1880), *N. Y. (1889), *N. C. (1922), *N. D. (1884), *Ohio (1880), *Oreg. (1885), *Pa. (1923), R. I., *S. D. (1896), *Texas (1900), *Vt. (1922), *Va. (1896), *Wash. (1891), W. Va. (1910), *Wis. (1887).

Phyllachora rosae (Schw.) Sacc. Sacc. Syll. Fung. 2: 611.
Rosa sp., Calif., R. humilis, Miss. (1895).

Phyllactinia corylea (Pers.) Karst. Salmon, Mon. Erysiphaceae pg. 224.
Rosa spp., R. gymnocarpa, R. pisocarpa, Wash. (1901).

Phyllosticta rosae Desm., leaf spot. Stevens. Fungi which cause plant disease, pg. 487.
Rosa spp., R. acicularis engelmanni, R. setigera.
*Colo. (1909), Del. (1923), *Ill. (1919), Ind. (1894), *N. Y. (1916), *Iowa (1926).

P. rosicola Mass., leaf spot. Sacc. Syll. Fung. 16: 830.
Rosa spp., N. J. (1913).
P. sp., leaf spot.
Rosa sp., *Miss. (1926), W. Va. (1918).

Physalospora cydoniae Am. Auct. - see P. malorum (Pk.) Shear

P. malorum (Pk.) Shear, canker. Shear, C. L. and others. Jour. Agr. Res. 28 (6): 596. 1924.
Rosa spp., R. macrantha x R. moyesii, R. setigera, R. sericea,
*Kans. (1925), *Md. (1926), Texas (1924), *Va. (1926), *W. Va. (1926).

P. rhodina (Berk. & Curt.) Cke. Stevens, N. E. Mycol. 18: 212. 1926.
Rosa rubiginosa, N. C. (1926).

Pleosphaerulina corticola f. rosae (Fckl.) Rehm. Brenckle, J. F. Mycol. 9: 276-293. 1917.
Rosa spp., R. woodsi, N. D. (1913).

Pleospora aculeorum Berl. Sacc. Syll. Fung. 9: 885.
Rosa sp., Wash. (1915).

Polyspora sp., blight.
Rosa spp., R. hugonis, R. saturata, R. sericea, R. spinosissima, R. var. soulieana hyb., R. woodsi and variety Rambler.
*D. C. (1926), *Ind. (1927), *Md. (1924), *Miss. (1927), *N. C. (1924), *N. J. (1927), *N. Y. (1926), *Pa. (1926), *Va. (1924), *W. Va. (1928).

Ramularia macrospora Fres., root and crown blight. Sacc. Syll. Fung. 4: 211.
Rosa var. Sunburst, *D. C. (1923).

Ramularia sp., leaf spot.
Rosa sp., Nebr. (1906).

Rhizoctonia sp.
Rosa sp., Texas (1918).

Robillardia sp., in process of publication.
Rosa gentiliana, Md. (1927).

Rosellinia rosarum Niessl. Sacc. Syll. Fung. 1: 266.
Rosa sp., N. Mex. (1916).

Sclerotinia sp., blight.
Rosa sp., Miss. (1924).

Sclerotiopsis concava (Desm.) Shear & Dodge - see Pezizella lythri (Desm.) Shear & Dodge.

Septoria rosae Desm., leaf spot. Sacc. Syll. Fung. 3: 485.
Rosa sp., S. C. (1923), Miss. (1923).

Sphaerella rosigena Ell. & Ev. Sacc. Syll. Fung. 9: 643.
Rosa sp., *La. (1887), N. J. (1918).

S. spinicola Ell. & Ev. Proc. Acad. Sci. Phila., 1890: 231. 1891.
Rosa sp., *Pa. (1890).

Sphaeronemella rosae Ell. & Ev. Sacc. Syll. Fung. 10: 407.
Rosa spp., R. coreana, R. hugonis, R. hugonis x lucida, R. humilis, R. macrophylla, R. mycrus, R. pisifera, R. woodsi.
*Md. (1923), *N. J. (1889), *Va. (1933).

Sphaeropsis malorum Pk. - see Physalospora malorum (Pk.) Shear.

S. rhodocarpa Fairman, cane blight. Fairman, C. E. Mycol. 5: 246. 1913.
Rosa lutea, N. Y. (1911).

S. rosarum Cke. & Ell., cane blight. Sacc. Syll. Fung. 3: 294.
Rosa sp., *Va. (1915), *W. Va. (1907).

S. sp., cane blight.
Rosa hugonis, *Va.

Sphaerotheca humuli (DC.) Burr., powdery mildew. Salmon, Mon. Erysiphaceae, pg. 45.
Rosa spp., Calif. (1923), Conn. (1902), Mich., Nebr. (1919), Ohio (1909), Texas (1909), Va. (1926), Wash. (1924), Wis. (1914).

S. mors-uvae (Schwein.) Berk. & Curt., powdery mildew. Salmon, Mon. Erysiphaceae, pg. 70.
Rosa spp., R. sp. var. Crimson Rambler, Mich., *Oreg. (1926).

S. pannosa (Wallr.) Lev., powdery mildew. Salmon, Mon. Erysiphaceae, p. 65.
Rosa acicularis, R. arcadia, R. arvensis, R. blanda, R. carelica, R. centifolia, R. cordata, R. damascena, R. davidi, R. deseglisci, R. dupontii, R. gallica, R. glauca, R. laevigata, R. ligustifolia, R. montnaga, R. lucida, R. nigrosa, R. palustris, R. paulii, R. pendulina, R. rugosa, R. sargentii, R. spinossissima and varieties Babette, Beauty of the Prairies, Bride, Bridesmaid, Columbia, Crimson Rambler, Dorothy Perkins, Hebe, Mme. Abel Chatenay, Maman Cochet,

Paul Neyron, Reine Marie Henriette, Radiance, Trubador, Ulrich Brunner.
Ala. (1890), Ariz. (1919), Ark. (1914), Calif. (1903), Colo. (1906), Conn. (1903), Del. (1908), D. C. (1906), Fla. (1907), Ga. (1902), Idaho (1915), Ill. (1881), Ind. (1915), Iowa (1906), Kans. (1914), Ky. (1902), La. (1907), Me. (1906), Md. (1907), Mass. (1907), Mich. (1903), Minn. (1908), Miss. (1902), *Mo. (1887), Nebr. (1905), Nev. (1915), N. H. (1921), *N. J. (1912), N. Mex. (1927), *N. Y. (1911), N. C. (1902), N. D. (1914), Ohio (1907); Okla. (1915), Oreg. (1909), Pa. (1910), S. C. (1905), Tenn. (1910), Texas (1890), Utah (1912), Va. (1926), Wash. (1900), W. Va. (1906), Wis. (1927).

Sphaeropsis sp., powdery mildew.
Rosa spp., N. Mex. (1924), Vt. (1924).

Sphaerulina corticola (Fckl.) Rehm. Brenckle, J. F. Mycol. 9: 276-293. 1917.
Rosa sp., N. D. (1914).

Stereum rameale Schw. Ann. Missouri Bot. Gard. 7: 169. 1920.
Rosa sp., *N. Y. (1922).

Uromyces rosicola Ell. & Ev., rust. Ellis, J. B. and B. M. Everhart. Am. Nat. 31: 427. 1897.
Rosa sp., R. acicularis engelmanni, *Mont., *Nebr. (1897).

Valsa ambiens (Pers.) Fr. Sacc. Syll. Fung. 1: 131.
Rosa sp., *N. D.

Valsa ambiens f. rosae Rehm. Brenckle, J. F. Mycol. 9: 276-293. 1917.
Rosa suffulta, N. D. (1913).

Valseutypella tristicha (DeNot.) v. Hoehn. von Hoehn, F. Ann. Myc. 16: 224.
Rosa sp., R. blanda, R. subnuda, Calif., *N. D. (1913).

Chlorosis, undet.
Rosa spp., Nebr., Texas.

Fasciation
Rosa sp., Conn. (1910).

Mosaic, undet.
Rosa spp., Conn., (1923) Md., (1909) N. J., (1928), Texas (1922).

Oedema
Rosa sp., *D. C.

Yellows, undet.
Rosa sp., Ind.

THE PLANT DISEASE REPORTER

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THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

SUPPLEMENT 64

Crop Losses from Plant Diseases in the United States in 1927

December 31, 1928

BUREAU OF
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

CROP LOSSES FROM PLANT DISEASES IN THE UNITED STATES IN 1927

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CONTENTS

INTRODUCTORY STATEMENT

For several years the Plant Disease Survey has prepared estimates of losses from plant diseases of some of the major crops. The following tables make up the eleventh annual compilation based principally on estimates of collaborators who are for the most part the plant pathologists at the Agricultural Experiment Stations and colleges.

The methods of calculation are the same as followed in other years.

Certain symbols have been used frequently in the tables. A dash (-) indicates no data available. A trace (t) in the percentage column indicates that the loss is less than one per cent and in most cases less than 0.1 per cent. A plus sign (+) is used where the percentage reduction in yield is a trace or where the production is too small to calculate the loss.

WHEAT

Estimated reduction in yield of wheat due to scab (*Gibberella saubinetii*), leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*), and bunt (*Tilletia laevis* and *T. tritici*), 1927.

State	Production 1927 Bushels (000 omitted)	Scab %	Scab Bushels (000 omitted)	Leaf rust %	Leaf rust Bushels (000 omitted)	Stem rust %	Stem rust Bushels (000 omitted)	Bunt %	Bunt Bushels (000 omitted)
Me.	72	-	-	-	-	-	-	-	-
Vt.	20	-	-	-	-	-	-	-	-
Conn.		-	-	-	-	-	-	-	-
N. Y.	6,291	-	-	1.	64	t	+	-	-
N. J.	1,380	-	-	-	-	t	+	-	-
Pa.	20,301	0.5	129	6.	1,544	0.5	129	7.	1,801
Del.	1,862	0.5	10	t	+	-	-	3.5	68
Md.	9,188	1.	106	0.5	53	1.	106	6.	634
Va.	8,381	t	+	1.5	135	0.1	9	3.	271
W. Va.	1,796	t	+	1.	20	1.	20	t	+
N. C.	5,168	t	+	3.	174	t	+	5.	290
S. C.	680	-	-	2.	18	-	-	-	-
Ga.	1,150	-	-	-	-	-	-	-	-
Ohio	29,068	-	-	0.5	152	t	+	2.	609
Ind.	27,749	2.	708	13.	4,601	t	+	3.	1,062
Ill.	34,644	4.9	1,976	2.5	1,008	0.8	323	3.9	1,573
Mich.	19,270	t	+	1.	211	1.	211	5.	1,053
Wis.	3,142	t	+	t	+	1.5	49	0.5	16
Minn.	21,397	t	+	3.	988	30.	9,875	t	+
Iowa	8,711	0	0	15.	1,548	0.6	62	t	+
Mo.	15,700	4.	661	t	+	t	+	t	+
N. D.	124,970	1.	1,562	2.	3,124	10.	15,621	2.5	3,905
S. D.	46,193	t	+	3.	1,650	10.	5,499	2.	1,100
Nebr.	73,826	-	-	2.	1,572	0.1	79	3.	2,359
Kans.	111,327	-	-	8.	10,214	0.5	638	3.3	4,213
Ky.	3,059	0.5	2	-	-	t	+	-	-
Tenn.	3,696	t	+	20.	986	t	+	2.0	98
Ala.	74	-	-	-	-	-	=	-	-
Miss.	102	-	-	-	-	-	-	-	-
Texas	17,945	-	-	3.	564	0.5	94	-	-
Okla.	33,372	-	-	-	-	-	-	-	-
Ark.	322	-	-	-	-	-	-	-	-
Mont.	79,702	0	0	t	+	0.1	88	5.	4,384
Wyo.	4,412	0	0	-	-	t	+	-	-
Colo.	21,997	0	0	t	+	t	+	5.	1,170
N. Mex.	570	0	0	t	+	t	+	-	-
Ariz.	1,450	0	0	-	-	14.	249	4.	71
Utah	5,678	0	0	t	+	t	+	-	-
Nev.	484	0	0	-	-	-	-	-	-
Idaho	32,374	0	0	t	+	t	+	6.	2,135
Wash.	53,344	0	0	t	+	t	+	2.	1,100
Oregon	26,782	0	0	t	+	t	+	3.5	976
Calif.	13,642	0	0	-	-	-	-	-	-
U. S.	871,691	0.5	5,154	2.9	28,626	3.3	33,052	2.9	28,888

WHEAT (continued)

Estimated reduction in yield of wheat due to loose smut (*Ustilago tritici*), black chaff (*Bacterium translucens undulosum*) and other diseases. 1927.

	Estimated reduction in yield due to disease									
ate	Loose smut		Black chaff		Other diseases		Sum of traces and no data		All diseases	
	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)
.	t	+	0	0	-	-	-	-	-	-
.	-	-	0	0	-	-	-	-	-	-
nn.	1	+	0	0	0.5	+	-	-	1.5	+
Y.	1	64	0	0	-	-	-	-	2.	128
J.	-	-	0	0	-	-	-	-	-	-
.	1.5	386	0	0	5.6	1,441	0	0	21.1	5,430
l.	t	+	0	0	0.5	10	-	-	4.5	88
.	0.5	53	0	0	4.0	422	0	0	13.	1,374
.	2.5	226	0	0	0	0	t	+	7.1	641
Va.	6.	118	0	0	t	+	1.	20	9.	178
C.	1.	58	0	0	2.	116	-	-	11.	638
C.	-	-	0	0	1.	9	-	-	3.	27
.	-	-	0	0	-	-	-	-	-	-
io	1.	304	-	-	1.	304	-	-	4.5	1,369
d.	2.	708	-	-	1.6	566	-	-	21.6	7,645
l.	0.8	323	-	-	0.7	282	-	-	13.6	5,485
ch.	1.5	316	-	-	t	+	-	-	8.5	1,791
s.	t	+	t	+	1.0	32	-	-	3.0	97
nn.	1.0	329	t	+	1.0	329	t	+	35.0	11,521
wa	t	+	0	0	t	+	t	+	15.6	1,610
.	1.	165	0	0	t	+	t	+	5.	826
D.	2.	3,124	0.5	781	2.0	3,124	0	0	20.	31,241
D.	1.	550	t	+	-	-	-	-	16.0	8,799
br.	-	-	-	-	1.	786	-	-	6.1	4,796
ns.	t	+	-	-	1.0	1,277	-	-	12.8	16,342
.	-	-	-	-	-	-	-	-	0.5	2
nn.	0.5	25	t	+	2.	98	0.5	25	25.	1,232
a.	-	-	-	-	-	-	-	-	-	-
ss.	-	-	-	-	-	-	-	-	t	+
xas	1.	188	-	-	-	-	-	-	4.5	846
la.	-	-	-	-	-	-	-	-	-	-
k.	-	-	-	-	-	-	-	-	-	-
nt.	-	-	1.	877	3.	2,630	-	-	9.1	7,979
o.	t	+	-	-	-	-	-	-	-	-
lo.	t	+	-	-	-	-	1.	234	6.	1,404
Mex.	-	-	-	-	-	-	-	-	-	-
iz.	0.5	9	0	0	t	+	0.1	2	18.6	331
ah	1.	57	-	-	-	-	-	-	1.	57
v.	-	-	-	-	-	-	-	-	-	-
a.	1.	356	t	+	2.	712	-	-	9.	3,203
sh.	t	+	-	-	t	+	1.	550	3.	1,650
egon	t	+	0	0	0.5	139	-	-	4.	1,115
lif.	-	-	0	0	-	-	-	-	-	+
S.	0.8	7,359	0.2	1,658	1.2	12,277	0.1	831	11.9	117,845

RYE

Estimated reduction in yield of rye due to smut (*Urocystis occulta*), ergot (*Claviceps purpurea*), leaf rust (*Puccinia dispersa*), stem rust (*Puccinia graminis*), and other diseases, 1927

State	Production Bushels (000 omitted)	Smut %	Smut Bushels (000 omitted)	Ergot %	Ergot Bushels (000 omitted)	Leaf rust %	Leaf rust Bushels (000 omitted)	Stem rust %	Stem rust Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	Sum of traces and no data %	Sum of traces and no data Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Conn.		-	-	-	-	.5	+	-	-	-	-	-	-	.5	+
N. Y.	368	-	-	-	-	t	+	-	-	-	-	-	-	-	-
N. J.	720	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	1,326	.5	7	t	+	1.	14	t	+	3.6	50	t	+	5.1	71
Del.	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md.	214	-	-	-	-	1.	2	t	+	t	+	-	-	1.	2
Va.	496	-	-	t	+	t	+	-	-	-	-	-	-	-	-
W. Va.	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N. C.	1,128	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. C.	117	-	-	-	-	1.5	2	-	-	1.5	2	-	-	3.	4
Ga.	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ohio	560	-	-	0.5	3	0.5	3	1.0	6	0.1	1	-	-	2.1	13
Ind.	1,610	-	-	0.1	2	5.	85	-	-	-	-	-	-	5.1	87
Ill.	899	-	-	0.03	+	.02	+	0	0	t	+	-	-	0.05	+
Mich.	2,617	-	-	t	+	1.	26	t	+	-	-	-	-	1.	26
Wis.	4,046	t	+	1.5	62	t	+	t	+	0.5	21	-	-	2.	83
Minn.	7,485	t	+	t	+	0	0	0	0	t	+	t	+	t	+
Iowa	542	t	+	0.5	3	0	0	0	0	t	+	-	-	0.5	3
Mo.	264	0	0	0	0	0	0	t	+	t	+	-	-	t	+

State	Production 1926	Estimated reduction in yield due to diseases													
		Smut		Ergot		Leaf rust		Stem rust		Other diseases		Sum of traces and no data		All diseases	
	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)
N. D.	23,063	0	0	1.5	353	0	0	t	+	0.5	118	-	-	2.	471
S. D.	2,772	-	-	t	+	-	-	t	+	-	-	1.	28	1.	28
Nebr.	4,110	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	576	0	0	0	0	1.	6	-	-	-	-	-	-	1.	6
Ky.	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	208	-	-	-	-	t	+	-	-	2.	4	0.5	1	2.5	5
Miss.		t	+	-	-	t	+	-	-	1.	+	-	-	1.	+
Texas	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Okla.	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mont.	2,412	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	638	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colo.	892	-	-	-	-	t	-	0	0	-	-	-	-	-	-
N. Mex.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utah	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	48	-	-	-	-	-	-	t	+	-	-	-	-	t	+
Wash.	552	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	58,572	t	7	0.7	423	0.2	138	t	6	0.3	196	0.05	29	1.3	799

BARLEY

Estimated reduction in yield of barley due to stripe (Helminthosporium gramineum), loose smut (Ustilago nuda) and covered smut (Ustilago hordei), 1927.

State	Production: 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease: Stripe %	Stripe Bushels (000 omitted)	Loose smut %	Loose smut Bushels (000 omitted)	Covered smut %	Covered smut Bushels (000 omitted)
Me.	108	-	-	-	-	-	-
Vt.	174	-	-	-	-	-	-
Conn.		+	-	.5	+	.5	+
N. Y.	5,452	.75	42	2.	113	1.	57
N. J.	74	-	-	-	-	-	-
Pa.	588	1.	6	3.3	21	1.2	8
Md.	274	t	+	4.0	11	1.	3
Va.	338	t	+	0.5	2	2.5	9
N. C.	480	1.	.5	-	-	-	-
S. C.		1.	+	1.	+	-	-
Ohio	4,185	-	-	.5	22	.5	22
Ind.	666	-	-	-	-	-	-
Ill.	13,364	2.7	387	3.4	487	-	-
Mich.	5,301	t	+	1.	55	2.	110
Wis.	21,390	2.	443	t	+	0.5	111
Minn.	45,090	.75	352	1.5	705	.75	352
Iowa	14,318	2.	301	t	+	1.0	151
Mo.	161	-	-	-	-	-	-
N. D.	42,406	1.	449	1.	449	1.	449
S. D.	32,670	1.	339	1.	339	t	+
Nebr.	7,577	t	+	t	+	0.5	38
Kans.	5,695	t	+	1.	59	1.5	88
Ky.	162	-	-	-	-	-	-
Tenn.	798	3.	26	2.	18	3.	26
Texas	3,120	-	-	2.	64	1.	32
Okla.	1,304	-	-	-	-	-	-
Mont.	6,435	0	0	3.	210	4.	280
Wyo.	2,124	-	-	-	-	-	-
Colo.	10,032	3.	331	t	+	6.	661
N. Mex.	144	-	-	-	-	-	-
Ariz.	700	t	+	0.5	4	1.5	11
Utah	1,410	4.8	72	-	-	1.	15
Nev.	405	-	-	-	-	-	-
Ida.	5,676	t	+	t	+	1.	58
Wash.	2,436	t	+	-	-	0.5	12
Oregon	3,185	t	+	t	+	0.5	16
Calif.	27,335	-	-	-	-	-	-
U. S.	265,577	1.	2,753	0.9	2,559	0.9	2,509

BARLEY (continued)

Estimated reduction in yield of barley due to leaf rust (Puccinia simplex,) stem rust (Puccinia graminis), and other diseases, 1927.

