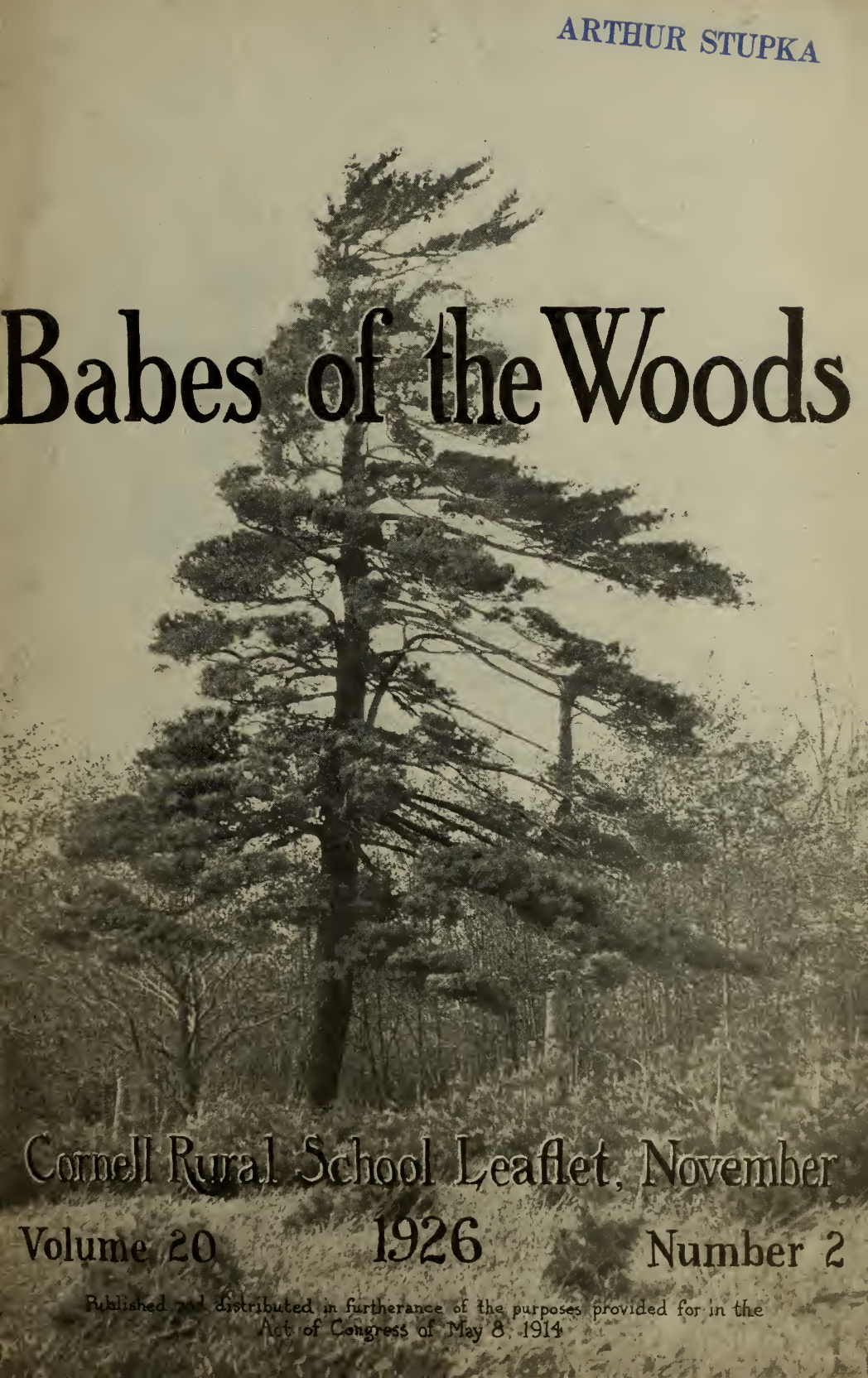


ARTHUR STUPKA

Babes of the Woods



Cornell Rural School Leaflet, November

Volume 20

1926

Number 2

Published and distributed in furtherance of the purposes provided for in the
Act of Congress of May 8, 1914

CORNELL RURAL SCHOOL LEAFLET

PUBLISHED BY

THE NEW YORK STATE COLLEGE OF AGRICULTURE
AT CORNELL UNIVERSITY, ITHACA, NEW YORK

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THIS ISSUE IS FOR BOYS AND GIRLS

CORNELL RURAL SCHOOL LEAFLET

VOLUME XX

ITHACA, NEW YORK, NOVEMBER, 1926

NUMBER 2

BABES OF THE WOODS



ARE there not some of you who remember the story of the "Babes in the Woods"? How, when lost and hungry, they lay down under the trees, and two kind robins came and covered them with dead leaves? We have been wondering what happened next, have we not? That is exactly what Peter wondered about some seed babes in which he was interested, and one lovely May morning he ran smack into a whole nursery of them on his father's woodlot.

You remember Peter, of course, if you read the past Leaflets on woody plants. The "Woody Plants in Autumn" Leaflet, November, 1921, introduced you to Peter and to the little old man who granted a very foolish wish Peter made. As a result Peter had to work very hard, and incidentally learned a great deal about woody plants. The November, 1923, Leaflet told you how Peter used his knowledge to help him build fires and to cook his meals out-of-doors. Although Peter did not enter into the January, 1924, Leaflet which told you how to make woody plants work for you, I am certain that he has lost none of his interest in these things, nor has he lost his keen eyes. We shall presently see.

WHEN TREES RACED

A story for the younger children

It has been a long time since you read a story about Peter. Peter it was who wished that all the wood in the world was far away because he had to keep the wood box filled, and who finally brought the wood back by learning something about it. I heard another story about Peter the other day, a story about Peter and some "Babes of the Woods." During the winter, cold winds had been howling around Peter's house, but Peter had not worried because there was a good pile of beech and maple behind the woodshed and plenty more tall trees in the woodlot on the top of the hill behind the house. But every family was not so fortunate as Peter's family. Many townsfolk have no real woodpile behind the house, you know. Their woodpile consists of a few boards from the crate the new



A WOODPILE LIKE THIS MAY OR MAY NOT APPEAL TO YOU

radio came in or of some small branches torn from the maple in the front yard by last summer's lightning. The wind howled around their houses too, so they came to Peter's father to buy wood for their fires, and he began to cut down the big trees on Turkey Hill. Peter used to go up on the hill with his father to watch the ax fly and to tug on the end of the big cross-cut saw. He loved to hear the z-z-z-z of the saw, to see the yellow bits of wood leap like live things from under the singing teeth, and to smell the sweet fresh odor of the sawdust.

But, finally, most of the big trees on the hill had disappeared. Spots in the woodlot were bare and lonely until something happened. Certain "Babes of the Woods," tiny maples, poplars, buttonballs, and hickories, began a race to cover the hill with tall trees once more. All unknown to Peter he was to help to decide the winner of the race — but that comes later.

How can little seedlings race? Not by pulling up their roots by their own bootstraps and dashing madly up the hill. No. They do not travel that way. However, they do travel. We will watch them start, at least.