State	Estimated reduction in yield due to disease									
	Leaf rust		Stem rust		Other diseases		Sum of traces and no data		All diseases	
	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)
Me.	-	-	-	-	-	-	-	-	-	-
Vt.	-	-	-	-	-	-	-	-	-	-
Conn.	-	-	-	-	-	-	-	-	1.	+
N. Y.	-	-	t	+	-	-	-	-	3.75	212
N. J.	-	-	-	-	-	-	-	-	-	-
Pa.	t	+	t	+	1.	6	-	-	6.5	41
Md.	t	+	t	+	t	+	-	-	5.	14
Va.	t	+	0	0	-	-	-	-	3.	11
N. C.	-	-	-	-	-	-	-	-	1.	5
S. C.	-	-	-	-	-	-	-	-	2.	+
Ohio	.5	22	1.0	43	1.1	48	-	-	3.6	157
Ind.	-	-	-	-	-	-	-	-	-	-
Ill.	0.6	86	t	+	t	+	-	-	6.7	960
Mich.	1.	55	-	-	-	-	-	-	4.	220
Wis.	t	+	0.5	111	0.5	111	-	-	3.5	776
Minn.	t	+	t	+	1.0	470	-	-	4.	1,879
Iowa	0	0	t	+	2.0	301	-	-	5.	753
Mo.	-	-	-	-	-	-	-	-	-	-
N. D.	0	0	2.	897	0.5	224	0	0	5.5	2,468
S. D.	t	+	1.5	508	-	-	-	-	3.5	1,186
Nebr.	-	-	-	-	-	-	-	-	0.5	38
Kans.	t	+	t	+	0.5	29	-	-	3.	176
Ky.	-	-	-	-	-	-	-	-	-	-
Tenn.	t	+	-	-	1.	9	-	-	9.	79
Texas	-	-	-	-	-	-	-	-	3.	96
Okla.	-	-	-	-	-	-	-	-	-	-
Mont.	0	0	0	0	1.	70	0	0	8.	560
Wyo.	-	-	-	-	-	-	-	-	-	-
Colo.	-	-	t	+	t	+	-	-	9.	992
N. Mex.	-	-	-	-	-	-	-	-	-	-
Ariz.	0.5	4	t	+	-	-	0.1	1	2.6	20
Utah	-	-	t	+	-	-	-	-	5.8	87
Nev.	-	-	-	-	-	-	-	-	-	-
Ida.	-	-	t	+	1.	58	-	-	2.	116
Wash.	-	-	-	-	t	+	0.5	12	1.	24
Oregon	-	-	-	-	t	+	-	-	0.5	16
Calif.	-	-	t	+	-	-	-	-	-	-
U. S.	t	167	0.6	1,559	0.5	1,326	t	13	3.9	10,886

OATS

Estimated reduction in yield of oats due to loose and covered smuts (Ustilago avenae and U. levis), stem rust (Puccinia graminis), crown rust (Puccinia coronata), and other diseases, 1927.

State	Production 1927 Bushels (000 omitted)	Loose and covered smut %	Loose and covered smut Bushels (000 omitted)	Stem rust %	Stem rust Bushels (000 omitted)	Crown rust %	Crown rust Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Me.	4,773	2.	98	-	-	1.	49	-	-	3.	147
N. H.	429	-	-	-	-	-	-	-	-	-	-
Vt.	3,237	-	-	-	-	-	-	-	-	-	-
Mass.	280	2.	6	-	-	-	-	-	-	2.	6
R. I.	64	-	-	-	-	-	-	-	-	-	-
Conn.	480	1.5	7	-	-	-	-	-	-	1.5	7
N. Y.	35,000	5.	1,852	t	+	0.5	185	-	-	5.5	2,037
N. J.	1,764	1.5	27	-	-	-	-	-	-	1.5	27
Pa.	39,600	9.	4,073	1.	453	1.	453	1.5	679	12.5	5,658
Del.	116	t	+	-	-	-	-	0.5	1	0.5	1
Md.	1,708	5.	90	t	+	t	+	t	+	5.	90
Va.	3,999	3.	124	-	-	0.5	21	-	-	3.5	145
W. Va.	5,421	5.	285	t	+	t	+	-	-	5.	285
N. C.	5,733	20.	1,433	-	-	-	-	-	-	20.	1,433
S. C.	10,327	35.	5,561	-	-	-	-	-	-	35.	5,561
Ga.	9,282	5.	494	-	-	1.	99	-	-	6.	593
Fla.	121	2.5	4	-	-	15.	22	-	-	17.5	26
Ohio	60,800	5.5	3,596	0.5	327	0.5	327	0.5	327	7.	4,577
Ind.	48,700	-	-	-	-	5.	2,563	-	-	5.	2,563
Ill.	102,204	4.8	5,652	t	+	0.8	942	7.6	8,949	13.2	15,543
Mich.	54,170	3.	1,729	2.	1,153	1.	576	-	-	6.	3,458
Wis.	93,247	3.	2,945	0.5	491	1.	982	0.5	491	5.	4,909
Minn.	120,493	4.	7,901	15.	29,629	15.	29,629	5.	9,876	39.	77,035

State	Production: 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease: Loose and covered smut %	Loose and covered smut Bushels (000 omitted)	Stem rust %	Stem rust Bushels (000 omitted)	Crown rust %	Crown rust Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Iowa	197,076	3.	6,483	0.8	1,729	2.	4,322	3.	6,483	8.8	19,017
Mo.	27,710	5.	1,474	t	+	t	+	1.	295	6.	1,769
N. D.	45,688	2.	1,187	10.	5,934	10.	5,934	1.	593	23.	13,648
S. D.	72,664	3.	2,759	12.	11,038	6.	5,519	-	-	21.	19,316
Nebr.	69,813	0.5	354	t	+	1.	709	-	-	1.5	1,063
Kans.	34,380	0.5	193	t	+	5.	1,931	5.5	2,125	11.	4,249
Ky.	4,085	-	-	-	-	-	-	-	-	-	-
Tenn.	3,043	5.	217	-	-	25.	1,087	-	-	30.	1,304
Ala.	1,768	-	-	-	-	-	-	-	-	-	-
Miss.	912	3.	36	-	-	12.	146	10.	122	25.	304
La.	612	t	+	-	-	20.	163	5.	41	25.	204
Texas	42,063	2.	886	-	-	3.	1,328	-	-	5.	2,214
Okla.	21,128	-	-	-	-	-	-	-	-	-	-
Ark.	4,140	-	-	-	-	-	-	-	-	-	-
Mont.	23,840	4.	1,060	0	0	0	0	6.	1,589	10.	2,649
Wyo.	4,560	-	-	t	+	-	-	-	-	-	-
Colo	5,481	5.	288	t	+	0	0	-	-	5.	288
N. Mex.	660	-	-	-	-	-	-	-	-	-	-
Ariz.	1,612	2.	12	t	+	0	0	0	0	2.	12
Utah	2,142	7.6	176	-	-	-	-	-	-	7.6	176
Nev.	80	-	-	-	-	-	-	-	-	-	-
Idaho	6,721	1.5	103	t	+	t	+	1.	69	2.5	172
Wash.	9,150	1.	93	t	+	-	-	-	-	1.5	139
Oregon	10,540	1.5	161	t	+	t	+	-	-	1.5	161
Calif.	4,190	-	-	-	-	-	-	-	-	-	-
U. S.	1,195,006	3.7	51,359	3.7	50,754	4.1	56,987	2.3	31,640	13.8	190,786

Estimated reduction in yield of corn due to smut (*Ustilago zeae*), leaf rust (*Puccinia sorghi*), brown spot (*Physoderma zeae-maydis*) and root-rot (*Gibberella saubinetti*), 1927.

State	Production 1927 Bushels (000 omitted)	Smut %	Smut Bushels (000 omitted)	Leaf rust %	Leaf rust Bushels (000 omitted)	Brown spot %	Brown spot Bushels (000 omitted)	Root-rot %	Root-rot Bushels (000 omitted)
Me.	518	t	+	-	-	0	0	-	-
N. H.	615	-	-	-	-	0	0	-	-
Vt.	3,276	-	-	-	-	0	0	-	-
Mass.	1,886	0.5	9	-	-	0	0	-	-
R. I.	380	-	-	-	-	0	0	-	-
Conn.	2,090	2.	43	-	-	0	0	-	-
N. Y.	22,542	1.	228	-	-	0	0	-	-
N. J.	7,160	1.	72	-	-	0	0	-	-
Pa.	50,165	3.	1,736	t	+	0	0	4.	2,314
Del.	4,725	0.5	24	-	-	0	0	t	+
Md.	22,660	0.5	133	t	+	0	0	10.	2,666
Va.	47,967	2.	1,043	-	-	0	0	3.	1,564
W. Va.	15,109	1.	159	1.	159	0	0	2.	318
N. C.	53,626	2.6	1,509	t	+	t	+	3.	1,741
S. C.	25,449	1.	262	t	+	t	+	-	-
Ga.	54,502	-	-	-	-	-	-	-	-
Fla.	7,449	2.	180	t		5.	449	5.	449
Ohio	109,720	3.	3,483	-	-	0	0	0.5	581
Ind.	132,458	0.2	316	-	-	0	0	3.	4,742
Ill.	254,070	0.2	540	t	+	t	+	-	-
Mich.	38,995	t	+	-	-	0	0	-	-
Wis.	68,250	1.5	1,197	t	+	0	0	-	-
Minn.	127,246	0.7	897	t	+	0	0	-	-
Iowa	399,566	3.	13,393	0	0	0	0	0	0
Mo.	172,637	2.	3,773	t	+	0	0	3.5	6,604
N. D.	23,975	4.	999	0	0	0	0	t	+
S. D.	134,995	t	+	-	-	0	0	2.	2,783
Nebr.	291,446	3.	9,014	-	-	0	0	0	0
Kans.	176,910	4.	8,630	-	-	t	+	8.	17,260
Ky.	75,010	-	-	t	-	0	0	-	-
Tenn.	70,656	1.	768	t	+	t	+	5.	3,840
Ala.	47,456	-	-	-	-	-	-	-	-
Miss.	34,140	-	-	t	+	1.	392	11.	4,317
La.	20,318	t	+	t	+	1.	257	-	-
Texas	119,347	1.	1,206	-	-	-	-	-	-
Okla.	84,190	-	-	-	-	-	-	-	-
Ark.	36,575	t	+	-	-	-	-	-	-
Mont.	7,168	-	-	-	-	0	0	2.	146
Wyo.	3,696	-	-	-	-	0	0	-	-
Colo.	22,816	t	+	-	-	0	0	-	-
N.Mex.	2,490	-	-	-	-	0	0	-	-
Ariz.	1,408	4.	59	0	0	0	0	-	-
Utah	494	-	-	-	-	0	0	-	-
Nev.	50	-	-	-	-	0	0	-	-
Ida.	3,116	t	+	-	-	0	0	t	+
Wash.	1,591	t	+	-	-	0	0	t	+
Oregon	2,916	-	-	-	-	0	0	-	-
Calif.	2,464	-	-	-	-	0	0	-	-
U. S.	2,786,288	1.7	49,673	t	159	t	1,098	1.6	49,325

CORN (continued)

Estimated reduction in yield of corn due to ear rots, (Fusarium sp.) and other diseases. 1926.

State	Ear rots %	Ear rots Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	Sum of traces and no data %	Sum of traces and no data Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Me.	t	+	-	-	-	-	-	-
N. H.	-	-	-	-	-	-	-	-
Vt.	-	-	-	-	-	-	-	-
Mass.	-	-	-	-	-	-	0.5	9
R. I.	-	-	-	-	-	-	-	-
Conn.	-	-	-	-	-	-	2.	43
N. Y.	-	-	-	-	-	-	1.	228
N. J.	-	-	-	-	-	-	1.	72
Pa.	5.3	3,067	1.	579	t	+	13.3	7,696
Del.	1.	48	-	-	-	-	1.5	72
Md.	4.5	1,200	t	+	-	-	15.	3,999
Va.	3.	1,564	-	-	-	-	8.	4,171
W. Va.	1.	159	-	-	-	-	5.	795
N. C.	2.	1,161	-	-	-	-	7.6	4,411
S. C.	-	-	2.	525	-	-	3.	787
Ga.	-	-	-	-	-	-	-	-
Fla.	5.	449	-	-	-	-	17.	1,527
Ohio	1.	1,161	1.	1,161	-	-	5.5	6,386
Ind.	3.	4,742	10.	15,806	-	-	16.2	25,606
Ill.	3.5*	9,450	2.2	5,940	-	-	5.9	15.930
Mich.	-	-	-	-	-	-	-	-
Wis.	3.	2,395	10.	7,983	-	-	14.5	11,575
Minn.	-	-	-	-	-	-	0.7	897
Iowa	7.	31,251	0.5	2,232	0	0	10.5	46,876
Mo.	2.	3,773	1.	1,887	-	-	8.5	16,037
N. D.	t	+	t	+	-	-	4.	999
S. D.	1.	392	0	0	-	-	3.	4,175
Nebr.	t	+	-	-	-	-	3.	9,014
Kans.	6.	12,945	t	+	-	-	18.	38,835
Ky.	-	-	-	-	-	-	-	-
Tenn.	2.	1,536	-	-	-	-	8.	6,144
Ala.	-	-	-	-	-	-	-	-
Miss.	1.	392	t	+	-	-	13.	5,101
La.	10.	2,572	10.	2,572	-	-	21.	5,401
Texas	-	-	-	-	-	-	1.	1,206
Okla.	-	-	-	-	-	-	-	-
Ark.	-	-	t	+	-	-	-	-
Mont.	-	-	-	-	-	-	2.	146
Wyo.	-	-	-	-	-	-	-	-
Colo.	-	-	-	-	-	-	-	-
N. Mex.	-	-	-	-	-	-	-	-
Ariz.	0	0	-	-	-	-	4.	59
Utah	-	-	-	-	-	-	-	-
Nev.	-	-	-	-	-	-	-	-
Idaho	t	+	1.	31	-	-	1.	31
Wash.	t	+	-	-	-	-	-	-
Oregon	-	-	-	-	-	-	-	-
Calif.	-	-	-	-	-	-	-	-
U. S.	2.6	79,257	1.3	38,716	-	-	7.2	218,228

* This includes all the root, stalk and ear rots.

POTATO

Estimated reduction in yield of potato due to mosaic, leaf roll, late blight (*Phytophthora infestans*), rhizoctonia (*Rhizoctonia solani*), blackleg (*Bacillus phytophthorus*), and fusarium wilt (*Fusarium oxysporum*), 1927.

State	Production: 1927 Bushels (000 omitted)	Mosaic %	Mosaic Bushels (000 omitted)	Leaf roll %	Leaf roll Bushels (000 omitted)	Late Blight %	Late Blight Bushels (000 omitted)	Rhizoctonia %	Rhizoctonia Bushels (000 omitted)	Blackleg %	Blackleg Bushels (000 omitted)	Fusarium wilt %	Fusarium wilt Bushels (000 omitted)
Me.	32,092	4.	2,025	1.	506	25.	12,655	2.	1,012	2.	1,012	0.	0
N. H.	1,800	-	-	-	-	-	-	-	-	-	-	-	-
Vt.	3,255	-	-	-	-	-	-	-	-	-	-	-	-
Mass.	1,400	5.	119	5.	119	30.	712	t	+	t	+	-	-
R. I.	220	-	-	-	-	-	-	-	-	-	-	-	-
Conn.	1,635	0.5	9	-	-	3.	52	-	-	t	+	-	-
N. Y.	28,620	3.	1,667	3.5	1,945	20.	11,115	5.	2,779	1.	556	t	+
N. J.	9,177	-	-	-	-	-	-	3.	284	0.1	9	-	-
Pa.	26,400	-	-	-	-	-	-	-	-	-	-	-	-
Del.	714	0.5	4	0.5	4	10.	83	-	-	-	-	-	-
Md.	5,246	5.	330	1.5	99	5.	330	5.	330	0.5	33	1.	66
Va.	19,760	t	+	t	+	1.	215	1.	215	1.	215	3.	644
W. Va.	5,989	-	-	-	-	t	+	t	+	1.	76	-	-
N. C.	7,368	5.	466	2.	187	1.5	140	2.	187	1.5	140	2.	187
S. C.	3,034	t	+	-	-	-	-	2.	64	-	-	-	-
Ga.	1,241	t	+	-	-	1.	13	t	+	0	0	-	-
Fla.	3,045	-	-	-	-	-	-	t	+	t	+	-	-
Ohio	12,180	-	-	-	-	-	-	-	-	t	+	-	-
Ind.	5,035	2.	107	4.	214	t	+	-	-	-	-	-	-
Ill.	5,376	-	-	-	-	-	-	-	-	-	-	-	-
Mich.	23,120	1.	280	1.	280	t	+	1.	280	1.	280	1.	280
Wis.	23,920	1.	261	0	0	0.5	131	2.	523	1.	261	t	+

State	Production: 1927 Bushels (000 omitted)	Mosaic %	Mosaic Bushels (000 omitted)	Leaf roll %	Leaf roll Bushels (000 omitted)	Late blight %	Late blight Bushels (000 omitted)	Rhizoctonia %	Rhizoctonia Bushels (000 omitted)	Blackleg %	Blackleg Bushels (000 omitted)	Fusarium wilt %	Fusarium wilt Bushels (000 omitted)
		Estimated reduction in yield due to disease											
Minn.	33,128	1.	414	t	+	1.	414	5.	2,071	3.	1,242	t	+
Iowa	6,396	t	+	t	+	0	0	6.	529	1.5	132	0.	0
Mo.	7,055	t	+	0	0	0	0	6.	476	t	+	2.	159
N. D.	11,526	1.	127	t	+	0	0	4.	509	2.	255	-	-
S. D.	7,590	-	-	-	-	0	0	-	-	-	+	-	-
Nebr.	8,904	1.	90	0	0	0	0	t	+	0	0	0.5	45
Kans.	5,390	-	-	-	-	0	0	-	-	5.	284	-	-
Ky.	4,732	-	-	25.	3,380	0	0	10.	1,352	0	0	t	+
Tenn.	3,432	7.	271	-	-	-	-	0.1	4	-	-	-	-
Ala.	2,475	-	-	-	-	0	0	-	-	-	-	-	-
Miss.	936	20.	272	5.	68	0	0	0.6	8	-	-	t	+
La.	2,665	-	-	-	-	0	0	-	-	t	+	-	-
Texas	2,310	-	-	-	-	0	0	-	-	-	-	-	-
Okla.	2,925	8.	312	2.	78	0	0	-	-	5.	195	7.	273
Ark.	1,972	-	-	-	+	0	0	-	-	-	-	-	-
Mont.	5,400	15.	1,019	0.5	34	0	0	1.5	102	0.5	34	3.	204
Wyo.	2,414	-	-	-	-	0	0	-	-	-	-	-	-
Colo.	16,046	t	+	-	-	0	0	-	-	t	+	10.	1,910
N. Mex.	150	-	-	-	-	0	0	-	-	-	-	-	-
Ariz.	320	1.	4	5.	21	0	0	10.	43	2.5	11	t	+
Utah	2,970	10.	505	2.	101	0	0	3.	152	0.1	5	1.	51
Nev.	780	-	-	-	-	0	0	-	-	-	-	-	-
Idaho	24,380	8.	2,281	2.	570	0	0	0.5	143	2.	570	t	+
Wash.	13,430	6.	895	1.	149	t	+	1.	149	t	+	t	+
Oregon	6,240	6.	481	2.	160	5.1	409	8.	641	1.	80	t	+
Calif.	7,956	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	402,149	2.4	11,939	1.6	7,915	5.2	26,269	2.4	11,853	1.1	5,390	c.8	3,819

POTATO (continued)

Estimated reduction in yield of potato due to tipburn and hopperburn, early blight (Alternaria solani), and other diseases, 1927.

State	Production 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease: Tipburn and hopperburn %	Tipburn and hopperburn Bushels (000 omitted)	Early blight %	Early blight Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Me.	32,092	1.	506	t	+	t	+	35.	17,716
N. H.	1,800	-	-	-	-	-	-	-	-
Vt.	3,255	-	-	-	-	-	-	-	-
Mass.	1,400	1.	24	t	+	-	-	41.	974
R. I.	220	-	-	-	-	-	-	-	-
Conn.	1,635	-	-	t	+	2.	35	5.5	96
N. Y.	28,620	10.	5,557	0.5	278	5.5	3,057	48.5	26,954
N. J.	9,177	-	-	t	+	-	-	3.1	293
Pa.	26,400	-	-	t	+	-	-	-	-
Del.	714	1.	8	0.5	4	1.	8	13.5	111
Md.	5,246	t	+	0.5	33	2.	132	20.5	1,353
Va.	19,760	1.	215	1.	215	t	+	8.	1,719
W. Va.	5,989	20.	1,516	t	+	-	-	21.	1,592
N. C.	7,368	1.5	140	1.5	140	4.	373	21.	1,960
S. C.	3,034	-	-	3.	96	-	-	5.	160
Ga.	1,241	3.	40	0.5	7	3.	40	7.5	100
Fla.	3,045	-	-	t	+	-	-	-	-
Ohio	12,180	-	-	-	-	-	-	-	-
Ind.	5,035	-	-	t	+	-	-	6.	321
Ill.	5,376	-	-	-	-	-	-	-	-
Mich.	23,120	5.	1,401	0.5	140	7.	1,962	17.5	4,903
Wis.	23,920	4.	1,046	t	+	t	+	8.5	2,222

State	Production 1927 Bushels (000 omitted)	Tipburn and hopperburn %	Tipburn and hopperburn Bushels (000 omitted)	Early blight %	Early blight Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Minn.	33,128	10.	4,141	t	+	t	+	20.	8,282
Iowa	6,396	15.	1,323	t	+	5.	441	27.5	2,425
Mo.	7,055	1.	79	t	+	2.	159	11.	873
N. D.	11,526	2.	255	0.5	64	t	+	9.5	1,210
S. D.	7,590	-	-	-	-	-	-	-	-
Nebr.	8,904	-	-	t	+	-	-	1.5	135
Kans.	5,390	-	-	t	+	-	-	5.	284
Ky.	4,732	30.	4,056	-	-	-	-	65.	8,788
Tenn.	3,432	2.	77	2.	77	0.1	4	11.2	433
Ala.	2,475	-	-	-	-	-	-	-	-
Miss.	936	4.	54	0.5	7	1.0	14	31.1	423
La.	2,665	-	-	-	-	-	-	-	-
Texas	2,310	-	-	-	-	-	-	-	-
Okla.	2,925	-	-	5.	117	-	-	25.	975
Ark.	1,972	-	-	-	-	-	-	-	-
Mont.	5,400	0	0	t	+	-	-	20.5	1,393
Wyo.	2,414	-	-	-	-	-	-	-	-
Colo.	16,046	5.	955	t	+	1.	191	16.	3,056
N. Mex.	150	-	-	-	-	-	-	-	-
Ariz.	320	0	0	1.5	6	5.	21	25.	106
Utah	2,970	-	-	t	+	25.1	1,268	41.2	2,082
Nevada	780	-	-	-	-	-	-	-	-
Idaho	24,380	0	0	t	+	2.	570	14.5	4,134
Wash.	13,430	-	-	t	+	1.	149	10.	1,491
Oregon	6,240	t	+	t	+	t	+	22.1	1,771
Calif.	7,956	-	-	-	-	-	-	-	-
U. S.	402,149	4.3	21,393	0.2	1,184	1.7	8,424	19.7	98,335

SWEET POTATO

Estimated reduction in yield of sweet potato due to stem rot (Fusarium hyperoxysporum and F. batatatis), foot rot (Plenodomus destruens) black rot (Ceratostomella fimbriatum), pox (Actinomyces sp.), other diseases and storage rots, 1927.

State	Production: 1927 Bushels (000 omitted)	Stem rot: %	Stem rot: Bushels (000 omitted)	Foot rot: %	Foot rot: Bushels (000 omitted)	Black rot: %	Black rot: Bushels (000 omitted)	Pox: %	Pox: Bushels (000 omitted)	Other diseases: %	Other diseases: Bushels (000 omitted)	All diseases: %	All diseases: Bushels (000 omitted)	Storage rots: %	Storage rots: Bushels (000 omitted)
N. J.	1,090	14.	307	-	-	-	-	-	-	-	-	14.	307	-	-
Del.	880	3.	28	-	-	1.	9	t	+	1.	9	5.	46	2.	18
Md.	1,584	2.	33	t	+	1.5	25	1.	17	0.5	8	5.	83	20.	316
Va.	5,805	3.	181	t	+	1.	60	t	+	-	-	4.	241	5.	290
W. Va.	330	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N. C.	10,146	10.	1,211	-	-	2.	242	t	+	2.	242	14.	1,695	30.	3,125
S. C.	5,300	t	+	-	-	2.	109	-	-	1.	55	3.	164	10.	530
Ga.	10,560	2.	219	0	0	1.	109	t	+	0.5	55	3.5	333	5.	528
Fla. *	2,668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ohio *	399	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ind.	224	-	-	-	-	3.	7	-	-	-	-	3.	7	-	-
Ill. *	1,030	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa	270	8.	24	0	0	2.	6	0	0	1.	3	11.	33	t	+
Mo.	1,344	2.	27	0	0	t	+	0	0	0	0	2.	27	10.	134
Kans.*	408	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ky.	1,488	-	-	-	-	3.	50	-	-	8.	134	11.	184	15.	223
Tenn.	4,704	10.	682	-	-	20.	1,363	1.	68	t	+	31.	2,113	5.	204
Ala.*	7,550	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miss.	7,728	3.	252	t	+	5.	420	-	-	t	+	8.	672	12.	927
La.*	9,702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas *	11,970	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Okla.	2,438	3.	83	2.	55	2.	55	-	-	5.	139	12.	332	10.	244
Ark.	4,408	3.	142	-	-	2.	95	-	-	2.	95	7.	332	25.	1,102
N. Mex.*	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ariz.	120	0	0	0	0	2.	3	0.	0	7.	9	9.	12	8.	10
Calif.	1,080	5.	57	-	-	-	-	-	-	-	-	5.	57	-	-
U. S.	93,928	4.9	3,246	0.1	55	3.8	2,553	0.1	85	1.1	749	10.	6,688	12.7	7,651

* Added for calculations for U. S. percentage loss.

TOMATO

Estimated percentage reduction in yield of tomatoes due to blight (*Septoria lycopersici*), fusarium wilt (*Fusarium lycopersici*), bacterial wilt (*Bacillus solanacearum*), early blight (*Alternaria solani*), western blight (*Curly top*) and other diseases, 1927. (Production figures not available.)

State	Estimated reduction in yield due to disease						
	Blight	Fusarium wilt	Bacterial wilt	Early blight	Western (yellow) blight	Other diseases	All diseases
Mass.	t	-	t	t	0	13.	13.
Conn.	1.	-	-	1.	0	0.5	2.5
N. Y.	1.5	0.5	-	t	0	4.	6.
N. J.	-	-	-	10.	0	-	10.
Del.	2.	t	-	2.	0	2.	6.
Md.	1.	4.	t	7.	0	3.5	15.5
Va.	5.	2.	t	5.	0	2.	14.
W. Va.	t	-	-	t	0	1.	1.
N. C.	2.	5.	2.5	1.	0	4.	14.5
S. C.	1.	1.	2.	t.	0	1.	5.
Ga.	t	5.	0.5	5.	0	16.5	27.
Ind.	6.	-	-	1.	0	1.	8.
Wis.	3.	t	0	t	0	t	3.
Minn.	t	t	0	t	0	5.	5.
Iowa	5.	t	0	0	0	1.	6.
Mo.	10.	2.	0	2.	0	10.	24.
S. D.	-	-	-	-	0	0.75	0.75
Nebr.	0.75	0	0	t	0	t	0.75
Kans.	-	6.	-	-	0	-	6.
Ky.	50.	5.	-	-	0	-	55.
Tenn.	-	10.	-	20.	0	6.5	36.5
Miss.	t	13.	t	2.	0	8.	23.
Okla.	5.	10.	-	0	0	10.	25.
Ark.	2.	15.	-	-	0	-	17.
Colo.	-	2.	-	-	0	t	2.
Ariz.	0	12.	3.	0	35.	5.5	55.5
Utah	-	1.5	-	-	6.	13.5	21.
Idaho	0	0	0	0	5.	2.	7.
Wash.	-	t	t	-	10.	1.	12.
Oregon.	-	-	-	-	25.	5.	30.
Calif.	-	-	-	-	10.	-	10.

BEAN.

Estimated percentage reduction in yield of beans due to anthracnose (*Colletotrichum lindemuthianum*), bacterial blight (*Bacterium* spp.), mosaic, rootrots (*Fusarium* spp.) and other diseases, 1927. (Production figures are for dry beans)

State	Production (dry beans) 1927 Bushels (000 omitted)	Anthracnose %	Anthracnose Bushels (000 omitted)	Bacterial blight %	Bacterial blight Bushels (000 omitted)	Mosaic %	Mosaic Bushels (000 omitted)	Rootrots %	Rootrots Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Me. *	96	-	-	-	-	-	-	-	-	-	-	-	-
Vt. *	70	-	-	-	-	-	-	-	-	-	-	-	-
Mass.		10.	+	-	-	t	+	t	+	t	+	10.	+
Conn.		-	-	-	-	-	-	-	-	1.	+	1.	+
N. Y.	1,066	1.	12	2.	23	0.1	1	5.	58	t	+	8.1	94
Del.		t	+	t	+	-	-	-	-	0.5	+	0.5	+
Md.		1.5	+	1.5	+	t	+	-	-	t	+	3.	+
Va.		2.	+	1.	+	t	+	0.5	+	0.5	+	4.	+
W. Va.		1.	+	t	+	t	+	-	-	t	+	1.	+
S. C.		-	-	-	-	-	-	-	-	1.	+	1.	+
Ga.		0.5	+	t	+	1.	+	t	+	15.5	+	17.	+
Mich.	5,004	0.5	26	3.	159	2.	106	t	+	-	-	5.5	291
Wis.	40	t	+	1.2	+	1.	+	t	+	t	+	2.2	+
Minn.	55	t	+	1.	1	5.	3	-	-	-	-	6.	4
Iowa.		0	0	t	+	0	0	0	0	t	+	-	-
Mo.		t	+	0	0	0	0	0	0	5.	+	5.	+
Nebr.	62	t	+	t	+	t	+	-	-	-	-	-	-
Ky.		t	+	t	+	t	+	t	+	t	+	t	+
Tenn.		10.	+	0.1	+	0.1	+	-	-	2.	+	12.2	+
Miss.		2.	+	2.	+	4.	+	t	+	2.5	+	10.5	+
Okla.		-	-	10.	+	10.	+	-	-	20.	+	40.	+
Mont.	935	t	+	5.	54	7.	76	2.	22	-	-	14.	152
Wyo. *	306	-	-	-	-	-	-	-	-	-	-	-	-

BEAN (continued)

State	Production (dry beans) 1927 Bushels (000 omitted)	Anthracnose %	Anthracnose Bushels (000 omitted)	Bacterial blight %	Bacterial blight Bushels (000 omitted)	Mosaic %	Mosaic Bushels (000 omitted)	Rootrots %	Rootrots Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
		Estimated reduction in yield due to disease											
Mo.		t	+	0	0	0	0	0	0	5.	+	5.	+
Nebr.	62	t	+	t	+	t	+	-	-	-	-	-	-
Ky.		t	+	t	+	t	+	t	+	t	+	t	+
Tenn.		10.	+	0.1	+	0.1	+	-	-	2.	+	12.2	+
Miss.		2.	+	2.	+	4.	+	t	+	2.5	+	10.5	+
Okla.		-	-	10.	+	10.	+	-	-	20.	+	10.	+
Mont.	935	t	+	5.	54	7.	76	2.	22	-	-	14.	152
Wyo. *	306	-	-	-	-	-	-	-	-	-	-	-	-
Colo.	1,578	0	0	5.	91	-	-	-	-	8.	145	13.	236
N. Mex. *	375	-	-	-	-	-	-	-	-	-	-	-	-
Ariz.	64	0	0	3.	2	6.5	5	[illegible]	1	0.5	+	11.	8
Utah.		-	-	1.	+	8.	+	1.5	+	-	-	10.5	+
Idaho	1,706	0	0	0	0	5.	+	2.	+	1.	+	8.	+
Wash.		-	-	-	-	8.	+	-	-	-	-	8.	+
Oregon		-	-	t	+	10.	+	-	-	3.	+	13.	+
Calif. *	4,825	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	16,782	0.3	30	2.9	330	1.7	191	0.7	81	1.3	145	6.9	785

* Omitted from calculations for total percentage loss.

COTTON

Estimated reduction in yield of cotton due to anthracnose (Colletotrichum gossypii), angular leafspot (Bacterium malvacearum), wilt (Fusarium vasinfectum), rootknot (Heterodera radicicola), and other diseases, 1927.

State	Production 1927 Bales (000 omitted)	Anthracnose %	Anthracnose Bales (000 omitted)	Angular leafspot %	Angular leafspot Bales (000 omitted)	Wilt %	Wilt Bales (000 omitted)	Rootknot %	Rootknot Bales (000 omitted)	Other diseases %	Other diseases Bales (000 omitted)	All diseases %	All diseases Bales (000 omitted)
Va.	32	2.	1	t	+	t	+	t	+	t	+	2.	1
N. C.	857	1.8	17	1.5	14	2.	19	1.	9	2.	19	8.3	78
S. C.	735	t	+	1.	8	2.	15	t	+	1.	8	4.	31
Ga.	1,100	t	+	t	+	1.	12	1.	12	5.	59	7.	83
Fla. *	17	-	-	-	-	-	-	-	-	-	-	-	-
Ill.		0	0	t	+	0	0	0	0	t	+	t	+
Mo.	104	1.	1	0	0	t	+	1.	1	1.	1	3.	3
Tenn.	345	10.	41	5.	21	1.	4	-	-	-	-	16.	66
Ala. *	1,200	-	-	-	-	-	-	-	-	-	-	-	-
Miss.	1,340	2.5	37	1.	15	5.5	81	t	+	-	-	9.	133
La.	545	0.2	1	-	-	4.	23	0.	0	1.	6	5.2	30
Texas	4,200	t	+	1.	54	2.	106	t	+	18.	975	21.	1,137
Okla.	990	3.	41	1.	14	8.	108	5.	68	10.	135	27.	367
Ark.	980	0.5	5	1.	11	4.	43	2.	22	2.	22	9.5	103
N. Mex. *	70	-	-	-	-	-	-	-	-	-	-	-	-
Ariz.	93	0	0	0.5	1	t	+	t	+	11.5	13	12.1	14
Calif. *	94	-	-	-	-	-	-	-	-	-	-	-	-
All others *	7												
U. S.	12,789	1.1	144	1.	138	3.1	413	0.8	112	9.2	1,239	15.2	2,046

* Omitted from calculations for U. S. percentage loss.

GRAPE

Estimated reduction in yield of grape due to blackrot, (Guignardia bidwellii), and other diseases, 1927.

State	Production 1927 Tons	Blackrot %	Blackrot Tons	Other diseases %	Other diseases Tons	All Diseases %	All Diseases Tons
Me.	58	-	-	t	+	-	-
N. H.	91	-	-	-	-	-	-
Vt.	45	-	-	-	-	-	-
Mass.	555	2.	12	5.	30	7.	42
R. I.	152	-	-	-	-	-	-
Conn.	1,087	-	-	2.	22	2.	22
N. Y.	51,520	t	+	t	+	t	+
N. J.	2,535	-	-	-	-	-	-
Pa.	14,650	-	-	-	-	-	-
Del.	1,207	1.5	18	0.5	6	2.	24
Md.	1,224	8.	108	1.	13	9.	121
Va.	2,048	9.	206	1.5	34	10.5	240
W. Va.	720	t	+	-	-	-	-
N. C.	5,135	5.	276	2.	110	7.	386
S. C.	1,540	2.	32	2.	32	4.	64
Ga.	1,472	-	-	-	-	-	-
Fla.	610	-	-	-	-	-	-
Ohio	20,000	-	-	-	-	-	-
Ind.	2,580	-	-	-	-	-	-
Ill.	3,440	10.	391	2.	78	12.	469
Mich.	51,700	t	+	2.	1,055	2.	1,055
Wis.	250	1.	3	1.	3	2.	6
Minn.	152	0	0	t	+	t	+
Iowa	5,329	t	+	t	+	t	+
Mo.	7,000	t	+	2.	143	2.	143
Nebr.	1,955	t	+	0.5	10	0.5	10
Kans.	3,735	1.	37	-	-	1.	37
Ky.	632	6.	40	-	-	6.	40
Tenn.	950	10.	107	1.	11	11.	118
Ala.	627	-	-	-	-	-	-
Miss.	225	5.	13	5.	13	10.	26
La.	30	-	-	-	-	-	-
Texas	1,260	3.	39	-	-	3.	39
Okla.	1,732	10.	217	10.	217	20.	434
Ark.	3,030	1.	31	1.	31	2.	62
Colo.	314	-	-	-	-	-	-
N. Mex.	458	0	0	-	-	-	-
Ariz.	1,900	0	0	3.	59	3.	59
Utah	1,320	0	0	-	-	-	-
Nev.	270	0	0	-	-	-	-
Idaho	304	0	0	-	-	-	-
Wash.	3,200	0	0	t	+	0.5	16
Oregon	3,500	0	0	2.	71	2.	71
Calif.	2,264,000	0	0	-	-	-	-
U. S.*	2,464,712	-	-	-	-	-	-

* Data insufficient for calculating losses for United States.

Estimated reduction in yield of apple due to bitter rot (Glomerella cingulata), blackrot (Physalospora cydoniae), blotch (Phyllosticta solitaria), and cedar rust (Gymnosporangium), 1927.

State	Production: 1927 Bushels (000 omitted)	Bitter rot %	Bitter rot Bushels (000 omitted)	Blackrot %	Blackrot Bushels (000 omitted)	Blotch %	Blotch Bushels (000 omitted)	Cedar rust %	Cedar rust Bushels (000 omitted)
Me.	2,236	0	0	t	+	0	0	-	-
N. H.	1,100	0	0	-	-	0	0	-	-
Vt.	990	0	0	-	-	0	0	-	-
Mass.	2,520	t	+	t	+	0	0	t	+
R. I.	242	-	-	-	-	0	0	-	-
Conn.	1,045	-	-	2.	22	0	0	1.	11
N. Y.	13,600	t	+	t	+	0	0	0.1	19
N. J.	2,697	t	+	t	+	0.3	9	t	+
Pa.	6,300	-	-	-	-	-	-	-	-
Del.	1,150	t	+	t	+	t	+	-	-
Md.	1,700	1.5	30	5.	101	1.	20	0.5	10
Va.	6,000	0.3	21	1.	71	t	+	4.	285
W. Va.	5,200	-	-	t	+	t	+	t	+
N. C.	1,825	3.5	82	2.5	59	3.5	82	3.	71
S. C.	363	-	-	-	-	-	-	1.	4
Ga.	595	5.	33	0	0	0	0	0	0
Ohio	5,600	-	-	-	-	-	-	-	-
Ind.	1,249	-	-	0.5	7	3.	43	-	-
Ill.	4,450	t	+	1.	49	5.	245	1.	49
Mich.	4,288	0	0	1.	56	0	0	t	+
Wis.	1,200	0	0	0	0	t	+	t	+
Minn.	854	0	0	t	+	0	0	1.	9
Iowa	1,720	0	0	t	+	t	+	t	+
Mo.	2,104	t	+	t	+	5.	118	t	+
S. D.	200	-	-	-	-	-	-	-	-
Nebr.	850	0	0	t	+	0.5	4	0.75	7
Kans.	1,925	0	0	-	-	5.	108	-	-
Ky.	720	t	+	t	+	3.	25	t	+
Tenn.	1,152	5.	75	2.	30	5.	75	0.5	7
Ala.	328	-	-	-	-	-	-	-	-
Miss.	152	5.	9	t	+	2.	4	0.5	1
La.	18	-	-	-	-	-	--	-	-
Texas	168	-	-	-	-	1.	2	-	-
Okla.	493	-	-	10.	93	20.	186	-	-
Ark.	1,015	t	+	5.	56	1.	11	1.	11
Mont.	277	0	0	0	0	0	0	0	0
Wyo.	40	0	0	0	0	0	0	0	0
Colo.	2,592	0	0	0	0	0	0	0	0
N. Mex.	456	0	0	0	0	0	0	0	0
Ariz.	62	0	0	0	0	0	0	0	0
Utah	660	0	0	0	0	0	0	0	0
Nev.	18	0	0	0	0	0	0	0	0
Ida.	6,000	0	0	0	0	0	0	0	0
Wash.	25,343	0	0	0	0	0	0	0	0
Oreg.	4,500	0	0	0	0	0	0	0	0
Calif.	7,458	0	0	0	0	0	0	0	0
U. S.	123,455	0.2	250	0.4	544	0.7	932	0.4	484

Estimated reduction in yield of apple due to fireblight (*Bacillus amylovorus*), scab (*Venturia inaequalis*), and other diseases, 1927.