Peter helped one of the first trees to start, although he did not know it at the time. With the coming of the spring and the warm winds, water began to flow down the hills and sap was in the trees. Rain fell and the snow began to melt away. Peter's father busily rattled the sap buckets stored in the barn, and started for the maple sugar bush on the lower slope of Turkey Hill. One morning after the sap had ceased to run, Peter

was carrying an empty bucket up the hill, whistling merrily and thinking of the fun he had had with the boiling down of the sap, and of the good times around the stove in the kitchen during chilly evenings to come. Then his mother would make maple-sugar candy, while his father and he would crack some walnuts they had gathered in the fall, and perhaps they would bring in a big pan of snow for maple-sugar wax. So busy was Peter with his happy



PETER AND HIS SAP BUCKETS

thoughts that he did not notice a little green-winged stranger whom the vagrant wind blew gently down from one of the tall elms that Peter's grandfather had dug up and planted in front of the house years ago. The stranger glided quickly into one of the sap buckets and was carried up the hill. Peter shook some of the dust from the buckets before storing them and out fell the little green stranger. The wind caught it up and carried it to the edge of the clearing before it was able to slip in between the moist leaves on the ground. Peter and the fresh spring wind had helped in the start of the race.

A couple of weeks later some other strangers appeared in the long "pussies" of the poplar trees in the side yard. Peter saw them hanging on the tree but did not know much about the tiny little fellows who were about to start in the race to cover the hill with tall trees once more.

At night one of the little poplar strangers started out from his home in the tree top. He was only pinhead in size and he wore a brown overcoat.



AMERICAN ELM

Unlike the elm child, this adventurer was not a glider but a sailor. He spread his hundred or more silky-white, thin sails and, carried by the lazy wind, sailed higher and higher, while slow clouds slipped past the face of the moon in endless procession. Finally he came to rest on the top of the hill. What did it mean? Another stranger had started in the race.

If only Peter could have known about this and had been able to watch it.

August came and with it came many new seeds. One hot sultry morning Peter saw a prim old robin in a choke-cherry tree in the hedgerow along the lane behind his house. Hungry as usual, Mr. Robin was eating the dark-red juicy cherries, staining his bill for the moment with the same red color that the Indians used to stain their baskets with years ago. He ate a great many cherries that day, dropping the pits in the tall grass where they were as lost as if they had been dropped in a haystack. One he carried with him until the sun had slipped down behind Turkey Hill. Then Mr.



COTTONWOOD

Robin flew along a splashing brook that ran down the hill to a cool, quiet, little pool. When he stopped for a drink, the last cherry pit was dropped on the ground. Another seed had entered the race. Peter may have seen Mr. Robin eating the cherries but I doubt if he realized just how he was helping in the race. Do you think he did?

September came with dusty, hot school days when Peter could hardly stay indoors. He thought of going fishing and of swimming in the creek and of all the vacation days that he had enjoyed. But real fall days came at last and the leaves turned red and yellow and the hills in the distance were blue and hazy. In the upland pastures and along the river valleys, nuts of all kinds were ripening and falling to the ground. Peter gathered as many of them as he could, although he could not compete with the squirrels and chipmunks who did not have to interrupt their nut gathering to go to school. One Saturday afternoon Peter had his cap filled and his



CHESTNUTS

These entries in Peter's race are losing a race with the chestnut blight disease

pockets bulging with hickory nuts, walnuts, and butternuts. On his way across the clearing on the slopes of Turkey Hill, he stubbed his toe on a rock, and a few of the nuts fell out of his pocket, unnoticed. What had happened? Again Peter had helped in the race.

There were, however, many entrants who never thought of asking Peter or anyone else, except the wind, for a ride. The sugar maples in the sap bush produced seed abundantly and the wind carried them away with a swoop and a swirl. The white pine opened the door of its little cone house. The seeds slipped out one by one, whirled round and round, and sailed over the slope of the hill.

There was splendid fun all fall for Peter and his friends but none of them was sorry to have winter come, when they could slide down hill and skate on the mill pond above the dam, or could tramp through the snowy fields with Peter's father, hunting rabbits. And so it happened that Peter saw one of the last entries in the race.

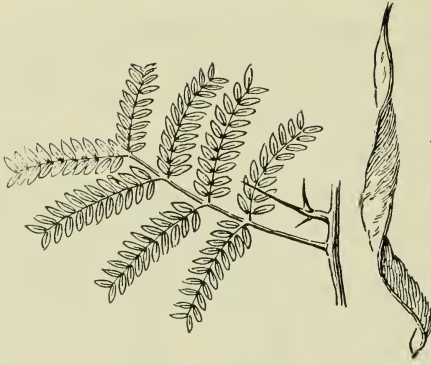
Up where the brush piles were, were the rabbits, and there also was Peter. As he tramped from pile to pile the crusted snow broke beneath him. It was not a good day to find rabbit tracks but the best kind of sledding for the long black-locust pod

that slid over the crust and dropped into the tracks Peter had just made. He picked it up, to find but a single seed still hanging stoutly to its sled. He dropped the pod and stood watching as it skidded and skated over frozen snow with its lone seed for pilot and for cargo. If he had stopped to look, Peter would have found another seed in the track out of which he had picked the pod, but he was looking for rabbits.

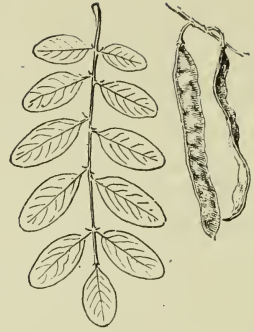
When spring came again with its warm sunshine and the seeds started to grow, who do you suppose had won the race? Which seeds were to be found in greatest numbers on the slope of Turkey Hill? I do not know. Peter found some of them there when he was cutting cross-lots for the cows. Perhaps you can tell me just who did win after all by looking for the seedlings in some woodlot near your home.



BOX ELDER



HONEY LOCUST



BLACK LOCUST

WHY SEEDS AT ALL?



THERE are a few who have not heard of the boy who, when asked what he liked to do best, replied with evident sincerity, "To eat." "The way to a man's heart is through his stomach" is an expression that rings as true now as it did when it was first coined. Not only do you like to eat but you are also particular what you eat, are you not? Think what you found waiting for you as you drew your chair to the breakfast table this morning. Was it oatmeal or some prepared breakfast food? Or did you have bread and butter, while your mother had toast and coffee?

It would be quite unnecessary ever to ask any farm boy or girl where bread comes from, or from what the flour that goes to make the bread is made. If you want to follow it back to where it came from, naturally you will go to the mill. What is being ground there but seeds? What was the main part of your breakfast but seeds? Oatmeal comes from oats, other breakfast cereals from wheat, corn, and rice. The flavor of the hot cup of cocoa that warms you these frosty mornings depends upon the husk of the fruit that produces chocolate and grows on a woody plant of the tropics.