State	Estimated reduction in yield due to disease							
	Fireblight		Scab		Other diseases		All diseases	
	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)
Me.	-	-	20.	559	-	-	20.	559
N. H.	-	-	-	-	-	-	-	-
Vt.	-	-	-	-	-	-	-	-
Mass.	t	+	5.	137	3.	82	8.	219
R. I.	-	-	-	-	-	-	-	-
Conn.	0.5	6	2.	22	-	-	5.5	61
N. Y.	t	+	25.	4,830	4.5	869	29.6	5,718
N. J.	-	-	7.5	223	1.3	39	9.1	271
Pa.	-	-	-	-	-	-	-	-
Del.	0.5	6	2.	24	2.	24	4.5	54
Md.	4.	81	3.	61	1.1	22	16.1	325
Va.	t	+	1.5	107	9.	641	15.8	1,125
W. Va.	t	+	t	+	-	-	t	+
N. C.	4.	94	4.	94	2.	47	22.5	529
S. C.	1.	4	2.	8	-	-	4.	16
Ga.	0	0	-	-	5.	33	10.	66
Ohio	-	-	-	-	-	-	-	-
Ind.	-	-	8.	114	1.	14	12.5	178
Ill.	2.	98	t	+	t	+	9.	441
Mich.	1.	56	20.	1,114	1.	56	23.	1,282
Wis.	1.	14	15.	214	t	+	16.	228
Minn.	2.	18	2.	18	0.3	3	5.3	48
Iowa	t	+	5.	92	1.	18	6.	110
Mo.	1.	24	t	+	5.	118	11.	260
S. D.	-	-	-	-	-	-	-	-
Nebr.	t	+	1.	9	-	-	2.25	20
Kans.	2.	43	-	-	4.	87	11.	238
Ky.	t	+	8.	65	1.	8	12.	98
Tenn.	0.5	7	7.	105	3.	45	23.	344
Ala.	-	-	-	-	-	-	-	-
Miss.	6.	11	t	+	-	-	13.5	25
La.	-	-	-	-	-	-	-	-
Texas	5.	9	-	-	-	-	6.	11
Okla.	2.	19	5.	47	10.	93	47.	438
Ark.	2.	23	1.	11	-	-	10.	112
Mont.	1.	3	10.	32	1.	3	12.	38
Wyo.	-	-	-	-	-	-	-	-
Colo.	t	+	t	+	t	+	t	+
N. Mex.	-	-	-	-	-	-	-	-
Ariz.	2.	1	0	0	7.7	5	9.7	6
Utah	0.2	1	0	0	3.	20	3.2	21
Nev.	-	-	0	0	-	-	-	-
Ida.	t	+	0	0	3.	186	3.	186
Wash.	t	+	t	+	1.	257	1.5	386
Oreg.	0.1	5	0.2	9	2.	92	2.3	106
Calif.	t	+	0.8	64	6.	480	6.8	544
U. S.	0.4	523	5.8	7,959	2.4	3,242	10.3	14,063

PEACH

Estimated reduction in yield of peach due to leafcurl (*Exoascus deformans*), brownrot (*Sclerotinia fructicola*), yellows and little peach, scab (*Cladosporium carpophilum*) and other diseases, 1927.

State	Production: 1927 Bushels (000 omitted)	Leafcurl %	Leafcurl Bushels (000 omitted)	Brownrot %	Brownrot Bushels (000 omitted)	Yellows and little peach %	Yellows and little peach Bushels (000 omitted)	Scab %	Scab Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
N. H.	26	-	-	-	-	-	-	-	-	-	-	-	-
Mass.	140	2.	3	3.	4	1.	1	t	+	t	+	6.	8
R. I.	23	-	-	-	-	-	-	-	-	-	-	-	-
Conn.	186	-	-	3.	6	-	-	-	-	-	-	4.5	9
N. Y.	1,140	5.	61	1.5	18	0.2	2	t	+	t	+	6.7	81
N. J.	2,304	1.	26	8.	206	1.5	39	-	-	-	-	10.5	271
Pa.	947	-	-	-	-	-	-	-	-	-	-	-	-
Del.	287	-	-	3.	9	-	-	2.	6	1.	3	6.	18
Md.	352	1.	4	15.	66	2.	9	2.	9	0.5	2	20.5	90
Va.	400	2.	8	2.	8	t	+	0.4	2	1.	4	5.4	22
W. Va.	202	-	-	1.	2	-	-	t	+	-	-	1.	2
N. C.	1,300	2.5	40	6.	97	-	-	3.	48	8.	129	19.5	314
S. C.	615	2.	13	3.	20	-	-	1.	7	1.	7	7.	47
Ga.	5,943	0	0	20.	1,486	0	0	0	0	-	-	20.	1,486
Fla.	69	-	-	-	-	0	0	-	-	-	-	-	-
Ohio	1,326	-	-	-	-	-	-	-	-	-	-	-	-
Ind.	242	1.	3	4.	10	0	0	-	-	2.	5	7.	18
Ill.	1,122	1.5	17	2.	23	0	0	0	0	0	0	3.5	40
Mich.	578	5.	31	1.	6	1.	6	t	+	t	+	7.	43
Iowa	65	t	+	0	0	0	0	0	0	t	+	t	+
Mo.	340	1.	5	20.	99	0	0	10.	49	t	+	31.	153

State	Production: 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease: Leafcurl %	Leafcurl Bushels (000 omitted)	Brownrot %	Brownrot Bushels (000 omitted)	Yellows and little peach %	Yellows and little peach Bushels (000 omitted)	Scab %	Scab Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Nebr.	82	t	+	t	+	0	0	0	0	-	-	-	-
Kans.	259	-	-	-	-	0	0	-	-	-	-	-	-
Ky.	180	7.	17	12.	29	0	0	2.	5	4.	10	25.	61
Tenn.	638	5.	39	10.	78	0	0	1.	8	2.	15	18.	140
Ala.	540	-	-	-	-	0	0	-	-	-	-	-	-
Miss.	279	1.	3	15.	51	0	0	1.	3	1.	3	18.	60
La.	86	-	-	-	-	0	0	-	-	-	-	-	-
Texas	800	-	-	-	-	0	0	-	-	-	-	-	-
Okla.	760	2.	20	10.	100	0	0	2.	20	10.	100	24.	240
Ark.	1,628	3.	59	3.	59	0	0	1.	20	10.	196	17.	334
Colo.	892	t	+	-	-	0	0	-	-	-	-	-	-
N. Mex.	40	-	-	-	-	0	0	-	-	-	-	-	-
Ariz.	55	0	0	0	0	0	0	0	0	9.	5	9.	5
Utah	561	-	-	-	-	0	0	-	-	-	-	-	-
Nev.	2	-	-	-	-	0	0	-	-	-	-	-	-
Idaho	144	t	+	0	0	0	0	0	0	0	0	t	+
Wash.	250	t	+	t	+	0	0	0	0	1.	3	1.5	4
Oregon	160	0.5	1	1.	2	0	0	0	0	0	0	1.5	3
Calif.	20,500	3.	666	-	-	0	0	t	+	4.7	1,044	7.7	1,710
U. S.	45,463	2.	1,016	4.7	2,379	0.1	57	0.3	177	3.	1,526	10.2	5,159

PEAR

Estimated reduction in yield of pear due to blight, (Bacillus amylovorus), scab (Venturia pyrina), leafblight (Fabraea maculata), and other diseases, 1927.

State	Production 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease: Blight %	Blight Bushels (000 omitted)	Scab %	Scab Bushels (000 omitted)	Leafblight %	Leafblight Bushels (000 omitted)	Other diseases %	Other diseases Bushels (000 omitted)	All diseases %	All diseases Bushels (000 omitted)
Me.	13	-	-	t	+	-	-	-	-	-	-
N. H.	14	-	-	-	-	-	-	-	-	-	-
Vt.	12	-	-	-	-	-	-	-	-	-	-
Mass.	61	1.	1	1.	1	t	+	2.	2	4.	4
R. I.	12	-	-	-	-	-	-	-	-	-	-
Conn.	54	1.5	1	0.5	+	1.	1	-	-	3.	2
N. Y.	1,872	2.	38	0.7	13	-	-	-	-	2.7	51
N. J.	420	-	-	-	-	-	-	-	-	-	-
Pa.	400	-	-	-	-	-	-	-	-	-	-
Del.	128	1.5	2	t	+	t	+	0.5	1	2.	3
Md.	193	8.	18	1.	2	5.	11	-	-	14.	31
Va.	130	2.	3	t	+	0	0	1.	1	3.	4
W. Va.	12	-	-	-	-	-	-	-	-	-	-
N. C.	100	10.	11	-	-	-	-	-	-	10.	11
S. C.	68	10.	8	-	-	1.	1	-	-	11.	9
Ga.	104	-	-	-	-	-	-	-	-	-	-
Fla.	44	-	-	-	-	-	-	-	-	-	-
Ohio	250	-	-	-	-	-	-	-	-	-	-
Ind.	140	-	-	-	-	-	-	-	-	-	-
Ill.	312	6.	20	0	0	t	+	0	0	6.	20
Mich.	702	3.	22	0.5	4	t	+	-	-	3.5	26
Wis.		t	+	2.	+	0	0	t	+	2.	+

State	Production: 1927 Bushels (000 omitted)	Estimated reduction in yield due to disease									
		Blight		Scab		Leafblight		Other diseases		All diseases	
		%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)	%	Bushels (000 omitted)
Iowa	41	10.	+	0	0	t	+	t	+	10.	+
Mo.	270	10.	31	t	+	0	0	2.	6	12.	37
Nebr.	36	t	+	-	-	-	-	-	-	-	-
Kans.	258	4.	11	-	-	-	-	-	-	4.	11
Ky.	34	-	-	-	-	-	-	-	-	-	-
Tenn.	125	25.	42	0	0	1.	2	-	-	26.	44
Ala.	85	-	-	-	-	-	-	-	-	-	-
Miss.	120	15.	22	-	-	-	-	2.	3	17.	25
La.	50	-	-	-	-	-	-	-	-	-	-
Texas	345	2.	7	-	-	-	-	-	-	2.	7
Okla	130	25.	68	20.	54	2.	5	5.	14	52.	141
Ark.	70	-	-	-	-	-	-	-	-	-	-
Colo.	400	t	+	-	-	-	-	-	-	t	+
N. Mex.	28	-	-	-	-	-	-	-	-	-	-
Ariz.	12	3.5	+	0	0	0	0	5.	1	8.5	1
Utah	60	8.	5	-	-	-	-	-	-	8.	5
Nev.	2	-	-	-	-	-	-	-	-	-	-
Idaho	56	t	+	0	0	0	0	0	0	t	+
Wash.	1,579	t	+	t	+	0	0	t	+	0.5	8
Oregon	1,900	0.2	4	0	0	0	0	0.5	10	0.7	14
Calif.	7,333	4.	319	1.	80	-	-	3.	239	8.	638
U. S.	18,072	3.3	633	0.9	154	0.1	20	1.4	277	5.7	1,092

PLUM AND PRUNE

Estimated percentage reduction in yield of plum and prune due to brownrot (Sclerotinia fructicola), and other diseases, 1927.

State	Estimated reduction in yield due to disease		
	Brownrot	Other diseases	All diseases
	%	%	%
Mass.	5.	2.	7.
Conn.	4.	-	4.5
N. Y.	0.5	t	0.5
Del.	1.	0.5	1.5
Md.	7.	1.	8.
Va.	4.	1.	5.
N. C.	5.	-	5.
Ill.	25.	t	25.
Mich.	1.	0.5	1.5
Wis.	5.	t	5.
Minn.	25.	2.	27.
Iowa	5.	t	5.
Mo.	20.	t	20.
N. D.	t	10.	10.
Tenn.	10.	2.	12.
Miss.	5.	1.	6.
Okla.	10.	10.	20.
Idaho	-	2.	2.
Wash.	t	t	1.
Oregon	10.	-	10.

CHERRY

Estimated percentage reduction in yield of cherry due to brownrot (*Sclerotinia fructicola*), leafspot (*Coccomyces hiemalis*), and other diseases, 1927.

State	Estimated reduction in yield due to disease			
	Brownrot	Leafspot	Other diseases	All diseases
	%	%	%	%
Mass.	5.	t	6.	11.
Conn.	1.5	-	1.	2.5
N. Y.	0.5	3.5	t	4.
Del.	0.5	1.	0.5	2.
Md.	1.	10.	11.	22.
Va.	3.	1.	1.	5.
N. C.	2.	-	-	2.
Mich.	1.	4.	-	5.
Wis.	t.	1.	1.	2.
Iowa	-	5.	8.	13.
Mo.	t	50.	t	50.
Ky.	t	-	-	-
Tenn.	2.	15.	-	17.
Miss.	t	t	-	-
Okla.	10.	20.	5.	35.
Ark.	t	5.	1.	6.
Mont.	0	0.5	1.5	2.
Colo.	-	-	t	-
Utah	-	-	2.	2.
Idaho	0	0	2.	2.
Wash.	t	t	t	1.
Oregon	5.	0.2	-	5.2

RASPBERRY

Estimated reduction in yield of raspberry due to mosaic and leafcurl (cause unknown), and other diseases, 1927.

State	Estimated reduction in yield due to disease		
	Mosaic and Leafcurl	Other diseases	All diseases
	%	%	%
Me.	10.	-	10.
Mass.	23.	2.	25.
Conn.	5.	1.	6.
Del.	t	0.5	0.5
Md.	3.	6.	9.
Va.	t	6.	6.
Ind.	-	8.	8.
Ill.	0	12.	12.
Mich.	10.	5.	15.
Wis.	5.	5.	10.
Minn.	10.	8.	18.
Iowa.	t	13.	13.
Mo.	t	2.	2.
N. D.	-	1.	1.
Tenn.	-	2.	2.
Okla.	10.	10.	20.
Ark.	-	25.	25.
Mont.	t	-	t
Idaho	t	t	t
Wash.	10.	2.	12.
Oregon	0	2.	2.

THE PLANT DISEASE REPORTER

ISSUED BY

THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

SUPPLEMENT 65

Diseases of Forest and Shade Trees, Ornamental and Miscellaneous

Plants in the United States in 1927

December 31, 1928

BUREAU OF
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF FOREST AND SHADE TREES, ORNAMENTAL AND MISCELLANEOUS PLANTS

IN THE UNITED STATES IN 1927

Plant Disease Reporter
Supplement 65

December 31, 1928.

Prepared by
G. Hamilton Martin, Assistant Pathologist,
Office of Mycology and Disease Survey.

CONTENTS

F O R E W O R D

This summary of the diseases of forest and shade trees, ornamental and miscellaneous plants in the United States in 1927 follows the same general plan as those of the preceding years. The sources upon which the information is based are as follows: (1) collaborators, (2) specialists in the Office of Forest Pathology, (3) articles in botanical journals, and (4) special reporters.

Many reports of new occurrences were received for 1927 both for individual states and for the United States. In the accompanying summary these first occurrences are given which have been obtained from literature, from the Mycological Herbarium of the Bureau of Plant Industry, or from past records of the Plant Disease Survey. Many diseases have been omitted due to their unimportance or to the fact that they have been reported in other years. It is not the object of this summary to enumerate all of the diseases that have been reported during the year, but to give facts concerning only some of the more important ones. "Standardized Plant Names" has been used as the source for the names of the hosts.

Where specimens are not indicated, the report is based on the authority of the person cited. The date given is that of its earliest reported appearance in 1927.

The following symbols are used: * indicates a specimen in the Mycological Herbarium; + preceding disease indicates the first report of the disease to the Plant Disease Survey; + preceding state indicates the first report from the state to the Plant Disease Survey; P.r. indicates prior reports of the disease to the Plant Disease Survey or from the Mycological Herbarium.

References have been given and in some instances brief abstracts made of recent articles which may be of service to those who do not have access to all botanical journals.

D I S E A S E S   O F   C O N I F E R S

ABIES AMABILIS, Cascade fir.
+Herpotrichia nigra Hartig, matting.
Oregon - Clackamas and Multnomah Counties, April 3; 4,000 feet altitude. (Boyce).
Peridermium sp., rust.
Oregon - (Boyce).

ABIES GRANDIS, great silver fir.
+Hypodermella abietis concoloris Dearn., needle cast.
Idaho - on old needles; sparse; elevation 3,000 feet; Clarkia, June 24. (Boyce).
+Phomopsis sp., canker.
Montana - Lincoln and Mineral Counties, August 26. (Boyce).
Idaho - causing cankers and killing branches on trees from saplings to mature trees; abundant; elevation 3,000 feet; Kootenai and Shoshone Counties, June 24. (Boyce).
+Uredinopsis macrosperma (Cke.) Magn., rust.
Idaho - elevation 3,000 feet; rare; Shoshone County, June 24. (Boyce).
British Columbia - elevation 20 feet; Vancouver Island, July 20. (Boyce).

ABIES LASIOCARPA, Alpine fir.
+Botrytis cinerea Pers., wither tip.
British Columbia - killed current season's shoots; frequent; elevation 4,500 feet; near Edgewood, August 30. (Boyce).
+Hypodermella abietis concoloris Dearn., needle cast.
Oregon - elevation 4,000 feet; occasional; Clackamas County, June 19. (Boyce).
+Lophodermium nervisequium (DC.) Rehm, needle cast.
*Montana - Bozeman, September 6, 1925; collected P. A. Young; determined W. W. Diehl.
+Macrophoma parca (B. & Br.) Berl. & Vogl.
*Montana - Bozeman, September 6, 1925; collected P. A. Young; determined W. W. Diehl.
+Phomopsis sp., canker.
Montana - very abundant in all age classes, in some cases killing 25 per cent of the branches; Flathead County, August 24. (Boyce).

CEDRUS DEODARA, Deodar.
+Phoma sp.
+Mississippi - Grenada, March 30; collected G. R. Fulton; determined N. O. Howard.
Limb blight - (undetermined).
Texas - serious in restricted localities. (Taubenhaus).

CHAMAECYPARIS SPP., white cedar, cypress, retinospora.
Gymnosporangium botryapites (Schw.) Kern, rust.
Connecticut - on C. thyoides; Bethany, May 17. (Clinton).
New Jersey - Atlantic County, June. (White).
+Pestalozzia sp., tip dieback, needle blight.
New Jersey - on C. pisifera plumosa and C. pisifera squarrosa and C. thyoides ericoides; found on dead scions in greenhouse

and also on dead needles and twigs in center of plants, May 27 and September 2, (White).

+Phomopsis juniperovora Hahn, nursery blight.

*Kansas - Manhattan, November 1926. Collected D. V. Layton; determined G. Hamilton Martin.

CRYPTOMERIA JAPONICA LOBBI, Lobb cryptomeria.

+Pestalozzia sp., dieback.

New Jersey - on young stock; local; Springfield, August 3. (White).

JUNIPERUS SPP., juniper, red cedar.

Lophodermium juniperinum (Fr.) DeNot., leaf cast.

+Connecticut - new to state, appeared to be cause of death of leaves; common locally; Norfolk, June 24. (Clinton).

+British Columbia - elevation 3,800 feet; September 4. (Boyce).

P.r.: *Colorado, *Iowa.

Phomopsis juniperovora Hahn, nursery blight.

+Connecticut - on J. virginiana cannarti, J. scopulorum; bad nursery seed beds; Cheshire, August 17. (Clinton).

+New Jersey - on J. virginiana, J. scopulorum argentea, J. chinensis, J. communis, J. squamata meyeri, and J. excelsa stricta; Cologne, February 21. (White).

Iowa - on J. virginiana; about a 20 per cent total loss in nurseries; scattered; June 1. (Archer).

Kansas - very serious in eastern half of state. (Elmer).

LARIX SPP., larch.

Dasyscypha calycina (Schum.) Fckl., larch canker.

+Massachusetts - Hamilton, August 2. (Graves, 18).

Connecticut - on L. laricina; found in several places in the state. (Clinton).

From Montana comes the following report from J. C. Boyce:

"Collected by Stillinger four miles north of Belton, Flathead, County, August 24; only two specimens found; in one case the fungus was saprophytic on a dead branch and in the other it was parasitic on the main trunk of a tree about 8 feet tall. Species agrees with description of D. calycina."

Specimens of what appears to be the same or at least a very similar fungus have been received by this office from New Jersey, Michigan, Idaho and Washington.

Recent literature: Spaulding, 47; Anon.,3; Metcalf, 36; Plassmann, 42.

+Fusarium spp., damping off.

New Jersey - on seedlings; general; Washington's Crossing, August 9. (White).

LIBOCEDRUS DECURRENS, incense cedar.

+Lophodermium pinastri (Schrad.) Chev., needle cast.

Oregon - Blue River, March. (Zeller, 57: 137).

PICEA SP., Spruce.

+Botrytis sp., tip blight.

New Jersey - on P. conica; P. excelsa, P. pungens aurea, P. pungens glauca, P. pungens kosteri, P. orientalis; general; New Brunswick, June 22. (White).

+Fusarium sp., damping off.

New Jersey - on P. excelsa and P. pungens; local; August. (White)

PINUS ALBICAULIS, whitebark pine.

+Dasyscypha fuscosanguinea Rehm, canker.

British Columbia - on a small tree about 6 feet high, cankers killing part affected, on another tree about 7 feet high, canker was on main stem and branch about 3 feet from ground. (Boyce).

PINUS FLEXILIS, limber pine.

+*Lophodermium pinastri (Schrad.), Chev., needle cast.

Montana - Bozeman, September 7, 1925; collected by P. A. Young; determined by W. W. Diehl.

PINUS MONTANA MUGHUS, Mugho pine.

+Pestalozzia sp., needle blight.

New Jersey - local; Pennington, August 5. (White).

PINUS MONTICOLA, western white pine.

+Armillaria mellea (Vahl) Quel., root rot.

Idaho - occasional; elevation 3,000 feet; killed small trees; no sporophores present, only rhizomorphs; near Clarkia, Shoshone County, June 26. (Boyce).

+Cucurbitaria pithyophila (Fr.) Ces. & de Not.

Washington - general; elevation 1,200 to 3,000 feet; May 13, 1927. (Boyce).

+Dasyscypha calicyformis (Willd.) Rehm, canker.

British Columbia - in the three instances collected it was secondary on a canker caused by Cronartium ribicola; May 6. (Boyce).

Lophodermium pinastri (Schrad.) Chev., needle cast.

+Oregon - severely parasitic on planted trees; elevation 3,800 feet; Clackamas County, June 9. (Boyce).

PINUS PONDEROSA, western yellow pine.

Cronartium harknessii (Moore) Meinecke, rust.

*+South Dakota - Pine Ridge Reservation, June. (Evans).

British Columbia - abundant; killing numerous twigs and branches; elevation 1,100 feet; August 4. (Boyce).

PINUS RESINOSA, red pine.

+Cenangium acuum Cke. & Pk., leaf and twig blight.

New York - local; Ithaca. (Welch).

+Cronartium cerebrum (Pk.) Hedgc. & Long, rust.

Minnesota - general in northern part of state; Crow Wing County, May 22. (Sect. Pl. Path.)

PINUS STROBUS, white pine.

Cronartium ribicola Fisch., blister rust.

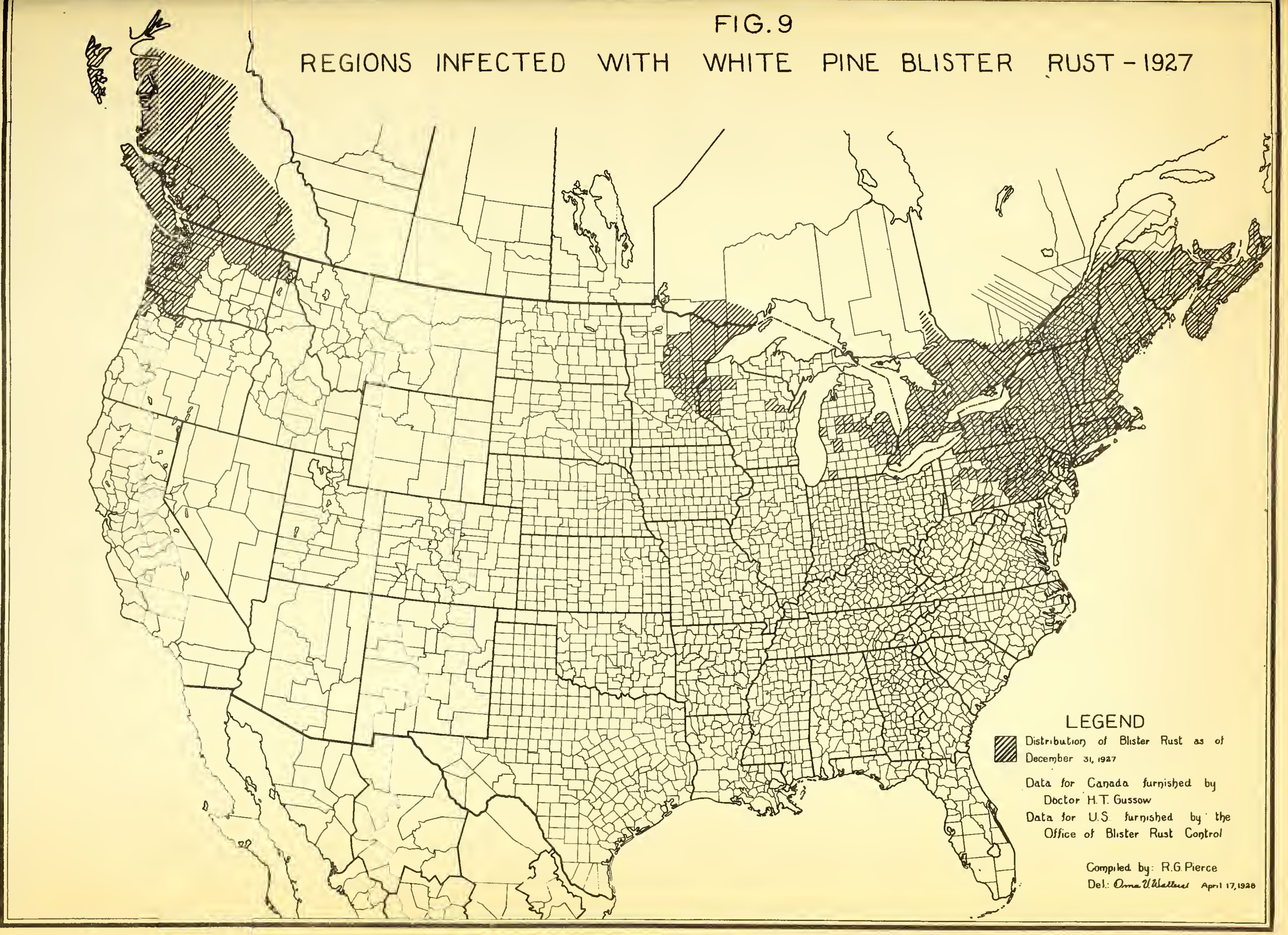
(See map, Fig. 9).

Hypoderma lineare (Pk.) Thuem., needle cast.

+Connecticut - Tolland County, June 16., (Clinton).

FIG. 9

REGIONS INFECTED WITH WHITE PINE BLISTER RUST - 1927



+Phoma caudata Dearness & Overholts, canker.
Pennsylvania - common as a canker on trunks of young pines growing near large ant hills; parasitism not well established as yet; Center County. (Thurston).

PINUS SYLVESTRIS, Scotch pine.
Cronartium comptoniae Arth., rust.
+New Jersey - local; May. (White & Rex).
+Sphaeropsis sp., needle blight.
New Jersey - scattered; Moorestown, September 2. (White).

PSEUDOTSUGA DOUGLASII, Douglas fir.
+Armillaria mellea (Vahl) Quel., root rot.
Oregon - killing a tree four inches in diameter; elevation 800 feet; Columbia County, July 13. (Boyce).
Botrytis cinerea Auct., gray mold twig blight.
+New Jersey - local; Bound Brook, July 8. (White).
+Oregon - frequent, killing current season's shoots on planted trees; elevation 800 feet; Clackamas County, June 9. (Boyce).
+Fusarium sp.
Washington - saprophytic on saplings following winter injury; elevation 700 feet; King County, July 31. (Boyce).
+Phomopsis sp., canker and top killing.
Washington - frequent; cankers on trees up to 6 feet tall, killing top or side branches; on taller trees killed side branches only; elevation 500 feet; Snohomish County, September 13. (Boyce).
+Poria incrassata (Berk. & Curt.) Burt, dry rot.
Washington - the most destructive decay in buildings in the Pacific Northwest; Cowlitz County, September 21. (Boyce).
Rhabdocline pseudotsugae Sydow, needle cast.
Montana - 1926 needles heavily infected; Park County, May. (Boyce).
+Washington - unusually prevalent, probably due to the moist cool summer; killing all 1925 needles on infected trees; Kitsap (May 3) and Lewis (April 28) Counties. (Boyce).
Oregon - Columbia (July 15) and Yamhill (May 8) Counties. (Boyce).

TAXUS CANADENSIS
+Metasphaeria taxicola Pk., leaf and twig blight.
New York - apparently favored by early spring rains. (Welch).
+Pestalozzia sp., die back.
New Jersey - local; Bridgeton, September 9. (White).

THUJA SP., arborvitae.
+Ozonium omnivorum Shear, root rot.
Texas - severe on both nursery and home plantings; Hidalgo County. (Bach).
+Pestalozzia sp., tip blight.
New Jersey - local; on several species; North Branch, August 2. (White).
Mississippi - Jackson, October. (Wedgworth).
Phoma sp.
*+Mississippi - Grenada, March 30 (Wedgworth).
Phomopsis sp., blight.

*+South Carolina - St. Matthews, November. (Ludwig).
+Rhizoctonia sp., seedling damping off.
Texas - (Taubenhaus).

DISEASES OF HARDWOODS

ACER PALMATUM, Japanese maple.
+Gloeosporium sp., anthracnose.

Connecticut - New Haven County, June 12. (Clinton).

ACER PLATANOIDES, Norway maple.
Gloeosporium apocryptum Ell. & Ev., anthracnose.
+Missouri - severe local defoliation; Cape Girardeau County. (Scott).
Nectria cinnabarina Fr., canker.
+Missouri - Atchison County. (Archer, Gilman, Scott).

ACER RUBRUM, red maple.
+Taphrina lethifer (Pk.) Sacc., leaf blister.
New York - general throughout Adirondack region. (Welch).

ACER SACCHARUM, Sugar maple.
*+Septobasidium pseudopedicellatum Burt.
Kentucky - Ordway, February 19. (Valleau).

ACER SPP., Maple.
Nectria cinnabarine Fr., canker.
*+Maine - Knox County, September. (Folsom).
Verticillium sp., wilt.
The following report has been received from G. F. Gravatt; Office of Forest Pathology:

"There has been no unusual development in this disease, as far as shown by very limited inspection work and by reports received. In the general region from the Mississippi River eastward and from Virginia northward, trees have been noted or reported as infected or killed at different points, but no such epidemic as took place in some Virginia cities in 1924 and 1925 has been noted. In 1924 and 1925, maple trees died by the hundreds in Roanoke, Virginia, and in some towns in that section, but general observations made each year since 1925 show a marked diminution in the destructiveness of the disease in that region. Possibly drought or some other climatic factor weakened the trees during those years so that they were more easily killed by the Verticillium fungus.

"During 1927, this disease was reported from several places in Michigan, from Ohio by Curtis May, from Pennsylvania by several persons, from Massachusetts by W. H. Rankin and others at several different places, from Connecticut, from New York by A. H. Graves, W. H. Rankin and others, from Maryland, from the District of Columbia, and from Virginia. Only a very small percentage of the trees were noted or reported as affected in these states, but the disease continues to be a factor of importance. Dr. Rankin thinks that the wilt is of more importance in Massachusetts towns than in previous years.

"During 1927, one Norway and one sugar maple seemed to be killed by a combination of illuminating gas and the Verticillium. Another interesting observation is that a few trees with the Verticillium fungus growing in the trunk and some of the branches have lost no limbs for the past eight years, though growth has been slow. The usual progress of the disease is much more rapid. In a few instances, the Verticillium fungus has been isolated from wood which did not show the usual green or dark streaks in the sapwood of the part cultured.

"G. H. Berkeley, on pages 91-100 of the Report of the Division of Botany, of the Canadian Department of Agriculture, for the year 1926, published in 1927, has given the results of a cultural study of the forms of Verticillia. Three isolations from the maple were placed in the species Verticillium ovatum and one isolation from the maple is given simply as Verticillium sp. in a strain group by itself."

AESCULUS SPP., buckeye, horse chestnut.

Guignardia aesculi (Pk.) V. B. Stewart, leaf blotch.

Reported from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Virginia, Kentucky, South Carolina, *Ohio, Iowa, Missouri, +South Dakota.

Uncinula flexuosa Pk., powdery mildew.

+Connecticut - Simsbury, September 8. (Bender).

+Iowa - in northern part of state. (Archer).

AMELANCHIER ELLIPTICA.

*+Dimerosporium collinsii (Schw.) Thuem.

Montana - Bozeman; collected by P. A. Young; determined by F. B. Cotner and W. W. Diehl.

AMELANCHIER GLABRA

*+Fabraea maculata (Lev.) Atk., leaf blight.

Montana - Bozeman; collected by P. A. Young; determined by W. W. Diehl.

AMELANCHIER SPP., shadblow, serviceberry, juneberry.

Nummularia discreta (Schw.) Tul., blister canker.

+Iowa - (Archer).

Phyllosticta paupercula Pk., leaf spot.

*+Montana - Bozeman; collected by P. A. Young; determined by W. W. Diehl.

CASTANEA DENTATA, chestnut.

Endothia parasitica (Murr.) P. J. and H. W. Anderson, blight.

The following report has been received from R. B. Clapper, Office of Forest Pathology:

"Survey work to determine the distribution of the chestnut blight was carried on by the Office of Forest Pathology in 1927 to a lesser extent than in the three previous years. Reports were made by members of this office who made trips in the

Southern Appalachians incidental to other work. In addition to the reports thus obtained, reports were received from state and extension pathologists and foresters, members of the United States Forest Service, county agents, timber men and other parties who come in contact with the chestnut problem.

"For convenience in mapping and otherwise recording the spread of the blight, classes of infection have been adopted as follows: 1-9 per cent; 10-29 per cent, 30-79 per cent and 80-100 per cent. At this time, of 200 chestnut producing counties in the Southern Appalachians, not one has an estimated infection of less than 1-9 per cent of the trees infected. The number of counties in this class of infection has been decreasing since 1925, the counties having become more heavily infected. At present, in the 1-9 per cent class of infection, there are four counties in Tennessee and nineteen in Kentucky. In a year or two the infection in these counties will be sufficient to place them in the 10-29 per cent class, and the 1-9 per cent class will be eliminated.

"In 1924, when the first extensive survey was made by the Office of Forest Pathology, it was found that, of 200 chestnut producing counties in the Southern Appalachians, 42, or 21 per cent, had reached an infection of 60 per cent or more. Up to and including 1927, 90 counties, or 45 per cent, have reached an infection of 60 per cent or more. By the end of 1930, most of the remaining 110 counties will have reached 60 per cent infection, the degree of infection at which dead chestnut trees begin to appear in most stands.

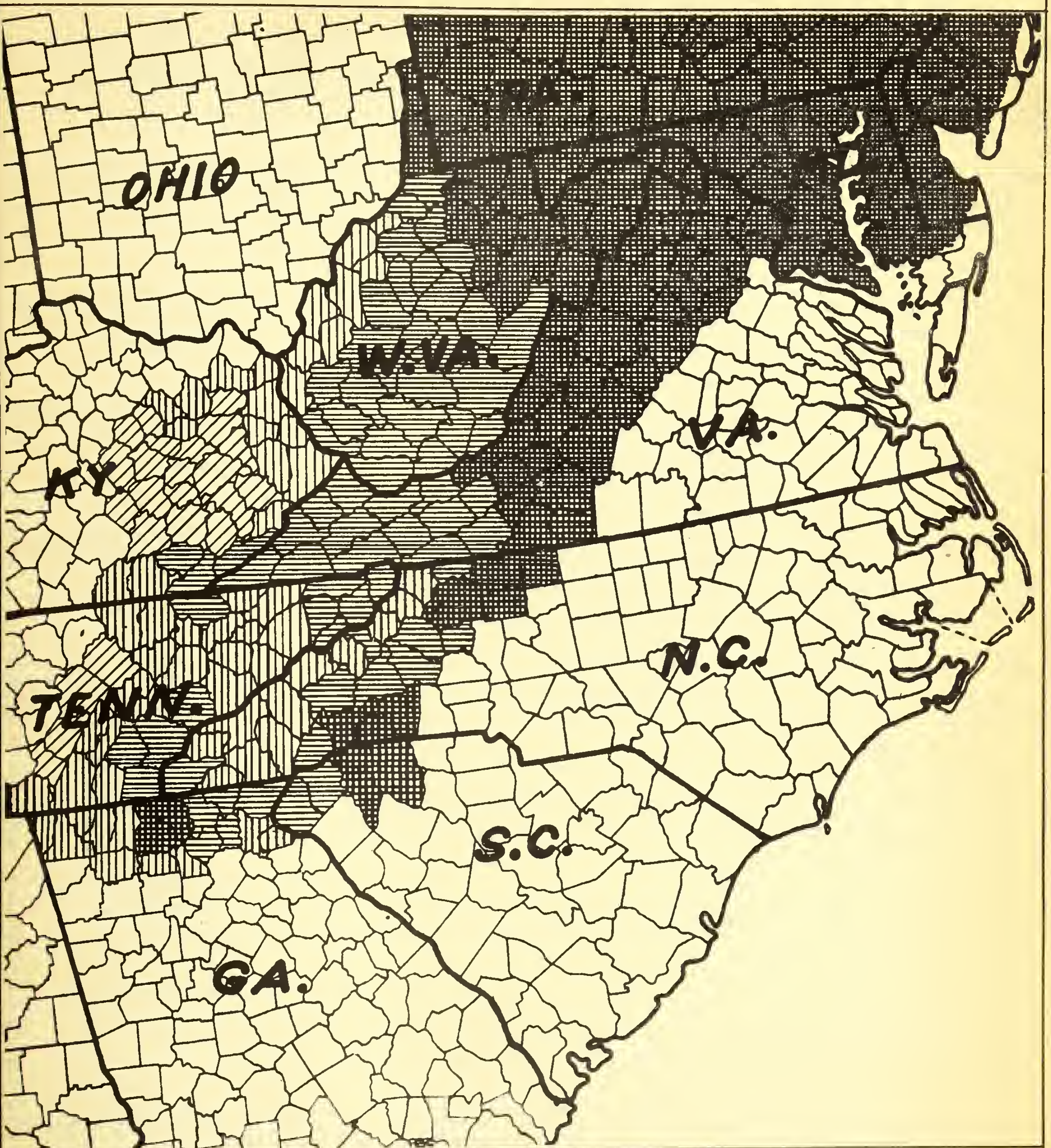
"A survey for blight resistant chestnut trees was carried on by members of the Office in Pennsylvania and West Virginia. Many persons owning or knowing about chestnut trees withstanding the blight were asked to furnish nuts and scions for reproduction and further study of their resistance. Most of the specimens received were from exotic chestnuts, varieties of Japanese chestnuts having the greatest representation. There are specimens of Castanea dentata still surviving the attacks of the blight, around New York City and in eastern Pennsylvania. The factors accounting for the survival of these trees are being studied.

"Chestnut blight was reported in Iowa by W. A. Archer in The Plant Disease Reporter, Vol. XI, No. 13, November 1, 1927. Three trees of medium size in the northern part of the state were killed back to the roots by Endothia parasitica. This infection was undoubtedly the result of an importation of infected nursery stock from the eastern infected states.

"In September, 1927, Dr. D. V. Baxter of the Office of Forest Pathology, located a diseased chestnut tree on Shady Mountain, near Birmingham, Alabama. The causal organism was identified by Dr. Shear as Endothia parasitica. This infection could very probably have originated by the natural dissemination of spores from blighted regions in southeastern Tennessee, or northwestern Georgia. The blight was found in Alabama some years ago at two different places on nursery trees from the infected northern states. These two infections were destroyed and as there was practically no native chestnut growth in their vicinity, it

DISTRIBUTION OF CHESTNUT BLIGHT

FIG. 10



ESTIMATED PERCENT OF INFECTED CHESTNUT TREES

1-9 10-29 30-79 80-100

JAN. 1928

OFFICE OF FOREST PATHOLOGY, U.S.D.A.

is thought that the recent spread into this state has been by natural means."

CRATAEGUS MONOGYNA, English hawthorn.
+Bacillus amylovorus (Burr.) Trev., blight.
Iowa - moderate blighting of limbs and twigs of host on campus at Ames; June 15. (Archer).

ELAEAGNUS ANGUSTIFOLIA, Russian olive.
*+Septoria elaeagni (Chev.) Desm., leaf spot.
Kansas - Franklin County; collected by D. V. Layton; determined by G. Hamilton Martin.

GLEDITSIA TRIACANTHOS, honeylocust.
Microsphaera alni (Wallr.) Wint., powdery mildew.
*+New Mexico - Dona Ana County, September 6. (Crawford).

HICORIA SP., hickory.
Microstroma juglandis (Bereng.) Sacc., witches' broom.
+Connecticut - scattered; appears to be unusually common on forest trees; Tolland County, June 13. (Clinton).

JUGLANS CINEREA, butternut.
Gnomonia leptostyla (Fr.) Ces. & DeNot., anthracnose.
+New York - very common, Tompkins County, July. (Chupp).
+Connecticut - New Haven County, July 13. (Clinton).

JUGLANS NIGRA, black walnut.
Microsphaera alni (Wallr.) Wint., powdery mildew.
+Iowa - local. (Archer).