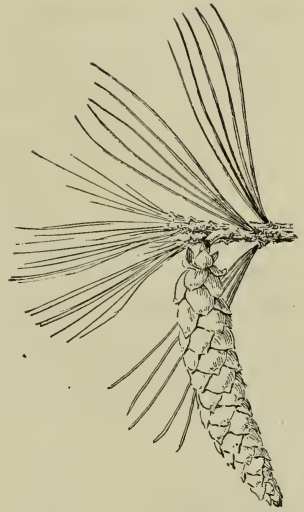
Were it not for seeds, you would not be able to have johnnycake for dinner, but this is not the real reason for the existence of seeds. Seeds are of great advantage to man and other animals as their main source of food but they are all important to the plants that produce them, for without them most plants would soon disappear, and without plants you and I would have a dreadful time trying to get something to eat, to wear, or to look at.



FIR



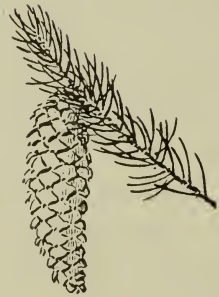
LARCH



WHITE PINE



HEMLOCK



NORWAY SPRUCE

And yet many of the plants that you saw on your way to school this morning reproduce their kind abundantly by means of parts other than seeds. Some members of the grass family in particular may spread rapidly by means of horizontal stems. Many cultivated plants and some shrubs and trees are raised successfully by setting out parts of the plants called *cuttings*, or *slips*.

Many flowering plants, however, depend mainly or entirely upon seeds for their continued existence. Especially is this true with trees and shrubs. The pines, spruces, and hemlocks that can often be seen from

the school window have no other means of reproducing themselves, and though most of the maples, elms, hickories, and other hardwood trees have the power to send up sprouts, or shoots, from the stump or roots, these shoots rarely, if ever, acquire the size of the tree that grows from a seed. After a while most trees lose this ability and have to depend entirely on seeds.

HOW SEEDS ARE FORMED

Have you ever tasted basswood honey, — the rich, bright, yellow sort that goes with flapjacks on a cold morning? Of course you are familiar with the story of the bees that help to produce it. Perhaps you have seen a maple or a tulip tree in the spring and noticed the flies and bees that gather about the flowers in search of something to eat. These are the fellows that all unwittingly make the formation of many good seeds possible.

Some place about the flowers there are two little organs, living, generally waiting for an insect or a vagrant wind to find them. These organs might go by the names of Mr. Anther and Mrs. Stigma. Of course a biologist would call them anther and stigma only, but as the former is essentially a male and the latter a female, I think that we shall call them Mr. and Mrs. just for fun. Mr. Anther may be a queer old chap who does nothing all day but try the best he can to give away a load of many-shaped balls, called *pollen*, to certain insects that come along. Sometimes other Mr. Anthers may give their tiny pollen balls a shake and they will go sailing on the wind like so many toy balloons. But Mrs. Stigma is usually a thrifty soul, and as the insects brush by her on their way to and from the sweet center of the flower she grabs as many of the pollen balls as she can. Sometimes she accepts pollen balls from anthers on her own tree; often she prefers pollen carried by wind or insects from some other tree. And presently, if the pollen grains are from the same kind of tree, they germinate and send out little pollen tubes of their own that grow through into the stigma. That is part of the way a new seed is started.

After the seed has once started to form it may develop rapidly or slowly, depending very largely upon what its ancestors have done before it. If it is a pine, it will take two years for it to become large enough to desert its parent tree, and in the meantime it will grow up with its brothers and sisters in a house that is roofed over with long woody scales, or shingles. This house is called a *pine-cone*. Each seed of the pine, before it is ready to venture into the world alone, is supplied with a wing for sailing. Other trees, such as the elms, may raise, equip with wings, and shed their seeds almost before the spring-time leaves are out. Red-maple and silver-maple seeds also start in the spring, but most seeds ripen in the fall of the same

year they started to grow. When they are ready to leave the parent tree, they float or sail, whirl or roll, or just drop straight down, whichever way is natural, to find new resting places and a permanent home, — but that is another story.

HOW SEEDS GET TO A GOOD PLACE TO GROW

Who among you is so hardy as to say that you have never taken a peep inside a seed voyager either before or after he has left his nursery in the tree tops? Show me the fellow who has never gathered hickory nuts and I will show you some one who lives a mighty long ways from hickory trees. Who among you has not stepped on a soft maple seed in the spring just to hear it pop and to see the green plant inside hurry to get out? Peeping into the seed to see that the plant is really there with its lunch packed all around it, put up by its mother unless she forgot it, is lots of fun whether we can eat the fruit afterwards or not.

Did you ever pack a lunch and get all ready for a picnic or a long journey while the day was bright and sunshiny, only to have it rain? Then you would have to put off the journey until the weather cleared. That is just what happens to our pine-seed baby. After he has spent from ten days to a year and a half growing, his mother decides it is high time that he went off on a picnic, so she opens the scale shingles of his cone house and lets him go. Sometimes she waits until the strong winds blow and tug at the little seed. Presently if they pull hard enough, the seed may forget its comfortable home and go sailing off over the tree tops to dance and play with the wind. If it happens to be a hickory nut instead of a pine seed, his mother throws the front doors wide open and lets him tumble out.

If you or I were to go on a journey, we would either walk or ride. No one has ever discovered true legs on seeds; they naturally have no choice but to roll or ride. Occasionally we find a seed like the witch-hazel that is actually shot through the air. But no two kinds of seeds are exactly alike, and each particular kind has a method all its own of getting to a good place to grow.

Those seeds that are big and fat and lazy usually fall down and roll over and over when they leave the parent tree. No one would expect to gather butternuts anywhere except under the tree from which they tumbled. So it is with our hickories, walnuts, beeches, and oaks. Yet sometimes these fellows catch a ride without even so much as asking for it. Along may come a squirrel looking for nuts to store against the cold winter to come. He picks up a mouthful of nuts and scampers off to store them in some fence corner, hollow tree, hole in the ground, or under a stone. This would sound suspiciously like riding off to market were it not for



BUTTERNUT

the fact that most squirrels are forgetful fellows at best and can not always remember just where all of the nuts are stored. Then, too, squirrel pie is a delicacy much appreciated by many hawks and owls and by not a few hunters. Thus the squirrel may never return to the nuts he has so carefully stored, and the seed's journey may end in a place where the nut may grow without having too many other nuts to compete with. In this way the squirrel may do some good after all.

From this you must not think that I am defending the squirrels and the rats and the mice that probably eat far more seeds yearly than do all the people in the world. You would have a rather hard time trying to raise any trees or shrubs from seeds planted in the open unless you first poisoned, shot, or trapped the rodents that would otherwise show their appreciation of your generosity in furnishing them with food by gobbling the

seeds down or storing them away the moment your back is turned. The same result is obtained when seeds are planted on a commercial scale by enclosing the entire nursery with fine wire fencing or the seedbeds with fine-mesh screen boxes.

If you read the story of Peter and of how he helped the trees to grow again on Turkey Hill, you will remember that after he had gathered a pocketful of hickory nuts, he stubbed his toe and spilled a handful or so. Although that was merely an accident, such happenings are responsible for the spreading of many seeds over long distances.