MALUS ARNOLDIANA.
+Gymnosporangium juniperi-virginianae Schw.
Connecticut - Fairfield County, July 20. (Bender).

MALUS ANGUSTIFOLIA, southern crab.
Gymnosporangium juniperi-virginianae Schw., rust.
*+Tennessee - Knoxville, September. (McClintock).

MALUS CORONARIA, wild sweet crab apple.
Bacillus amylovorus (Burr.) Trev., blight.
+Pennsylvania - rather common on host in wild condition, Center and Clinton Counties, May 30. (Thurston).

MALUS FLORIBUNDA, Japanese flowering crab.
+Gymnosporangium germinale (Schw.) Kern, rust.
Connecticut - general; 47 reports mostly from nurseries. (Bender).
+Leptothyrium pomi (Mont. & Fr.) Sacc., flyspeck.
Florida - (West).

MALUS FLORIBUNDA ATROPURPUREA, purple crab.
*+Phyllosticta sp., leaf spot.
Iowa - Shenandoah, September 1926. (Archer).

MALUS SARGENTI
Gymnosporangium juniperi-virginianae Schw., rust.
Connecticut - Fairfield County, July 20. (Bender).

OSTRYA VIRGINIANA, hophornbeam.
Microsphaera alni (Wallr.) Wint., powdery mildew.
+Indiana - White County, October 8. (Gardner).

PLATANUS SP., sycamore planetree.
Gnomonia veneta (Sacc. & Speg.) Kleb., anthracnose.
Reported from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, +Mississippi, Arkansas, Ohio, Indiana, Missouri, Kansas.
Microsphaera alni (Wallr.) Wint., powdery mildew.
+New Jersey - Germania, July 28. (White).

POPULUS ALBA, white poplar.
*+Cytospora nivea (Hoffm.) Sacc., canker.
Massachusetts - Amherst, August 10; collected by R. J. Haskell; determined by G. G. Hedgcock.

POPULUS ANGUSTIFOLIA, narrowleaf cottonwood.
*+Septoria musiva Pk., leaf spot.
Montana - Bozeman; collected by P. A. Young; determined by A. E. Jenkins

POPULUS DELTOIDES, southern cottonwood.
Dothichiza populea Sacc. & H. Briard, canker.
+Connecticut - Fairfield County, July 29. (Bender).

POPULUS NIGRA ITALICA, Lombardy poplar.
Dothichiza populea Sacc. & H. Briard, canker.
*+Kentucky - Lexington, April 18. (Valleau).
+Marssonia populi (Lib.) Magn., leaf spot.
Indiana - on nursery stock; Marion County, June 28. (Gardner).

POPULUS SARGENTI, Sargent cottonwood.
*+Septoria musiva Pk., leaf spot.
Utah - Roosevelt, August 10. (Linford).

POPULUS TRICHOCARPA, black poplar.
Trametes peckii Kalchbr., rust.
+Oregon - Marion County. (Boyce).

POPULUS SP., poplar, cottonwood, aspen.
Cytospora chrysosperma (Pers.) Fr., canker.
Reported from +New Jersey, Pennsylvania, +Wisconsin, Minnesota, Iowa, Colorado, Utah, Idaho, +Oregon.
Dothichiza populea Sacc. & H. Briard, canker.
Reported from Massachusetts, Connecticut, Pennsylvania, Maryland, +Virginia, Kentucky, +Louisiana, Indiana, Wisconsin.

PRUNUS MELANOCARPA.
*+Coccomyces hiemalis Hig., leaf spot.

Montana - Bozeman; collected P. A. Young; determined W. W. Diehl.

PRUNUS VIRGINIANA, chokecherry.
Exoascus confusus Atk., fruit galls.
+New York - local; Lewis County, June 21. (Welch).
*+Sclerotinia seaveri Rehm.
*South Carolina - Clemson College, April 18; collected by C. A. Ludwig; determined by G. Hamilton Martin and R. J. Haskell.
*Missouri - Jefferson City, April 17; collected by A. C. Burrill; determined G. Hamilton Martin and R. J. Haskell.

QUERCUS ALBA, white oak.
Strumella coryneoides Sacc. & Wint., canker.
+Virginia - severe locally; Salem, October 10. (Fromme).

QUERCUS SPP., oak.
Armillaria mellea (Vahl) Quel., root rot.
+Minnesota - on Q. alba, Q. coccinea, Q. macrocarpa, and Q. rubra; especially prevalent on Q. rubra; White Bear, June 2. (Sect. Pl. Path.).
+Bulgaria inquinans Fr.
Connecticut - on Q. alba; some doubt as to whether this fungus is parasitic; Portland, August 25. (Stoddard).
Bulgaria polymorpha (Oed.) Wettst.
New York - frequently found on Long Island; apparently parasitic but may need special conditions, as a final agent, at least, it works rapidly killing bark and cambium tissues; Oyster Bay, July 10. (Rankin).
Gnomonia veneta (Sacc. & Speg.) Kleb., anthracnose.
Reported from Massachusetts, Connecticut, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Iowa, +Kansas. Especially severe on Q. alba.
Physalospora malorum (Pk.) Shear, twig blight.
Minnesota - on +Q. alba, Q. coccinea, Q. macrocarpa, and Q. rubra; first report from any state for Q. coccinea and Q. rubra; St. Paul, July 12. (Sect. Pl. Path.).
Taphrina coerulescens (Mont. & Desm.) Tul., leaf blister.
Reported from Connecticut, New Jersey, Pennsylvania, South Carolina, Georgia, Florida, Mississippi, Louisiana, +Texas, Indiana, Iowa.

RHUS CANADENSIS, fragrant sumac.
+Sphaerotheca humuli (DC.) Burr., powdery mildew.
Connecticut - Hamden, August 28. (Bender).

SALIX SPP., willow.
Bacterium tumefaciens EFS. & Town., crown gall.
Connecticut - on S. babylonica and S. nigra, first report from any state for these two hosts. (Bender).
+Fusicladium saliciperdum (Alb. & Tub.) Lind., scab.
Maine - Mt. Desert, July 15. (Brown).
Connecticut - a serious trouble on willows in northern part of state; ornamental trees 2-3 feet in diameter showed diseased condition early in June at which time the foliage was largely killed and resembled the anthracnose troubles of sycamores and oaks during

spring season; I found this same trouble in several localities in Nova Scotia and New Brunswick. (Clinton).

Trametes suaveolens Fr., white wood rot.

+Connecticut - Litchfield County, June 24. (Clinton).

SCHINUS MOLLE, California pepper tree.

+Caconema radicicola (Greef) Cobb.

Texas - Dimmit County. (Taubenhaus).

SORBUS AMERICANA SITCHENSIS, western mountain ash.

+Gymnosporangium nootkatensis (Trel.) Arth., rust.

Oregon - altitude 4,000 feet; Clackamas County, August 21. (Boyce).

SORBUS AMERICANA, American mountain ash.

*+Alternaria sp., leaf spot.

Iowa - Shenandoah, September, 1926. (Archer).

SORBUS QUERCIFOLIA, oakleaf mountain ash.

*+Cytospora sp.

Montana - Bozeman, April 8, 1926. (Young).

SORBUS SP., mountain ash.

*+Eutypella sorbi (Schm. & Kze.) Sacc.

Montana - Bozeman, September 6, 1925; collected by P. A. Young; determined by W. W. Diehl.

Nummularia discreta (Schw.) Tul., blister canker.

+Iowa - found in two localities; at Osage the disease occurs on old trees planted on an avenue; a number were dead and many have a severe infection; September 30. (Archer).

ULMUS PUMILA, dwarf Asiatic elm.

+Gloeosporium sp., anthracnose.

Texas - (Taubenhaus).

Ozonium omnivorum Shear, root rot.

Texas - a very susceptible host; 80 per cent loss. (Taubenhaus). Baker (6) states that, though the host is said to be resistant to diseases in general, it is susceptible to this disease and that serious losses were experienced in Wichita Falls, Waco, and other places in northern and central part of state.

ULMUS SPP., elms.

Gnomonia ulmea (Sacc.) Thuem., black spot.

Reported from Connecticut, New Jersey, +Virginia, *South Carolina, *Ohio, Texas, Wisconsin, *Missouri, Kansas.

DISEASES OF ORNAMENTALS

ABELIA GRANDIFLORA, glossy abelia

+Ozonium omnivorum Shear, root-rot.

Texas - severe on both nursery and home plantings (Bach).

ALTHAEA ROSEA, hollyhock.

Cercospora althaeina Sacc., leaf-spot.

+*Ohio - Columbus, Franklin County, August 12. (Mendenhall).

Indiana - rather prevalent in Lafayette; some plants apparently resistant. October (Mains).

*Nebraska - Freemont, October 1926. Collected by R. Johnston. Determined by G. Hamilton Martin).

*Kansas - Manhattan, November 1926. Collected by D. V. Layton. Determined by G. Hamilton Martin.

Puccinia hibisciata (Schw.) Kell., rust.

+New Jersey - very severe infection on small planting; Cedarville, Cumberland County, April 22. (White).

P. r.: Kansas, Nebraska, North Dakota.

Puccinia malvacearum C. G. Bertero, rust.

Reported from Maine (a source of more complaint than any other disease of minor crop, Folsom). New Hampshire, Massachusetts, Connecticut, (more than average year, Stoddard and Bender) New York, Delaware, New Jersey, Pennsylvania, Maryland, Virginia, North Carolina, Ohio, Indiana, Michigan, Wisconsin (a start of an epidemic checked by advent of drought). Minnesota, +South Dakota, (first report), +Nebraska (first report), Colorado, New Mexico, Utah, Idaho, Washington, and Oregon.

AMPELOPSIS SPP., Virginia creeper, Boston ivy.

Guignardia bidwellii (Ell.) Viala and Rav., black-rot.

Reported on A. quinquefolia from New York and New Jersey.

Report on A. tricuspidata from Connecticut, Rhode Island, New Jersey, and +Delaware.

Sphaeropsis ampelopsidis Daniels.

Illinois - (Tehon and Daniels, 50:123).

ANEMONE CORONARIA, poppy anemone.

+*Aphelenchus agricola de Man., nematode.

California - San Jose, Dec. (Cobb).

+*Cephalobus elongatus de Man., nematode.

California - San Jose, Dec. (Cobb).

ANEMONE SP.

+Botrytis sp., crownrot.

New Jersey - very severe, killing plants in large spots; Rahway, Union County, December 28. (White).

ANTIRRHINUM MAJUS, snapdragon.

Colletotrichum antirrhini F. C. Stewart, anthracnose.

New Jersey - Belvidere, Warren County, August 29. (White).

Ohio - Crop almost an entire loss in one large commercial greenhouse; September 15. (May).

Phyllosticta antirrhini Syd., leafspot, stem canker.
+*Maine - Orono, Penobscot County, October. (Folsom).
New Jersey - local; no leaf spotting but a high percentage of stem cankers at soil level caused death of entire plant; New Brunswick, October 29. (White).
Pennsylvania - Breinigsville, January 6. (Weiss).

Puccinia antirrhini Diet. and Holw., rust.
Reported from Connecticut, New Jersey, Delaware, Texas, Ohio, Indiana (dusting with sulphur almost completely eliminated the trouble. (Mains). Minnesota, Nebraska, Kansas (more prevalent; practically destroyed plantings long before they should have ceased blooming. (Elmer). Colorado (common; caused considerable damage. (LeClerg) Utah (said to be difficult to control in greenhouse culture where plants are started from cuttings but seldom present where only seedling snapdragons are grown; yet in one home garden at Logan, seedlings were found thoroughly infested and plants weakened to less than half their full vigor. (Linford)), Washington.

Mains and Thompson (29) have studied the conditions influencing spore germination, and they report successful control with sulfur dust. Several strains showing resistance have been developed.

Sclerotium rolfsii Sacc., crown rot.
+Texas - Lee County. (Taubenhaus).
P. r.: Mississippi.

AQUILEGIA SP., columbine.
Erysiphe polygoni DC., powdery mildew.
+Colorado - very common; appeared too late in season to do any appreciable damage. (LeClerg).

ASPARAGUS PLUMOSUS, asparagus fern.
+*Ascochytella asparagina Petrak, blight. New York (Weiss).

ASPIDISTRA SP.
+Labrella aspidistrae Tehon and Daniels.
Illinois (Tehon and Daniels, 50:126).

BAUHINIA TOMENTOSA, St. Thomas-tree.
+Ozonium omnivorum Shear, root-rot.
Texas - Hidalgo County. (Bach).

BEGONIA SP., begonia.
Aphelenchus olesistus Ritzema Bos, nemic leaf-spot.
New York - several reports. (Massey).
P. r.: New York and Pennsylvania.
Botrytis sp., cinerea type, blight.
New Jersey - Newark, August 13. (White).
P. r.: Illinois, Indiana, New York.
Caconema radicicola (Greef) Cobb, root-knot.
+Texas - unimportant out doors, very important under greenhouse conditions; 2 per cent loss. (Taubenhaus).
P. r.: California, Indiana, Nebraska, Ohio.

BERBERIS THUNBERGI, Japanese barberry.
Leaf-spot, apparently bacterial.
+*Ohio - Put-in-Bay, August 18. (Haskell).
Wisconsin - Madison, June 25. (Vaughan).
+*Kansas - Kansas City, October 1926. Collected by D. V. Layton; det. by G. Hamilton Martin.
P. r.: Minnesota, New York, Michigan and Wisconsin.

BERBERIS SPP., barberry.
Leaf-spot, apparently bacterial.
+*Arkansas - Springdale, Washington County, June 7. (Young).
P. r.: Idaho, Michigan, Minnesota, Nebraska, *New York, North Dakota, *Ohio, *Pennsylvania, *Washington, Wisconsin.

BUDDLEIA SP., butterflybush.
Caconema radicicola (Greef) Cobb, root-knot.
+Texas - trace. (Pessin).
P. r.: Mississippi.

BUXUS SEMPERVIRENS, box.
Macrophoma candollei (Berk. & Br.) Berl. and Vogl., leaf-blight.
New York - Long Island, November 7. (Hollister).
New Jersey - severe; general; New Brunswick, May 12. (White).
+*West Virginia - Charleston, June 25. (Martin).
*Mississippi - Ridgeland, February 5. (Wedgworth).
Nectria rousselliana Tul., canker.
*New York - Long Island, August 1. (Martin).
+*West Virginia - Charleston, June 25. (Martin).
P. r.: Maryland, New Jersey, *New York, *North Carolina, *Pennsylvania.
Phoma sp.
+*Mississippi - Ridgeland, February 5. (Martin and Wedgworth).
P. r.: *District of Columbia.
Frost injury.
Pennsylvania - (McCubbin).

CALENDULA OFFICINALIS, calendula.
+Sclerotium rolfsii Sacc., stem-rot.
Texas - Prevalent sandy soils; 2 per cent loss; Lee County. (Taubenhaus).
Mosaic - undetermined.
Connecticut - one report of infection in greenhouse containing other mosaic plants; host new to state; New Haven, August 7. (Clinton).
P. r.: Iowa, Minnesota.

CALLISTEPHUS CHINENSIS, China-aster.
Coleosporium solidaginis (Schw.) Thuem., rust.
*Virginia - third in importance of diseases of this host in Mathews County aster section; August. (McWhorter).
+South Carolina - less prevalent. (Ludwig).
Indiana - damage largely due to defoliation and unsightly appearance; Yellow Comet very resistant. (Mains).

+Iowa - severe local infection; Ames, September 14. (Archer).
+Nebraska - first time observed by me in state. (Peltier).
Erysiphe cichoracearum DC., powdery mildew.
+*Vermont - Charlotte, August 15. (Weiss and Bruman).
Fusarium conglutinans callistephi Beach, wilt.
+Massachusetts - general; more prevalent; 10 per cent loss; Maximum loss in early part of season. (Davis).
New York - Steuben County, July 28. (Chupp).
+Pennsylvania - about 70 per cent loss on one large commercial planting. (Thurston).
+Delaware - very heavy infection was generally observed, especially with late plantings. No practical control measures have been worked out. The solution of this problem is in the development of wilt resistant varieties as developed for the wilt or yellows of cabbage. (Adams, 40).
Virginia - traces in two fields examined; new land on which asters had never been grown; possible introduction with seed; North, June 29. (McWhorter and Haskell).
Michigan - general; more prevalent; more important than yellows in 1927; all varieties observed susceptible; maximum injury in midseason. (Nelson).
+Wisconsin - present in many gardens; more prevalent; some varietal susceptibility observed; resistant selections give promise; Madison, June 15. (Vaughan).
Minnesota - general; average prevalence; St. Paul, July 14. (Sect. Pl. Path.)
North Dakota - average prevalence. (Brentzel).
+Utah - wilt is driving commercial aster growers out of business and seriously damaging home garden plantings in several localities; found in Iron, Beaver, Utah, Salt Lake and Davis Counties; Cedar City, August 24. (Linford).
P. r.: *Connecticut, *Georgia, Idaho, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, New Hampshire, *New Jersey, *New York, North Dakota, Ohio, Oregon, Vermont, *Virginia, Washington, West Virginia. See Bibl. Jackson (20) and Jones (22).
Yellows, virus.
New Jersey - general; New Brunswick, August 29. (White).
Pennsylvania - quite common; usually very bad where found. (Thurston).
Delaware: - One of the most troublesome diseases of the China aster which discourages many from propagating this attractive flower. The destruction of all weeds which show the disease near plantings will assist in checking the prevalence of the leaf hoppers. Keeping young plants protected from insects during early stages of growth along with frequent applications of nicotine dust as the plants mature should assist in reducing possibilities of infestation. Solid plantings have been observed to be more seriously infested than if interplanted with other flowers. Propagation under glass as long as possible has advantages in order to reduce the exposure to outside conditions. (Adams 1).
Virginia - three commercial fields (one to two acres in size) showed a trace, 2 per cent, and 5 per cent of plants affected with yellows; plants just

beginning to bloom; some plants showed the extreme type (dwarfing) while others showed only parts of otherwise normal plants affected. June 29. (McWhorter and Haskell).
Indiana - Lafayette. (Kohl).
Wisconsin - observed in many gardens in Dane, Milwaukee, Winnebago and Washington Counties; probably widely distributed. (Vaughan).
Minnesota - general; St. Paul, August 5. (Sec. Pl. Path.).
+Nebraska - found in occasional plantings. (Peltier).
+Colorado - has become quite a serious disease with the growers. (Le Clerg).
+Utah - observed presumably for the first time in this state at Murray, September 9. Since then, was seen in several localities in Salt Lake and Davis Counties; 3 per cent heaviest infection noted. (Linford). See Bibl. Kunkel (24), (25); McCallan (31), Ogilvie (38), Weinard (9).

CAMELLIA JAPONICA, common Camellia.
Pestalozzia guepini Desm.
+New Jersey - found on large grey leaf spots and dead twigs; inoculations unsuccessful; local; Rahway, Union County, August 26. (White).
P. r.: Alabama, *Louisiana, *Mississippi, *New York and *Pennsylvania.

CAMPANULA AMERICANA, tall bellflower.
Fusarium sp.
+New Jersey - a Fusarium sp. associated with an undetermined root-rot was isolated from the roots and browned bundles; plants are wilted; lower leaves dead; Caldwell, July 7. (White).

CAMPANULA MEDIUM, Canterbury bells.
+Sclerotinia sp., stem-rot.
Washington - Milton. (Dept. Pl. Path.).

CANNA SP., canna.
Budrot, undetermined.
Delaware - common in a commercial planting, probably caused by bacteria; disinfection of roots is being tried to check it. (Adams 1).

CENTAUREA MONTANA, mountain bluet.
+*Sclerotium sp.
Indiana - Vincennes, August 5. (Weiss).

CHRYSANTHEMUM SPP., Chrysanthemum
Botrytis cinerea Auct., blossom rot.
+Washington - single report from greenhouse; Walla Walla, December 5. (Dept. Pl. Path.).
See Bibl. Pape (40).
Caconema radicicola (Greef) Cobb, root-knot.
Washington - Tacoma. (Dept. Pl. Path.).
Cylindrosporium chrysanthemi Ell. and Dearn., leaf-spot.

Connecticut - on greenhouse plants; two reports; Storrs, November 4. (Clinton).

+*New York - Larchmont, August 23. (Weiss).

Cuscuta sp., dodder.

+Washington - single report from greenhouse; Spokane, July 23. (Dept. Pl. Path.)

Erysiphe cichoracearum DC., powdery mildew.

Connecticut - in greenhouse; Redding Ridge, November 7. (Clinton).

New York - reported from several greenhouses on commercial crop. (Massey).

New Jersey - Clinton, Hunter County, July 3. (White).

Delaware - late season favorable for mildew; no serious disturbance experienced. (Adams 1).

+Mississippi - September 6. (Neal).

Fumago vagans Pers., sooty mold.