Perhaps you have heard the clever expression suggested by some energetic apple growers, "an apple a day keeps the doctor away." Since you live in the country, you can gather your quota easily. Hardly a picnic is complete without a couple of apples or pears or peaches. After the fruit is eaten, the core or pit is usually tossed aside. If it lands in a favorable place, the seeds in it may start to grow. If human beings do not like a fruit, some bird or animal may. Most of you have seen in your shuffles through the woods a low-trailing, green-leaved vine with bright berries. Perhaps you have said, "That's a partridge berry." This berry takes its name from the fact that partridges are very fond of it. Possibly because it is bright red it attracts the attention of the birds who feed on the fleshy part of the fruit. The small seeds pass uninjured

through the digestive tract of the bird and are thus scattered. So you see that both the bird and the plant benefit.

The seeds that depend upon the birds and animals to help them find good places constitute a legion. The fruits of the common Virginia creeper, the ne'er-do-well poison ivy sometimes confused with it, and the bittersweet with its bright orange fruits may fall to the ground and start to germinate, but very often they are spread over long distances by birds. Our common junipers, or red cedars, sumacs, most of our dogwoods, barberries, and the hackberries are all distributed in the same manner.



HICKORY

There is only one other group of seed travellers with which you are probably as familiar as with the seeds that earn a free ride by being good to eat. These are the sailors. When I was a youngster, stories of the sailors that went down to the sea in ships often so held my interest that I would scarcely throw them aside at mealtime. The surge of the sea, the pull of the sail, the fight, and the calm, how vivid they all were! If you could read a story of sailors in the air instead of on the sea, sailors that are torn from their moorings in some tall tree, and are swept along with the gale, tossed this way and that, helpless before the wind, how equally exciting you would find it!

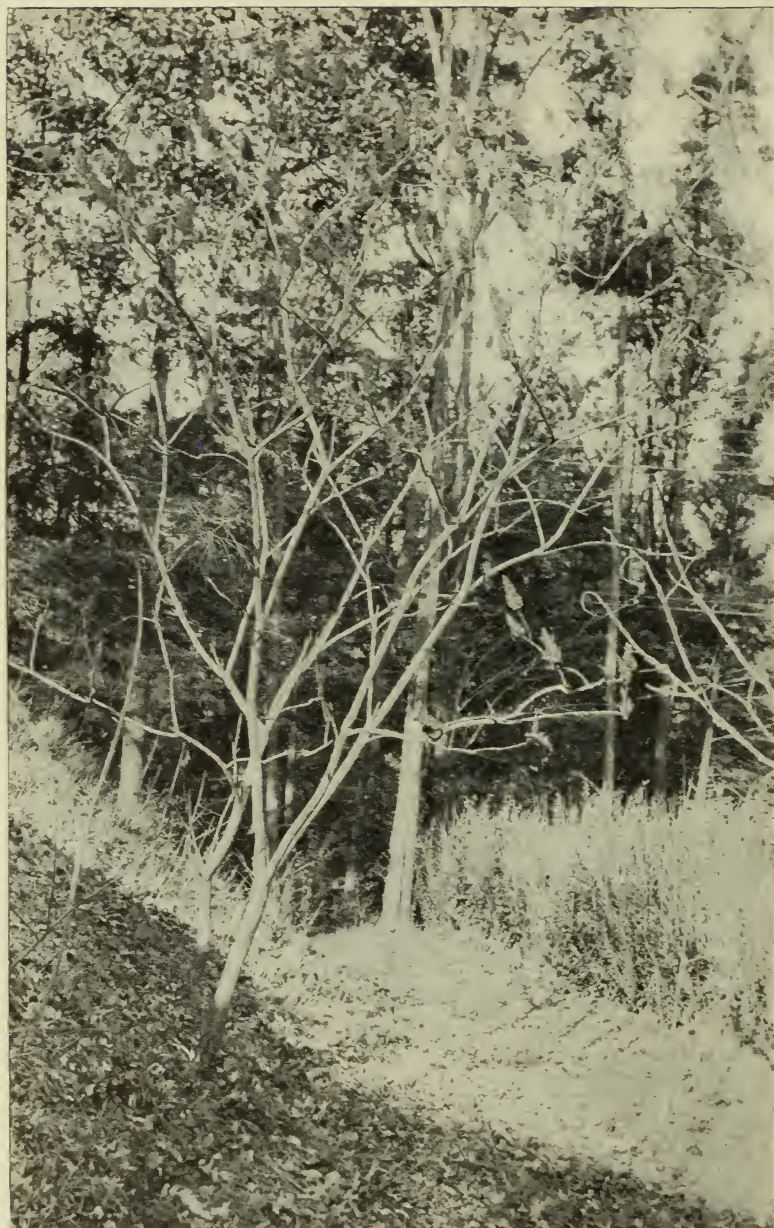
A youngster once asked the Leaflet office what a "squartum tree" was. Its seeds were said to be long and round and attached to a long curved sail. Perhaps you have crushed one of these under your shoe just to watch the little green seedling leave its outer coat behind with a pop. If you never have, try it with the next green sugar-maple "key" you see. We know that the youngster meant a maple because one of the seeds was sent in by the little girl.



BASSWOOD



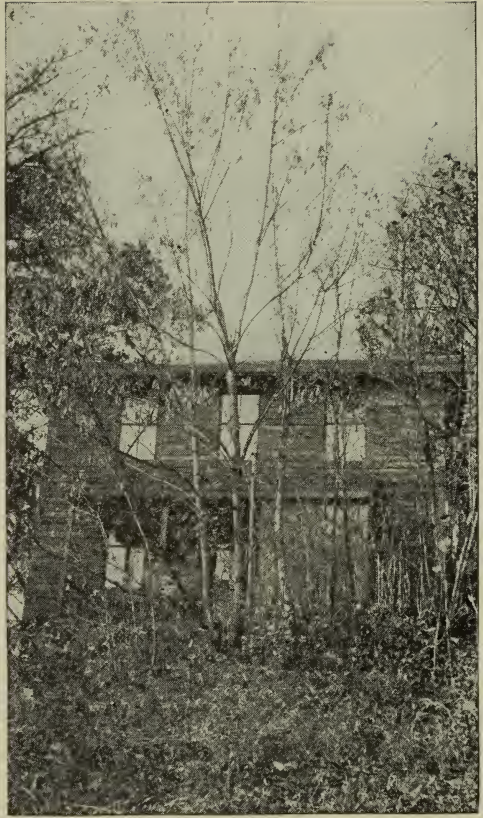
MAGNOLIA



SUMAC IN FRUIT

These fruits serve as food for birds and in the earlier days served as a source of dye stuff

There is an old story this sugar maple might tell its children of a peaceful home under the sheltering leaves; of a late night in August or early September when the thick clouds scudded across the moon and the wind blew half a hurricane. The limbs of the sturdy old maple rocked and occasionally broke off short some of the seeds, or "keys," that apparently clung desperately to their high homes. It would tell of a song that the wind sang as it tugged at the sails that the fruits had spread; a song that had started with a gentle "Come with me," then changed to a swishing "I'll get you yet." While the branches tossed in the gale, the song ended in a final triumphant whistle as the little seeds let go their hold and sailed off into the dark woods. When spring came, there were so many large trees and so little sunlight that



BOX ELDER

the seeds scarcely grew at all and most of them fell sick and died. Some there were that were not good sailors and these landed on hard macadam roads or on the house roofs or in other barren, dry places and, because there was no water to drink or food to eat, they shriveled and died. Others landing on the front lawns or in cultivated fields, sent a root down into the soil and started a new home, only to be cut off or torn up by the mower or cultivator before the summer was over. Of course, though, there must be some among the maple sailors who discover good land, even as Columbus did, where there was plenty of sunlight and water and where the soil was of the kind best suited for the seed to germinate and grow. And there we shall leave not only our maple sailors but our elm, ash, tulip, birch, hornbeam, and most of our evergreen sailors as well, confident that they have explored well and established themselves in a strange country successfully and that the settlement, if not destroyed by fire, will grow into a tall and useful community of trees.



BIRCH FRUITS ON THE SNOW

Most seeds, such as the tulip, the white pine, the hornbeam, and the ash, like to go sailing in the fall. Some prefer to tarry until winter winds are strongest, while the pitch pine holds its sailors safe in port for many years before opening the cone gates and letting the wind coax her seeds away. A

few, like the elm and the red and silver maples, shed their seeds in May or June. These must find a home soon after they start out if they are to keep from shrivelling and dying.

There is another group of sailors that are truly the world's most fearless adventurers. Up hill and down dale, across mountains and deserts, plains and great bodies of water, they sail, without a map to guide them or a rudder to steer them, and with only such food as they can store in a space much smaller than a pinhead, and with no extra tanks of water to fall back on in case they should not be able to land where water was plentiful. Their sails are long and very light. The slightest breeze will keep them sailing for hours if the sails keep dry. I have seen the air thick with these adventurers a half a mile away from the poplar tree from which they had come. Sycamore or buttonball, virgin's bower, cottonwood, and the willows, each bears countless thousands of these long-distance travellers. And well they may, for such are the dangers both seeds and men face in sailing into the unknown, that many must die by the way. Though many start, only an occasional individual ever comes through to live and grow and tell the tale.

By this time, perhaps you will think that all seed explorers are sailors. You will find some, however, that are not very air-worthy but can coast and skate like anything. Perhaps the best coasters and skaters that we have are the fruits of the black locust, which ripen in the fall but hang on the branches for some time. From swinging backward and forward with the wind, the stems finally break off close to the branch. The pods fall to the snow and start on their long coast. They may split apart and slip along on one runner with the little seed babies clinging close. If

there is hard frozen snow for the wind to carry them over, they go racing along at a great rate. Over the crust they skip and skate, carrying with them the small brownish black seeds. One by one the seeds break off and are scattered behind until the last one is gone. Then the wind snatches up the empty pod, carries it this way and that, and finally piles it up with other refuse in some ditch or furrow. There it gradually rots away.

Many of our trees that bear seeds in flat pods belong to the coaster group. The common "squeek beans," or seeds of the honey locust, and those of the basswood as well, are sometimes to be found a mile or more to the leeward of the parent tree. Redbud and yellowwood pods are seldom scattered as far because they do not grow so large as do the locusts and the basswoods.

I have saved until last what is probably the strangest way in which seeds get to a good place to grow. Perhaps you might call it the spring-board method, for the seeds that travel this way neither roll nor sail, but jump. If you bruise or scratch yourself, one of the old family remedies is witch-hazel, an extract prepared from witch-hazel twigs. If you look for tree or shrub flowers in late October, I am afraid you will not have much luck unless you know where the witch-hazel grows, for it is our only native tree or shrub, with an occasional exception of an apple or cherry tree, that flowers in the fall. Surely some of you must have seen its small yellow flowers, each with its four streamer-like petals, in the woods this fall when its little nuts are almost ripe. These nuts come from the flowers of the previous year.

It very often happens in all nature that something which is unusual in one respect is found to be unusual in many. Therefore, we might well expect a shrub that flowers in the fall to have a curious way of sending its seeds out into the world. If you have ever looked closely at the fruit of the witch-hazel, you will recall that it is not bright colored and juicy looking to attract birds or boys who might carry it off. Neither will you find it with silky sails to let it float through the air nor with wings to help it sail. To offset this handicap, witch-hazel has developed a method whereby the seeds are actually shot out of their husk, or capsule, like bullets from a gun. When the capsule is ripe, a slight tap on the branch is often sufficient to cause it to open with such violence that the little black seeds are sent rattling off into the air. They may not fall to the ground until they have gone ten or fifteen feet from home.



WHITE ASH

If you would like to see them actually pop open, gather some of the capsules while the yellow streamer-like flowers of the witch-hazel are still blooming and take them home with you. It will not be long before they begin to pop open and shoot their little seeds, provided they have not already done so.

GROWING SEEDLINGS

How to make seedlings grow where we would like to have them grow

If you have read the preceding pages, you should have at least some idea of how seeds are formed and how land that has been cleared for cultivation may in time again bear trees and become a forest domain. In the early days settlers throughout New England and New York cleared as much land as was necessary to cultivate. The topsoil wherever the forest had stood for ages was black and rich and full of humus. On top of that soil were decaying leaves and logs to insure continued fertility. There has never been any one, however, so smart that he could continue taking something out of the soil and have anything left if he did not put something in the soil. Our Yankee forefathers were rather shrewd people and as long as the soil remained good and the crops were big, they were satisfied to leave matters alone. But, then came a day when, on farms where the underlying soil was not fertile, the crops fell off because the good topsoil, built up by centuries of leaf mold, was exhausted. Then it was that a migration from such farms to the unsettled lands in the West began. Some farms were sold, many were allowed to go uncultivated and were merely abandoned.

White pine has been called the "King" of American trees from the point of view of lumber production. No other tree produces in large quantities such a good grade of lumber. For no other wood have so many uses been found. It was the seed of the white pine that first took advantage of the unused farm lands that were, and still are, scattered thickly in many parts of the country. Wherever there was a white-pine tree near a clearing, pine seedlings sprang up by the hundreds.

The result is that we find scattered throughout this State and New England what are called *second-growth white-pine stands*. These are not only putting back into the soil what years of farming and soil erosion have taken out, but they are themselves also increasing in value year by year.

Every time a large tree falls in your father's woodlot — if he has one — it lets in light and starts a fierce struggle for existence between many seedlings and saplings that grow in the opening formerly shaded by the crown of the fallen tree. This is true provided, of course, that fire, cattle, and sheep are kept out and the surrounding trees produce the usual amount of seed. Working on this principle, foresters and farmers who under-



THE SEEDLINGS IN A GROVE LIKE THIS HAVE A CHANCE TO RACE AMONG THEMSELVES
IF PROTECTED FROM FIRE AND GRAZING

stand the laws that govern tree growth often cut out undesirable kinds of trees, such as the hornbeams, beeches, elms, soft maples, hemlocks, and black birches, for firewood, in order that red and white pines, Norway spruces, and the various hardwoods, such as sugar maple, white ash, basswood, hickories, red oak, and tulip, may have a chance to seed into the openings thus made. This is one method of making seedlings grow where you want them to grow. While it is not always satisfactory, for the right species of seed tree are not always on hand, it is the best method of natural seeding to use on present-day farm woodlots.