New Jersey - New Brunswick, October 5. (White).

Septoria chrysanthemella Cav., leaf-spot.

New Jersey - New Brunswick; June 22. (White).

Virginia - frequent Bordeaux dusting has been found necessary to prevent defoliation; a marked varietal susceptibility was shown. (McWhorter).

Texas - trace, unimportant. (Taubenhaus).

Verticillium alboatrum Reinke and Berth., wilt.

New Jersey - two reports Hunterdon and Middlesex Counties isolated and determined in both cases; Clinton, September 12. (White).

CLEMATIS SPP., clematis, virgins-bower.

Cercospora squalidula Pk., leaf-spot.

+*Utah - on C. ligusticifolia; Duchesne, August 11. (Linford).

Didymaria clematidis Cke. and Hark.

+*Utah - on C. ligusticifolia; Duchesne, August 11. (Linford).

P. r.: *California, *Colorado, *Montana.

Erysiphe polygoni DC., powdery mildew.

Washington - single report from Seattle. (Dept. Pl. Path.).

+Leptosphaeria agminalis Sacc. and Morth.

Oregon - Ashland, September 1925. (Zeller 57: 134).

Puccinia clematidis (DC.) Lagh., rust.

Washington - Walla Walla, July 11. (Dept. Pl. Path.).

CONVALLARIA MAJALIS, lily-of-the-valley.

+Bacterial leaf-spot.

New Jersey - North Branch, August 2. (White).

CORDYLINE TERMINALIS, common dracena.

+Corticium vagum Berk. and Curt., root-rot.

Indiana - (Rutherford, June 15.) (White).

COSMOS SP., cosmos.

Phomopsis stewartii Pk., stem-canker.

+Iowa - found in two gardens. (Archer).

+Kansas - Linn County, October. (Elmer).

P. r.: Michigan, New York, Ohio, *South Dakota.
+Sclerotium rolfsii, Sacc., stem-rot.
Mississippi - Canton, May 18. (Wedgworth).

CROCUS SP., crocus.
Fusarium sp.p., dry rot of bulb.
+Washington - Seattle, October 28. (Dept. Pl. Path.).
P. r.: *Pennsylvania.

CYCLAMEN SP., cyclamen.
Caconema radicicola (Greef) Cobb, root-knot.
+New Jersey - general; damage slight; no severe cases observed; Bridgeton, August 19. (White).
P. r.: Indiana, Nebraska, *Ohio, West Virginia.
Glomerella cingulata (Stonem.) Spauld. and Schrenk, anthracnose.
+New Jersey - found at Bound Brook, Bridgeton and Clinton, September 13. (White).
P. r.: Massachusetts, *Virginia.
Stem rot - undetermined.
New Jersey - found in all cyclamen collections observed; Botrytis cinerea (?) was present on all plants affected; sporulating abundantly. Inoculations negative. Bacteria associated in all cases and are probably primary. (White).

DAHLIA SP., dahlia.
Bacterium solanacearum EFS., tuber-rot.
+Delaware - very heavy infection; careful selection and disinfection as for potatoes should prove effective.
Georgetown, August 1. (Adams).
+Botrytis cinerea Auct.
Rhode Island - abundant on necrotic areas, which occurred where fallen petals adhered; Newport, September 2. (Bruman). Determined by F. Weiss.
Caconema radicicola (Greef) Cobb, root-knot.
*+Georgia - Thomasville, October 24. (Boyd).
+Missouri - a 100 per cent infection in a planting in Dunklin County; southeastern section of state has considerable root-knot; no blossoms were formed on the infected plants examined; Kennett, October. (Scott).
P. r.: California, Mississippi.
Erysiphe spp., powdery mildew.
E. cichoracearum DC., reported from +Indiana and *New Mexico.
E. polygoni reported from New Jersey and Iowa.
Yellows, mosaic.
Connecticut - noted in several places. (Stoddard).
New Jersey - on all of Geisha variety that came from one root in 1926; also on La Favorita, spread by leaf hoppers from a single plant to all in vicinity in one garden where leaf hoppers were bad; July 9. (White).
+Indiana - Owen County, November 2. (Gardner).
Wisconsin - Janesville (August 20) and Madison. (Vaughan).
See Bibl. Goldstein (17).

Stunt, dwarf, rosette.

+New York - common in state; a 90 per cent infection in a field of about one-half acre. (Massey).

Delaware - many plantings showed this symptom early in season but as weather conditions became more favorable for growth, affected plants outgrew the symptoms. (Adams 1).

Maryland - much less than in the New England States. (Norton).

+Kansas - reported once; symptoms include dwarfed leaves, shortened internodes and abnormal number of stalks, giving a dwarfed and a rosette-like appearance; no abnormal internal discolorations of stems or roots, similar in appearance to disease noticed on dahlias in Iowa in 1926. (Elmer).

See Bibl. Goldstein (17), Weiss (52).

DELPHINIUM SP., larkspur.

Bacterium delphinii (EFS.) Bryan, black-spot.

*Maine - Thomaston; June 15. (Folsom).

*Massachusetts - Tyringham, June 2. (Weiss).

Connecticut - New Haven, June 11. (Clinton and Bender).

New York - very common and destructive in all parts of the state; Tompkins County, July 1. (Chupp).

Delaware - very prevalent with early growth; May 9. (Adams).

+*West Virginia - Salem, Harrison County, June 22. (Martin and Craig).

+Indiana - Lafayette. (Kohl).

+Iowa - reported for first time in the state at Des Moines on some English hybrids, nearby American varieties were slightly affected, June 11. (Archer).

P. r.: Connecticut, Delaware, Illinois, Maine, *Massachusetts, Michigan, New Hampshire, *New York, Oregon, Pennsylvania.

Corticium vagum Berk. and Curt., stem rot.

New Jersey - Woodbury, April 4. (White).

+Washington - Puyallup. (Dept. Pl. Path.).

P. r.: *Arizona, *Maine, New Jersey, New York.

Erysiphe polygoni DC., powdery mildew.

Minnesota - Duluth, July 29. (Sect. Pl. Path.).

+Utah - Logan (Linford).

P. r.: Connecticut, Delaware, Indiana, Maine, Minnesota, *Nebraska *New York, *Pennsylvania, Washington, Wisconsin.

Sclerotium spp., root and crown-rot.

Massachusetts - September 14. (Weiss).

Connecticut - Clinton, July 29. (Clinton).

New York - numerous reports. (Chupp).

New Jersey - most severe infection in nurseries where losses reached 10 and 12 per cent; Essex Fells. June 17. (White).

+Virginia - Norfolk, May. (McWhorter).

Kentucky - Lexington, June 15. (Valleau).

Mississippi - general; Starkville, April 21. (Wedgworth).

Texas - Lee County. (Taubenhaus).

See Bibl. Takahashi (49).

Ring spot.

Kentucky - nearly all plants at a local nursery were affected; closely resembles ring spot of tobacco. (Valleau).

Yellows.

Utah - in a garden at Logan: 50 per cent infection on tall perennial varieties; some of the plants became chlorotic in advance of blossoming; leafy proliferation of floral parts was the characteristic feature, all degrees of transformation present from slightly greenish flowers to expansive leafy structures which were recognized as floral organs only by their arrangement on the axis, on some plants the severity of injury varied widely from spike to spike. (Linford).

DENDROBIUM THYRSIFLORUM, Orchid.

+*Botrytis cinerea Auct.

Massachusetts - Marblehead, August 18. (Weiss and Bruman).

DIANTHUS SPP., pink.

+Volutella dianthi (Hals.) Atk., anthracnose.

Indiana - on D. Allwoodii and D. caesius; killed several plants; Lafayette. (Mains).

DIANTHUS CARYOPHYLLUS, carnation.

Alternaria dianthi Stevens and Hall., leaf-spot and blight.

+*Massachusetts - Guba (19) reports that it was the cause of much damage and loss to carnation growers in the vicinity of Boston during the past year.

Bacterium woodsii EFS., bacterial spot.

+*Ohio - serious in greenhouses; Cincinnati, December 14. (Wilson).

Corticium vagum Berk. and Curt., stem-rot.

+Mississippi - general; more prevalent; Grenada, September 6. (Neal).

Texas - Bell County. (Taubenhaus).

Fusarium sp., wilt.

*Massachusetts - about a 1 per cent loss in a greenhouse. (Davis).

+New Jersey - 10 per cent loss in a local planting; found only in Mercer County; Miss Theo most susceptible variety; Trenton, September 27. (White).

Pennsylvania - in greenhouse at State College. (Thurston).

Delaware - very common. (Adams).

Iowa - occasional. (Archer).

Missouri - caused considerable damage in the planting of a florist in Pettis County. (Scott).

+Washington - Spokane and Walla Walla. (Dept. Pl. Path.)

See Bibl. Ludwigs (28) and Preti (43).

Sporotrichum poae Pk., bud-rot.

New Jersey - Montclair, June 25. (White).

*Virginia - Richmond, December 7. (Weiss).

Uromyces caryophyllinus (Schrank) Wint., rust.

DIGITALIS PURPUREA, foxglove.

+Sclerotium sp., root-rot.

*Indiana - Vincennes, August 6. (Weiss).

EUONYMUS SPP., burningbush, wahoo.

Colletotrichum griseum Heald and Wolf, anthracnose.

+*Mississippi - on E. japonicus; Meridian, January 21. (Martin and Neal).
P. r.: *Louisiana and *Mississippi.
Gloeosporium sp., anthracnose.
Texas - prevalent, reported from five counties. (Taubenhaus).
P. r.: Louisiana, Mississippi and Texas.

FICUS ELASTICA, India rubbertree.
Glomerella cingulata (Ston.) Spauld. and Schrenk, anthracnose.
+New Jersey - Rutherford, October 3. (White).
P. r.: *District of Columbia, New York.

FORSYTHIA SP., forsythia, goldenbell.
Caconema radicicola (Greef) Cobb, root-knot.
Mississippi - West Point, February 25. (Wedgworth).
+Pestalozzia sp., leaf-spot.
New Jersey - on F. viridissima (greenstem forsythia), Beverly, September 2. (White).

FREESIA REFRACTA ALBA, common freesia.
Fusarium sp., bulb-rot.
+Washington - Spokane, November 28. (Dept. Pl. Path.).
P. r.: *Pennsylvania.

GALAX APHYLLA, galax.
Dimerosporium galactis Ell. and Ev.
South Carolina - (Stevenson and Wilson).

GARDENIA FLORIDA, Cape-jasmine.
Caconema radicicola (Greef) Cobb, root-knot.
+*Florida - Wauchula, August (Steiner and Gilbert).
+Mississippi - Greenwood, February 22. (Neal).
P. r.: *New York, Texas.
+Phyllosticta sp., leaf-spot.
*Mississippi - Yazoo City, April 11. (Wedgworth). Determination made by N. O. Howard.
Bacterial bud rot.
California - Wilson (55) states that one of the greatest trials of nurserymen who grow gardenias in quantity is the falling off of buds shortly before flowering time. In the San Francisco Bay region, bud drop caused a $2,000 loss in one nursery during 1925. Temperature has a direct influence on the activity of the bacteria, higher temperatures being more favorable. The organism belongs to the group Erwinia and is spread by mealy bugs and ants.

GLADIOLUS SP., gladiolus.
Bacterium gummisudans McC., bacterial blight.
Indiana - Lafayette, November 3. (Gardner).
P. r.: Indiana, Michigan, *Minnesota, North Dakota.
Bacterium marginatum McC., stem-rot, scab.
+*Vermont - on var. Pfitsers' Triumph; Burlington, August 15. (Weiss and Bruman).
+*Massachusetts - Longmeadow; July 27. (McCulloch and Bruman).
New York - increasing in severity; general. (Massey).

Delaware - very common with many outside plantings; carried over with corms and bulblets. (Adams 1).
Indiana - found in ten counties. (Dietz). Noted on varieties. (Mrs. Frank Pendleton). Crimson Glow, America (Mains).
Wisconsin - apparent all summer; general; less than average; Madison, June 15. (Vaughan).
Washington - (Dept. Pl. Path.).
California - appears quite abundantly in several sections of state; affects leaves and flower stalks as well as bulbs; some varieties are injured beyond flower production in the field, others to the extent that the flower stalks rot on arrival at the flower markets. (California Dept. of Agr. 10).
See Bibl. Nelson (37), Scott (45:554), Starrett (48).
Wisconsin State Department of Agriculture (56).

Fusarium spp., rot.
+Mississippi - Lyman, May 28. (Wedgworth).
California - (Scott, 45: 556).

Fusarium oxysporum gladioli Massey, rot.
+*Connecticut - Bridgeport, March 22. (Brierly).
+New York - scattered. (Massey).
New Jersey - on Flora and Anna Berrius varieties only in collection of over 60 varieties; Mutchen, December 27. (White).
Wisconsin - average prevalence. (Vaughan).

Penicillium gladioli McCul. and Thom, corm rot.
Indiana, Minnesota and Iowa. (Elmer 14).
New York, Kansas and New Mexico. (McCulloch and Thom 32 and 33).
+New Jersey. (White).

Sclerotium sp., dry-rot.
New York - General. (Massey).
Indiana - found in seven counties. (Dietz).
Wisconsin - (Wisconsin State Department of Agriculture 56).

Septoria gladioli Pass., hard-rot, leaf-spot.
+Connecticut - one complaint of serious injury to bulbs which produced poor plants later; Devon, January 22. (Clinton).
New York - General. (Massey).
New Jersey - general; very severe infection on corms noted on many varieties in storage; Madison, April 27. (White).
Delaware - considerably on the increase but not recognized usually until corms are ready to plant. A slight infection develops very rapidly after planting, causing complete collapse of all growth. Control is accomplished by soaking the corms two or three hours in a standard solution of the organic mercury compounds sold under trade names. Much of the loss occurs during storage period. After harvest and when corms are dry, the treatment may be made before placing them in storage. This should materially reduce storage losses. (Adams 1).
*Ohio - Lakewood; February 16. (Weiss).
Indiana - Elkhart and Huntington Counties. (Dietz).
Wisconsin - present but not important. (Vaughan).
See Bibl. Wisc. State Dept. Agric. (56).
+*North Dakota - Fargo, October 1. (Brentzel and Weiss).
Washington - Seattle, January 7. (Dept. Pl. Path.).
See Bibl. - Anon. (2), Gloyer (16), and Scott (45).

Recent literature - see Bibl. Beal (7), Clark (11), Delkin (12), Drayton (13), Massey (30), McLean (35), Nelson (37), Schenk (44).

HEDERA HELIX, English ivy.
+Pestalozzia sp., leaf-spot.
New Jersey - Newark, August 13. (White).

HELICHRYSUM BRACTEATUM, strawflower.
+Yellows, undetermined.
New Jersey - New Brunswick, August 13. (White).

HEMEROCALLIS SP., day-lily.
+*Sclerotium sp., root-rot.
Indiana - Vincennes, August 6. (Weiss).

HUMULUS SP., ornamental hop.
Sphaerotheca humuli (DC.) Burr., powdery mildew.
+Connecticut - New Haven, July 20. (Clinton).

HYDRANGEA SP., hydrangea
Botrytis cinerea type, blight.
+*West Virginia - Charleston, June 25. (Martin and Craig).
+*Missouri - more prevalent than in 1926; Jefferson City, June 3. (Burrell). Determination by G. Hamilton Martin.
Cercospora hydrangeana Tharp, leaf-spot.
+Virginia - appears to be the only economic disease of this host in Tidewater section of State. (McWhorter).
P. r.: Alabama, *Mississippi, *Texas.
Oidium sp., powdery mildew.
Pennsylvania - some damage under glass in Washington County. (Thurston).
+*Virginia - many of the first year potted plants at a local nursery were rendered unsightly by an abundance of powdery mildew; varieties Splendens and Marshall Foch were particularly susceptible, variety De Viscage was most resistant; Hampton, October 11. (McWhorter).
+*Utah - found at a local florist, who has propagated own stock for years has noticed this disease for about 15 years but has experienced no serious result from it; Farmington, September 12. (Linford).
P. r.: Florida (1923). New Jersey (1924).
Pape (41) in a recent article notes the recent appearance in Germany of Oidium hortensii and states that it is severe at times and seems to be spreading. He further says that the first mention of the occurrence of mildew on this host was in 1925 in Holland on plants from France, later also on some from Germany. Reported from Denmark in 1926 on plants from Holland and also it had been observed in Norway on plants from Holland. He gives the following observation as to varietal susceptibility. "Varieties severely attacked; Eclaireur, Elmar, Loreley. Moderately susceptible: America, Blauer, Prinz, Freya, Friedr. Matthes, Giselher, Gudrun, HeiderÜsel, Helge, Lancelot, Madame Mouillere, Marne, Marshall Foch, Matador, Mein Ideal, Odin, Parsifal, Peer Gynt, Professor Bois, Schone Perle, Viking. None observed on Gertrud Glahn,

Goliath, Niedersachsen, Schöne Dresdnerin."

Phyllosticta sp., leaf-spot.

+*Virginia - Hampton, October 11. (McWhorter).

HYPERICUM ADPRESSUM, creeping St. Johnswort.

+Cercospora hyperici Tehon and Daniels, leaf-spot.

Illinois - Bremet, Pratt County, July 6. (Tehon and Daniels, 50:127).

IBERIS PECTINATA, candytuft.

+Rhizoctonia sp.,

Arizona - caused a girdling of stems; Alhambra. Arizona News Letter (4).

ILEX OPACA, American holly.

+Sphaeropsis sp., leaf-spot.

New Jersey - caused severe defoliation in one instance. Moorestown, March 16. (White).

ILEX VERTICILLATA, common winterberry.

+Rhytisma ilicis-canadensis, tar-spot.

New York (Fitzpatrick 15:60).

IRIS SPP., Iris.

Bacillus carotovorus L. R. Jones, soft-rot.

New York - New York City - May 1. (Martin).

New Jersey - Caldwell (July 7), Somerville and Vineland; follows borer work. (White).

+West Virginia - Charleston, June 25. (Martin and Craig).

Ohio - scattered. I. germanica very susceptible. (May).

Indiana - found in seven counties scattered over state; much more prevalent; frequent rains in early season were favorable to the disease. (Dietz and Jackson). Noted on varieties Queen Caterina and Quaker Lady. (Mains).

Michigan - dry season unfavorable to disease; less prevalent. (Nelson).

+Washington - Liberty Lake, June 15. (Dept. Pl. Path.).

Botrytis sp., root-rot.

+Wisconsin - northern and central sections; Madison, September 1. (Vaughan)

Didymellina iridis (Desm.) Hoehn., leaf-spot.

Reported from *Maine, Connecticut, *New York, +New Jersey, Pennsylvania, Delaware, Maryland, Virginia, (Japanese iris not affected), *West Virginia, Indiana, Michigan, Minnesota, Iowa, +South Dakota, Oregon, *California.

Macrosporium sp., leaf-spot.

Kansas - general in vicinity of Manhattan. (Elmer).

+Sclerotium delphinii Welch, stem-rot.

*Connecticut - a new host to state; Clinton, August 2. (Clinton).

Indiana - second most serious disease of host in state; conspicuous at digging time; causes loss to commercial growers: serious in June and July at Indianapolis killing foliage on var. Dream, Madam Cheri and Mother of Pearl. (Jackson and Dietz). Noted on Pallida dalmatica. (Mains).

KALMIA LATIFOLIA, mountain laurel.
Phomopsis kalmiae Enlows, leaf-blight.
+New Jersey - local; also found on twigs; Bound Brook, May 27. (White).
P. r.: *District of Columbia, *Virginia.
Phyllosticta latifolia Ell. and Ev., leaf-spot.
New Jersey - general; Bridgeton, June 2. (White).
P. r.: *Delaware, Mississippi and New Jersey.

LABURNUM VOSSI
Fusarium salicis Fr.
Ohio - Tippecanoe City, June 20. Collected by J. M. R. Adams. Determined by C. D. Sherbakoff.

LAGERSTROEMIA INDICA, common crapemyrtle.
Uncinula australiana McAlp. oidial stage, powdery mildew.
Reported from South Carolina, +Mississippi, +Louisiana, Texas.
+Ozonium omnivorum Shear, root-rot.
Texas - Travis County. (Bach).