By far the most important problem many of your fathers are wondering how to solve is that of foresting the poor land that is better suited to bear trees than crops and on or near which there are no desirable trees so that natural seeding or regeneration can take place. There is obviously but one thing to be done, — if you want trees there, you must plant them there yourself.

This, also, is one way of making seedlings grow where you want them to grow. There are other ways, many of them, but Nature prefers to start most of her trees and shrubs from seed. New York State has followed her lead by establishing state nurseries where a million or more seeds are grown each year.

How to obtain seedlings

Naturally the first thing that comes to your mind after you have decided to set out some trees is where and how can you get the seedlings of the

right kind. What is the right kind, anyway? If you will turn to pages 40 to 43, you will find there a table in which is given the answers to as many common questions on the growing of seedlings as it is possible to give in this Leaflet. There are, however, many points which can best be explained in the text.

Probably at first, you will think of getting seedlings for planting by digging them up in their wild state in the woods and transplanting them into the field where they are expected to grow. This idea would work out fairly well were it not for the difficulties encountered in trying to find the right kind of seedlings of approximately the same age and in large numbers. For this reason it is customary to gather in the fall the seeds of the kind of tree you want to plant, store them over winter, and plant them as directed in the table in the back of the Leaflet. It is really lots of fun to collect seeds in the fall and watch them grow in the spring and early summer. It is a project that might well be carried through by a class in school. After the seedlings are old enough to set out in the field it is usually easy to sell them to someone near-by for more than enough to cover the cost of collecting the seed and of growing the seedling.

For anyone interested in setting out large numbers of trees it might pay to buy a few different kinds of seedlings direct from the Conservation Commission at Albany. But if you or I did that, we would miss all the fun of collecting, storing, and planting our seeds, and of watching them grow. Then, too, if you grow them at home or at school, they are where you want them, when you want them. It is a great feeling to be able to point to a husky young tree or shrub and say, "I grew that from seed I gathered myself." Try it sometime and see.

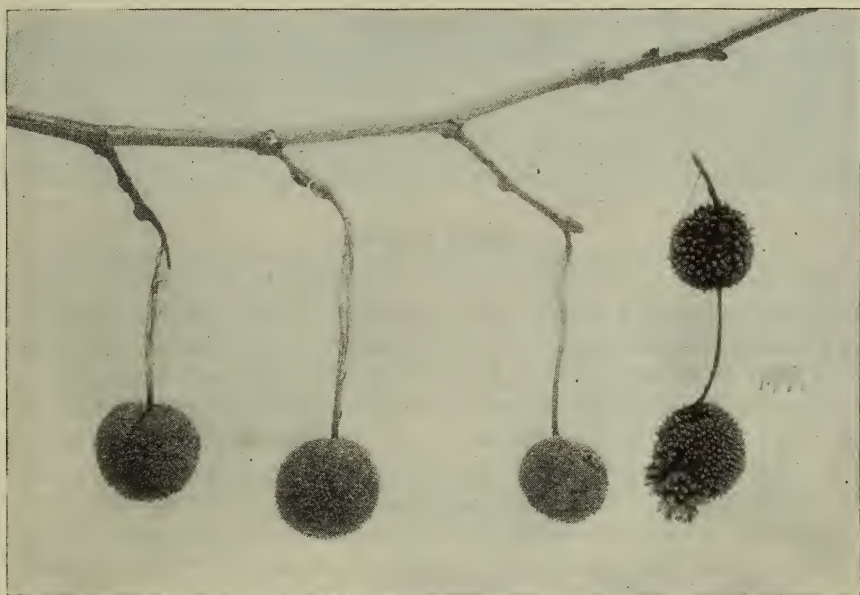
To help you understand how to go about the growing of seedlings, I am giving you a few short cuts and suggestions on how to do so.

The gathering of the seeds

The time for gathering seeds naturally varies with the individual species of trees. There is never a time in a well-wooded country where you can not collect seeds of one kind or another, for such seeds as pitch pine are likely to linger on the tree for a long time before falling. With the box elder, locust, ash, catalpa, birch, Norway spruce, and others, a large part of the seed crop will cling to the tree far into the winter. It is well, however, not to depend too much on winter collecting, since squirrels, mice, and birds have a fondness for many seeds that leads them to strip the woods of good seeds. Then, too, a heavy wind may blow them to the ground and an early snow cover them up. Some trees, on the other hand, hold their seeds for but a few weeks at best. Have you ever seen the small, green-winged fruit of the American elm? It appears in May before

the leaves come out, it ripens in less than two weeks, and before the leaves are fullgrown it has sailed away to find a new home. The seeds of the red maples and silver maples ripen early in June and must be collected and planted immediately, for they dry out rapidly and quickly and hence lose their power to grow. Most tree seeds, however, ripen in September or October and fall as soon as ripe.

Few trees bear a good seed crop every year but usually at intervals of from two to three years. Seed gathered from off-year crops is liable to be of poor quality.



SYCAMORE FRUITS

During what months do you suppose these might have been collected?

Trees in the open usually produce many more seeds than do trees in the woods, and the seeds are probably just as good and much easier to collect. Whenever possible, gather large seeds, as sturdier, faster-growing seedlings are more likely to come from large than from small seeds of any certain kind.

The actual process of gathering the seeds may be easy or difficult, depending upon the scarcity of the seed and upon the kind of seed to be gathered. Who among you have not gathered hickory nuts in the fall? Seeds of the nut-bearing trees, including the oaks, are generally easily gathered, provided the squirrels have not visited the tree before you. But with maples and other trees bearing small seeds, gathering from the ground may become tiresome. Many small seeds, when fully ripe, may be shaken

onto sheets spread beneath the tree. The seed of the ashes, maples, cherries, barberries, locusts, elms, and others, together with all cones, are best collected from the tree by hand. This is especially easy with cones, for while you often must climb to break them off from the branch tips where they grow, you obtain from 20 to 250 seeds with each cone, depending upon the size and kind of cone and the amount of "blind," or undeveloped seed in it. In good years, this will be very small, but in years of poor seed production the blind seeds may average as much as three-quarters of all the seed gathered of any particular kind.

The cones in which many trees house their seed children may be tightly closed when gathered, but may be opened by laying them on paper in a warm room. In a few days the cone scales should be open and the seeds can be shaken out on the paper. Care should be taken not to gather the seeds before they are ripe, but perhaps the greater danger lies in waiting too long. By far the larger part of the seed sailors leave their homes within two or three weeks of the time the cone begins to open.

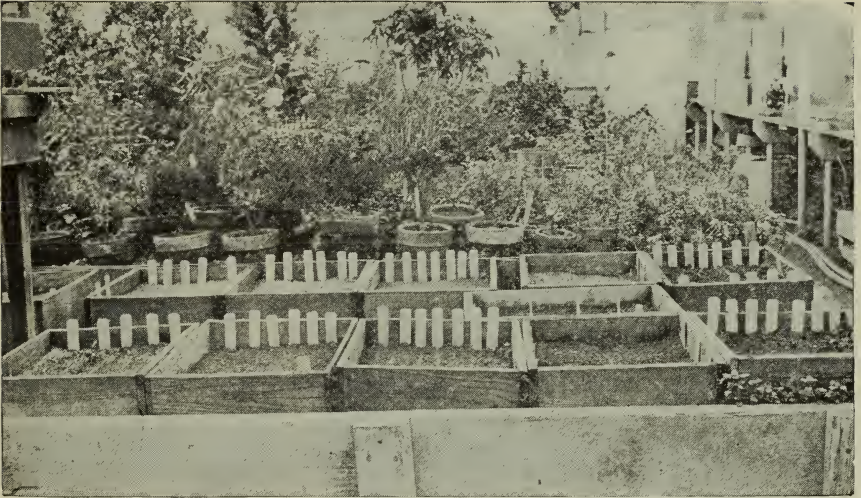
Storage of seeds

The best time to sow seeds, either in the nursery or on the site where they are to remain, is soon after they are ripe. When this is not possible, or the mice and squirrels are thick, the seeds must be stored until spring. Many tree and shrub seeds are provided with wings or are surrounded by a juicy pulp which contributes to making traveling easy. Some, like the black locust, "have bobsleds." Others have nothing but a husk or cap, which is for protection. Whatever they may have, it is usually easiest to remove it before the seeds are stored.

Nature has her own ways, often wasteful but effective, for keeping seeds over winter. Some, such as the locusts and the buttonballs, or sycamores, hold their seeds close to them all winter. The majority of seeds drop in the fall and remain buried beneath the grass or leaves until the following spring. If you will look about you, you will discover just how each seed is stored by nature. Then try to copy those conditions. You cannot go far wrong on such a policy.

Seeds that mature in the spring and early summer, like those of willows, poplars, most of the elms, red birch, red maple, and silver maple, are short-lived even if properly stored. These should be sown shortly after ripening. Fall-ripening seeds may, with few exceptions, be sown in the fall, if protected, or they may be given suitable storage until spring. Those that germinate readily under a rise of temperature, such as red pine, should be sown late in the fall when this danger is past.

If you wish to keep seeds over winter, they should be stored dry or moist (see page 41). All seeds borne in cones can be spread out to dry



SEED BOXES

Tree seeds were stored and grown in these boxes for use in the preparation of this leaflet

in the sun for a few days, then placed in sacks and hung up, out of reach of rodents, in an outbuilding or attic. They must be kept away from heat and moisture. If an old milk can is handy, bags of seed may be dropped inside, the cover put firmly in place, and the can set in a shed where normal outdoor temperatures prevail. Seeds that can be stored dry will, however, if stored under moist conditions, germinate more quickly when sown. Moist storage is particularly adapted for the seeds of walnut, oak, hickory, beech, basswood, sugar maple, and for other tree seeds that do not keep well otherwise.

The best moist storage is to be had in a box of moist sand. Layers of seeds and sand may be alternated at one-inch intervals until the box is full. The box should then be buried out-of-doors, about a foot deep, and covered with leaves and soil, much as you would bury vegetables. Screens should be placed over the box to prevent mice and squirrels from digging up the seeds. Most seeds thus stored may be put in bags for convenient handling before being buried in the sand.

Preparing the seed for planting

There is in many of our tree seeds a period of "after-ripening" following their fall. Thus you may find that basswood will not germinate until after it has been in moist storage for two seasons, and that horse-chestnut seed will not sprout until after it has been frozen. You will find the same true of many of our seeds of shrubs.

It is often difficult to make the seeds of the locust and Kentucky coffee-tree germinate. It is not easy to cut through their hard seed coats, even with a sharp knife. Such jackets allow very little water to pass into the seeds and therefore make germination, even at the right temperature, uncertain. A good way to soften such seed coats is to pour hot water over them and let them soak until they have swelled to twice their natural size. Heat a kettle of water until it boils, then set it aside until it has cooled a little. Place the seeds in a pail and pour this water over them, and watch them swell. After they have swelled, they are ready for planting.

Making a seedbed

Before sowing the seed that you have gathered, make a seedbed in which to sow it. Seedbeds may be broadly rectangular in shape or they may be made up of narrow, ribbon-like rows, or drills. Choose a well-drained, preferably loamy soil, that may be easily watered when necessary. It must be where mice, squirrels, or chipmunks are not likely to bother it. Spade or plow the soil, then pulverize it with a rake or harrow. Seedbeds, separated by 2-foot paths, should be 4 feet wide and of any convenient length, as in commercial nurseries.

If you buy firecrackers for the Fourth of July, some will be good, some bad. A seed coat without a seed inside is often referred to as a *blind seed*. The amount of good seed or bad seed differs according to the kind of tree. Thus, more than 90 per cent of white-pine seeds may germinate,



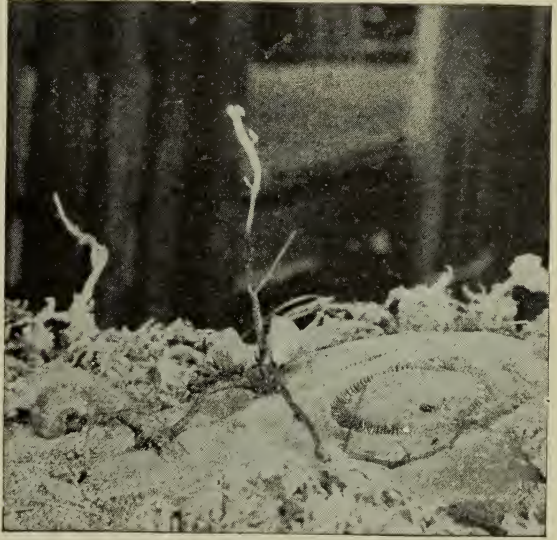
A STATE TREE NURSERY

while with the tulip it is seldom that more than one seed in ten ever develops. Test your seeds by cutting a few of them open and counting the number of wormy, shrivelled seeds and the empty seed coats.

Seeds should be spread far apart or close together in the seedbeds, depending upon their root and top development and the number of poor seeds that are likely to be sown unknowingly. In the case of the tulip, for instance,

which has a germination of about 10 per cent, it would be necessary to sow 150 seeds to obtain 15 seedlings.

The white-oak seeds, on the other hand, germinate very well. For some unknown reason, they seem to be particularly anxious to steal a



AN OAK SEEDLING

This shows the strong taproot already developing



WOODY PLANT SEEDLINGS

These seedlings were grown for use in the preparation of this leaflet

march on all the other fall seeds. I have known of some of these to develop rootlets 2 inches long between the time that they fell in late September or October and when cold weather set in. Unless such seeds are planted as soon as collected and covered with a fine mulch of leaves, the tender rootlet will be killed by alternate freezing and thawing, and the seedling will never grow.

It is often best to mulch the fall-sown seedbeds with 2 or 3 inches of leaves or leaf mold. This, of course, must be removed in the spring. Seeds that have been kept over winter should be removed from storage and sown immediately when the frost is out of the ground and the soil is in condition for working.