LATHYRUS ODORATUS, sweetpea.
+Aphanomyces euteiches Drechs., root-rot.
Michigan - Linford (27) states that several varieties were seen at McMillan in 1926 much weakened by the attack of this fungus.
Bacterium tumefaciens EFS. and Town., fasciation.
Reported by Brown (9) for +New York, New Jersey, +Maryland, and +Virginia by Dietz for +Indiana.
Erysiphe polygoni DC., powdery mildew.
Connecticut (Stoddard), +Colorado - very abundant (LeClerg), Washington (Dept. Pl. Path.).
Fusarium sp., root-rot, wilt.
New York - general over state; Wayne County, July 4. (Chupp).
+Mississippi - severe locally; Bay Springs, April 16. (Wedgworth).
Microsphaora alni (Wallr.) Wint., powdery mildew.
New Jersey - general; Bound Brook, May 27. (White).
+New Mexico - causing considerable damage to sweet peas grown for seed; July 1. (Crawford).
+Washington - Seattle. (Dept. Pl. Path.).
Pythium sp., root-rot.
+*Maryland - Catonsville, December 15. (Weiss).
P. r.: Connecticut, New Jersey.
Thielavia basicola (Berk and Br.) Zopf., black root-rot.
Connecticut - severe local infection; Morris December 14. (Clinton).
New Jersey - local; Clinton, January 7. (White).
+Indiana - Floyd County, November 21. (Gregory and Gardner).
Mosaic, virus.
Reported from *New York, +New Jersey, *Virginia and *Kansas.
See Bibl. Weinard (51).

LAUROCERASUS OFFICINALIS, English cherry-laurel.
+Shot-hole, undetermined.
South Carolina- Greenville, July 14. (Ludwig).
Mississippi - Jackson, June 29. (Wedgworth).

LEDUM GROENLANDICUM, true Labrador-tea.
Melampsoropsis abietina (Alb. and Schw.) Arth.,
+*Minnesota - Askov, August 20. (Dept. Pl. Path.).
P. r.: New Hampshire, Wisconsin.

MARSILEA SP., pepperwort.
+*Botrytis sp., blight.
Illinois - Evanston, March 31. Collected by A. H. Povah. Determined by H. H. Whetzel.

MUSCARI BOTRYOIDES, grape hyacinth.
+Sclerotium sp.,
Missouri - August 1. (Scott).

NARCISSUS SPP., narcissus, jonquil.
Aphelenchus subtenuis Cobb, bulb and stem nematode.
+*California - one-third of shipment imported from France, showed infestation; a description of this species and symptoms caused by it will be found in the U. S. Department of Agriculture. Official Record of May 26, 1926.
Fusarium sp., basal rot.
+Washington - Puyallup. (Dept. Pl. Path.).
+Oregon - (McKay).
+California - (Scott 45: 559).
See Bibl. Lewis (26) and Weiss (53).
Sclerotium sp., dry rot.
+Missouri - a serious dry rot developed in stock bulbs in a bulb producing section of the state; August 1. (Scott).
Tylenchus dipsaci (Kuehn) Bast., bulb nematode.
*Virginia - Arlington County, October 12. (Woods).
+*Kansas - Rosedale, August 6. (Weiss).
Oregon - much less prevalent than formerly due to almost universal use of hot water treatment for control; it is reasonable to expect practically complete eradication of the pest from the state in two more seasons' time; spreads faster in moist season; Forest Grove, February 21. (McKay).
California - (Scott, 45:558).
Mosaic, or gray disease, undetermined.
+Virginia - present in all varieties grown as bulb stock in Norfolk section. (McWhorter).
+Oregon - quite prevalent in some stocks and is gradually increasing as control measures are practical for elimination or reduction; appears to spread by contact of plants in row; Corvallis, February 21. (McKay).
+California - (Scott, 45:562).

NUPHAR ADVENA, spatterdock.
+Phyllosticta nymphaeicola Tehon and Daniels.
Illinois - Olney, August 28. (Tehon and Daniels, 50:117).

PAEONIA SP., peony.
Botrytis paeonia Oud. blight.

Reported from Massachusetts (Davis), Connecticut (McCormick), Pennsylvania (Thurston), New Jersey (White), Delaware (Adams), District of Columbia (Martin), Maryland (Norton), Virginia (Haskell), West Virginia (Giddings), Ohio (May), Indiana (Mains), Michigan (Nelson), Wisconsin (Vaughan), Minnesota (Sect. Pl. Path.), Colorado (LeClerg), Washington (Dept. Pl. Path.)

Botrytis sp., blight.

+*Maine - peony shoots, blackened above and below and throughout including the leaves yielded copious fruiting growth of Botrytis upon being put into a damp chamber while plantings from the stem gave only a Phytophthora. A similar association was reported in 1923 by Clinton for Connecticut. (Pl. Dis.Reptr. Suppl. 37:402). (Folsom).

Conn. - one report of serious injury; Wallingford, May 14. (McCormick).

Caconema radicicola (Greef) Cobb, root-knot.

+New Jersey - New Brunswick, August 24. (White).

Wisconsin - Ozaukee County. (Vaughan).

Cladosporium paeoniae Pass., leaf-mold.

+*Vermont - Charlotte, August 15. (Weiss).

+*Rhode Island - Newport, September 2. (Weiss).

New Jersey - appeared only after blooming, rather severe in Middlesex but very slight in Cumberland County; New Brunswick, September 4. (White).

+*Virginia - Reswick, August 29. (Weiss).

+*West Virginia - Janelew, Lewis County, June 22. (Martin).

Michigan - found abundantly in commercial plantings; increasing in importance. (Nelson).

Iowa - common; causes considerable killing of leaves; damage probably slight. (Archer).

Phytophthora sp., stem blight.

*+Maine - associated with Botrytis; July 1: See Sci. 54:170. (Folsom).

+New York - Schenectady, June 19. (Chupp).

Indiana - serious loss in seven acre field; worst on varieties Felix Crousse and Festiva maxima; Knox County. April 28. (Pierce).

Septoria sp., leaf-spot.

+*Maine - on var. Rosette; Portland, August 9. (Weiss).

+*Rhode Island - Newport; September 2. (Weiss).

+Washington - Mason, June 13. (Dept. Pl. Path.)

Mosaic, undetermined.

+*Vermont (Weiss), *Virginia (Wingard), +Kentucky (Valleau), +Iowa (Archer).

PAPAVER ORIENTALE, oriental poppy.

+Rhizoctonia sp., damping off.

Indiana - Lafayette, June 1. (Gardner).

Leaf-spot, bacterial.

Virginia - Norfolk, June 2. (McWhorter).

PELARGONIUM SP., geranium

Bacterium erodii Lewis, bacterial leaf-spot.

Connecticut - New Haven, August 5. (Clinton and Bender).

Bacterium pelargoni Brown, bacterial leaf spot.

New Jersey - caused complete defoliation of plants in cold frames; local; Newark, August 13. (White).

+Delaware - infection on greenhouse plants but did not cause any loss. (Adams 1).

Bacterium sp., bacterial leaf-spot.

Pennsylvania - Miflin County. August (Thurston).

Texas - Falls County. (Taubenhaus).

Botrytis sp., grey-mold.

+New Jersey - very serious in greenhouse; local; Newark, August 13. (White).

+*Missouri - damaged foliage in one greenhouse; Boone County. (Scott).

Minnesota - Mankato, September 17. (Weiss).

PETUNIA HYBRIDA, petunia.

Mosaic - undetermined.

+Indiana - local damage. (Mains).

+Kansas - very common. (Elmer).

P. r.: Connecticut, Iowa, Louisiana, Pennsylvania, South Carolina.

PHLOX SPP., phlox.

Cercospora omphakodes Ell. and Holw., leaf-spot.

Connecticut - fourteen reports; Manchester, August 1. (Bender and Stoddard).

Cercospora sp., leaf-spot.

+*Iowa - Shenandoah, September 1926. (Archer).

Erysiphe cichoracearum DC., powdery mildew.

Reported from Massachusetts, Connecticut, New York, New Jersey, +Oregon. (1925).

Septoria divaricata Ell. and Ev., leaf-spot.

Reported from *Connecticut, New York, Virginia (the most common and most serious disease of this host. (Fromme).

Blight, undetermined.

New Jersey - on all varieties of host; general; leaves die off from the bottom up; Whitehouse Station, June 9. (White).

See Bibl. Weiss (52).

PHOTINIA SERRULATA, low photinia.

+Pestalozzia sp., leaf-spot.

New Jersey - local; Shiloh, November 17. (White).

PRIMULA SP., primrose.

Tylenchus dipsaci (Kuehn) Bast.

Pennsylvania - bad infection; Harrisburg, December 15. (McCubbin).

District of Columbia - 2000 out of 4000 plants were discarded by a single grower. (Brown.).

RHODODENDRON SPP., rhododendron.

+Botrytis sp., cinerea type, seedling blight.

New Jersey - causes death of growing tip and eventually whole plant; local; Bridgeton. August. (White).

Cercospora sp., leaf-spot.

+New Jersey - on R. catawbiense; local; Bridgeton, December 15. (White).

+Virginia - locally severe and destructive; Hampton. October. (McWhorter).

P. r.: Florida.

+Guignardia sp., leaf-spot.

New Jersey - on R. maximum, local; Beverly, September 2. (White).

Laestadia rhodorae Berl. and Vogel, probably the imperfect stage of this fungus, has been previously reported from New York.

Lophodermium rhododendri Ces.

+New York - on R. maximum; on collected plants from North Carolina; New Rochelle, June 15. (White).

Oregon - Alsea Mt. and Blue River. March to June 1925. (Zeller, 57:137).

+Pestalozzia macrotricha Kleb.

New Jersey - general: Bridgeton. May 4. (White).

ROSA SPP., rose. (cultivated and wild species).

Bacterium tumefaciens EFS. and Town., crown-gall.

Reported from Massachusetts (Davis), Connecticut (Zappe), New Jersey (White), +Delaware (Adams), Maryland (Norton), South Carolina (Fenner), Florida (West), Texas (Taubenhaus), +Arkansas (Young), *Indiana (Dietz), Michigan (Nelson), +Wisconsin (Vaughan), +Iowa (Archer), Washington (Dept. Pl. Path.), +Oregon (Zeller), *California (Horne).

+Blastocladia tenuis Kanouse

Michigan - (Kanouse, 23:301).

Botrytis sp., cinerea type, bud blight.

Reported from New York (Fitzpatrick (15:67), New Jersey (White), *Mississippi(Martin and Wedgworth),Texas (Taubenhaus), Washington (Dept. Pl. Path.)

Cercospora rosicola Pass., leaf-spot.

Reported from South Carolina (Ludwig and Fenner), *Mississippi (Wedgworth and Neal), *Michigan - collected by Eilleen W. Erlanson. Determined by G. Hamilton Martin. *Kansas - collected by D. V. Layton. Determined by G. Hamilton Martin.

Cladosporium fuscum Link, leaf-spot.

*Mississippi - Lauderdale and Jackson Counties, March 26. (Wedgworth and Neal).

Coniothyrium sp., cane blight and canker.

Reported from *New York, *New Jersey, *Maryland, *District of Columbia, *Virginia, *West Virginia, *Tennessee, *Florida, Texas, *Ohio, *Indiana.

Cylindrocladium scoparium Morgan, crown canker.

New Jersey - 25 per cent reported useless with an additional 50 per cent infection; Madison, February 17. (White).

+*Ohio - Martin's Ferry, January. (Jenkins).

Diaporthe umbrina Jenkins, brown canker.

Reported from *New York, *New Jersey, *Pennsylvania, Delaware, *District of Columbia, *Maryland, *Virginia, *West Virginia, Florida, +*Mississippi.

See Bibl. Jenkins. (21: 161-182).

Diplocarpon rosae Wolf, black spot.

Reported from Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, *District of Columbia, *Maryland, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Louisiana, Texas, Arkansas (severe), Ohio, Indiana, Michigan, Wisconsin, Iowa, Missouri, North Dakota, Kansas, Washington, Oregon. Several reports stated that it had been very severe and hard to control.

Discosia artocreas (Tode) Fr., blossom blight, stem canker.

+*Connecticut - Washington. Collected by Beatrice Hinkle. Determined by G. Hamilton Martin.

+*Mississippi - A. and M. College, March 31. Collected by D. C. Neal. Determined by G. Hamilton Martin.

Ozonium omnivorum Shear, root rot.

+Arizona - several large bushes killed in a garden at Tempe. (Arizona News Letter, 5).

Pestalozzia rosae Westd.

+*Virginia, on variety Sunburst; Norfolk in May and at Virginia Beach, September. (Martin).

Pestalozzia sp.

+*Mississippi - scattered: March 31. Collected by Wedgworth and Neal. Determined by G. Hamilton Martin.

Phyllosticta rosae Desm., leaf-spot.

+*Iowa - Shenandoah, September. Collected by W. A. Archer. Determined by G. Hamilton Martin.

Sphaerotheca pannosa (Wallr.) Lev., powdery mildew.

Reported from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Tennessee, North Carolina, South Carolina, Florida, Mississippi, Louisiana, Texas, Arkansas, Ohio, Indiana, Michigan, +Wisconsin, Minnesota, Iowa, Missouri, North Dakota, Nebraska, Kansas, Colorado, +New Mexico, Arizona, Utah, Idaho, Washington, Oregon.

RUDBECKIA LACINIATA, coneflower.

+Mosaic, undetermined.

Indiana - Lafayette, June 28. (Gardner).

SALVIA SPLENDENS, scarlet sage.

+Rhizoctonia sp., damping off.

New Jersey - East Patterson, March 25. (White).

SENECIO CRUENTUS, cineraria.

+Botrytis sp., cinerea type, leaf-spot.

New Jersey - in many greenhouses; excessive humidity in all cases; Newark, August 13. (White).

+Verticillium sp., wilt.

New Jersey - local; Clinton, January 7. (White).

SHEPHERDIA ARGENTEA, silver buffaloberry.
+Cylindrosporium shepherdiae Sacc.
*Utah - Vernal, August 9. (Linford).

SMILAX SP., smilax
+Phoma sp., stem canker.
*Mississippi - A. and M. College, February 20. Collected by H. H. Wedgworth. Determined by G. Hamilton Martin.

SOLANUM PSEUDOCAPSICUM, Jerusalem cherry.
+Mosaic, undetermined.
Virginia - October. (McWhorter).

SPIRAEA LUCIDA, spiraea.
+*Cylindrosporium salicifoliae (Trel.) Davis.
Montana - Bozeman, August 22, 1925; collected by P. A. Young. Determined by W. W. Diehl.
+Caconema radicicola (Greef) Cobb, root-knot.
Mississippi - Lumberton, December 30. (Wedgworth).

TIGRIDIA PAVONIA, common tigerflower.
+Bacterium marginatum L. Mc.
*Maryland - isolated from black lesions on bulbs; Takoma Park. Determination by Lucia McCulloch.

TULIPA SPP., tulip.
Botrytis tulipae (Lib.) Hopkins, botrytis blight.
Report from *Maine, +Massachusetts, New York, New Jersey (severe general losses, White), +Delaware, *+Virginia, +*Kentucky (considerable local loss, Valleau), Indiana, +Michigan (general losses in commercial plantings, Nelson), *Wisconsin, Minnesota, +Missouri, Washington, Oregon.
See Bibl. Biekart (8), McKay (34), Scott (45), Westerdijk (54).
+Rhabditis cylindrica Cobb, nematode.
*Arkansas - Little Rock, April 22. Collected by V. H. Young. Determined by N. A. Cobb.

VIBURNUM OPULUS, European cranberrybush.
Phyllosticta punctata Ell. and Dearn., leaf-spot.
+*Iowa - Shenandoah, September 1926. Collected by W. A. Archer. Determined by G. Hamilton Martin.

VINCA MAJOR, herbaceous periwinkle.
Puccinia vincae (DC.) Berk., rust.
Massachusetts - caused a serious loss in a greenhouse; Fall River. (Doran).

VIOLA SP., violet.
+Cladosporium sp., leaf-spot.
New York - Onondaga County, September 8. Determined by H. M. Fitzpatrick. (Chupp).

Sclerotium rolfsii Sacc., root-rot.

+*Virginia - in gardens at Virginia Beach May 30, where the tall ornamental delphiniums are grown, a Sclerotium apparently identical with that on delphinium is causing a serious root-rot of cultivated violets. (McWhorter). Cherrydale, July 8. by C. L. Shear.

P. r.: Alabama, Mississippi, South Carolina.

See Bibl. Paintin, (56).

WISTERIA SP., wisteria.

Phyllosticta wisteriae Sacc., leaf-spot.

+*Missouri - St. Joseph, October 1926. Collected by D. V. Layton, determined by G. Hamilton Martin.

P. r.: *Texas.

YUCCA SP., common yucca.

Coniothyrium concentricum (Desm.) Sacc.

+Colorado - widespread; found on old leaves; July 1. (LeClerg).

P. r.: Alabama, *Idaho, Indiana, *Iowa, *Maryland, *New Jersey, *New York, *North Dakota, *Virginia.

ZANTEDESCHIA AETHIOPICA, common calla-lily.

Bacillus aroideae Town., soft-rot.

+*Pennsylvania - Carlisle, (Weiss).

P. r.: Indiana, Maryland,

ZINNIA ELEGANS, common zinnia.

Cercospora atricincta Heald and Wolf, leaf-spot.

+*South Carolina - Shelton, September 9. (Diehl and Ludwig).

P. r.: Florida, *Texas.

Erysiphe cichoracearum DC., powdery mildew.

+South Carolina - Clemson, College, September 5. (Ludwig).

+Indiana - Lafayette, November 3. (Gardner).

+*New Mexico - unusually severe, State College, September 7. (Crawford).

Mosaic - undetermined.

+Connecticut - greenhouse plants which were kept too near mosaic plants became accidently infected. (Clinton).

+Kansas - very common. (Elmer).

P. r.: Iowa.

DISEASES OF MISCELLANEOUS HOSTS

CHAMAEDAPHNE CALYCULATA

Melampsoropsis cassandrae (Pk. & Clint.) Arth., leaf spot. *+Minnesota.

DESMANTHUS ILLINOENSIS

Cercospora desmanthi E. & K., leaf spot. *+ South Dakota.

EPILOBIUM ANGUSTIFOLIUM

Ramularia cercosporioides Ell. & Ev., leaf spot. *+Montana,

EPILOBIUM COLORATUM
+Plasmopara epilobii (Rabh.) Schroet., downy mildew. New York.

ERIGERON ANNUUS
+Aster yellows. Kansas.

FRAGARIA AMERICANA
Mycosphaerella fragariae (Tul.) Lindau, leaf spot. *+Wyoming.

FRAGARIA VIRGINIANA
Cercospora vexans Massee., leaf spot. *+New York.

HERACLEUM LANATUM
Cylindrosporium heraclei (Desm.) Ell. & Ev., leaf spot. *+Montana.

LATHYRUS SULPHUREUS
*+Urophlyctis lathyri (Bjorn.) Palm., crown wart. Oregon.

LEPTILON CANADENSE
*+Aster yellows virus (.?) yellows. Maryland.

NICOTIANA TRIGONOPHYLLA
*+Oidium sp., powdery mildew. New Mexico.

OENOTHERA BIENNIS
Erysiphe polygoni DC., powdery mildew. +New Jersey.

OENOTHERA LACINIATA
Erysiphe polygoni DC., powdery mildew. *+Virginia.

PHYTOLACCA AMERICANA
+Ozonium omnivorum Shear, root rot. Texas.

PLANTAGO SP.
Ovularia obliqua (Cke.) Oud., leaf-spot. *+Ohio.

RANUNCULUS SEPTENTRIONALIS
+Didymaria didymia (Ung.) Schroet., leaf-spot. Indiana.

RUDBECKIA LACINIATA
+Cercospora rudbeckiae Pk., leaf-spot. New York.

SHEPHERDIA CANADENSIS
*+Cylindrosporium sheperdiae Sacc., leaf-spot. Montana.

SMILAX HISPIDA
Puccinia smilacis Schw., rust. *+Missouri.

TARAXACUM OFFICINALE
*+Protomyces pachydermus Thuem. Utah.
Ramularia taraxaci Karst., leaf spot. *+Missouri.

THALICTRUM POLYGONUM

Phytophthora thalictri Wilson & Davis, downy mildew. +New York.

VACCINIUM PARVIFOLIUM

Calyptospora columnaris (A. & S.) Kuhn, witches broom. +Oregon.

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Supplement 66

Index to Supplements 58-65

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BUREAU OF
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UNITED STATES DEPARTMENT OF AGRICULTURE

INDEX OF ORGANISMS AND NON-PARASITIC DISEASES IN THE PLANT DISEASE REPORTER SUPPLEMENTS LVIII--LXV, 1928

Plant Disease Reporter
Supplement 66

December 31, 1928

Prepared by Mary G. Van Meter and Rosella C. Loftus

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ERRATA AND EXPLANATION

Page

25 Read "Coniothyrium pyrina" instead of "C. pirina".

34 Read "Guignardia bidwellii" instead of "G. bidwelli".

238 Read "Thielavia basicola" instead of "Thielavie basicola".

297 Read "Sclerotinia sclerotiorum" instead of "S. sclerotorium".

350 Read "Bacterium puerariae" instead of "B. pueriae".

363 Read "Marssonia" instead of "Marsonia".

385 Read "Ceratostomella fimbriata" instead of "C. fimbriatum".

386 Read "Bacterium solanacearum" instead of "Bacillus solanacearum".

405 Read "Nectria cinnabarina" instead of "N. cinnabarine".