Sowing the seeds

Follow the rules of gardening in sowing tree seeds and shrubs seeds. Press large seeds closely into the soil. Make it firm after small seeds have been planted. After sowing cover the seeds about two to three times their diameter with pulverized soil.

It is often handy to plant the seed in drills by placing a narrow board across the seedbed, making a narrow drill along the edge of the board with a sharpened stick or a hoe. When the seeds have been sown, turn forward the board for a new drill. The width of the board regulates the distance between the drills. Many prefer a board from 8 to 10 inches wide.

In sowing broadcast, one should cover the seeds lightly and take care that none are washed away while watering the beds.

Caring for the seedlings

Whether good seeds start to grow or not depends in part upon the amount of air, heat, and moisture they receive. Of air there is generally plenty, and shade frames may be built to keep the sun from the seedbeds. It is necessary to water the beds.

Watering.—Seedbeds should be watered immediately after sowing the seed unless the soil is already damp from recent rains. Keep the beds damp continually throughout the spring and early summer. Towards fall, let the ground dry out a bit to help the seedlings "harden off" for the winter.

If you find numbers of your seedlings that are wilting and dying without apparent cause, stop watering the bed and raise the shade frame, if you have one, to let the bed dry out rapidly. "Damping off," a fungus disease, is very destructive to seedlings a few weeks old. It spreads quickly in very moist soil, especially in hot weather.

Protecting.—Mice, squirrels, and chipmunks revel in newly planted seedbeds. Wire is often used in commercial nurseries to protect seedbeds from birds and rodents.

Shading.— Hardwood seedlings seldom need shading. Evergreen seedlings, however, are liable to serious sun injury and must often spend the first four months of their lives under partial shade. Laths, nailed $1\frac{1}{2}$ inches apart to a rectangular frame and placed 8 inches above the seedbed offer sufficient shade. In cloudy weather the frame may be removed.

Weeding.— “Weedlings” grow much faster than do tree seedlings and must be plucked out during the growing season. While you are removing the weeds, cultivate the ground about the seedlings, except where the seedlings have come up thickly as a result of broadcast sowing.

Transplanting.— Most evergreen seedlings and some hardwood seedlings should be transplanted from seedbeds to transplant rows at the beginning of their second or third season. Seedlings must have elbow room above ground and foot space below. Seedlings thus well-cared-for grow fibrous, well-developed roots. Shallow-rooted seedlings can be easily transplanted. Those with deep growing roots, or those with one strong central root, called a *taproot*, should be set out at the end of the first season without transplanting.

Seedlings should seldom remain more than from one to two years in transplanted rows before being set out in a place where you want them to grow.

Setting out.— Many hardwood seedlings reach the size of about 8 inches the first season and may well be set out without first being transplanted.



A GERMINATING HICKORY

This hickory was germinated over a hard surface and developed many tap-roots none of which could find favorable soil in which to grow



A GERMINATING ACORN

Whether they be seedlings or transplants the method of setting out is the same.

If your teacher has a September, 1921, Leaflet, she will find in it complete directions for tree planting. If you cannot find one of these Leaflets at school, remember these few sugges-

tions. Seedlings need all the roots they have. Roots grow in the dark, and five minutes of sunlight may kill them if they are in a dry place. They have a certain position before they are dug up; put them in that form again before covering them up. Press the soil firmly about the roots and stamp it down at the surface, and do not forget a little water for the youngster whenever it is possible to supply it.

Where do we want trees to grow?

Not long ago the Nature Study office received a letter from a youngster asking about a park. To him, a park was a place where pop corn grew in bags or as balls, and red, white, and blue lights were strung from a few scattered trees left for that purpose. All the rest of the trees and the shrubs were cut down and the grass was to be given a haircut every two weeks with a lawn mower.

There is nothing unusual in this notion, but there certainly is something wrong. The best parks are those with plenty of trees and shrubs, clustered here and there, that will attract the birds and bees and butterflies. Beautiful flowering shrubs belong in a park along with wide-spreading trees, under which you can go on a hot day to cool off.

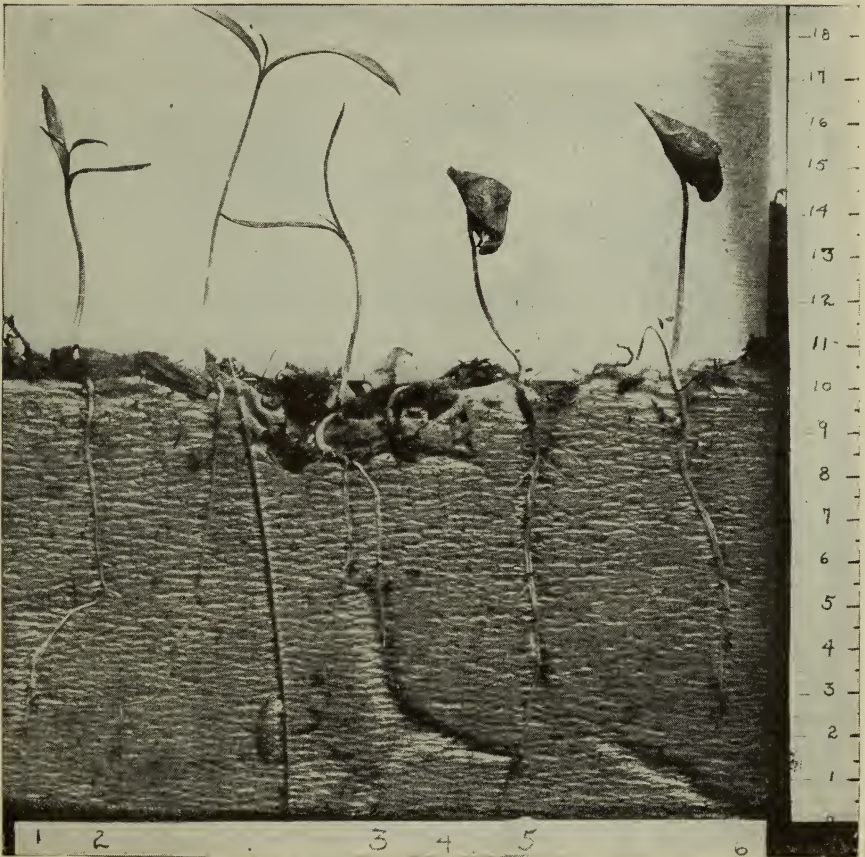
If your teacher has a September, 1921, Leaflet, ask her to loan it to you while you read how Mr. Porter would have you improve your school and home grounds by planting trees and shrubs about them.

The planting of trees and shrubs in your school yard or around your home helps to make these places more attractive to you and to your neighbors. Among the pleasantest of your friends, whose numbers it is easy to increase by planting trees and shrubs, are the birds. All they ask is a good place to build their nests and a fair supply of food close by. Some idea may be gained of the best trees and shrubs to plant in order to attract birds by glancing over the following list:

TREES, SHRUBS, AND VINES WHICH FURNISH FOOD FOR BIRDS:

Mountain Ash	Black Cherry
Sumac	Choke Cherry
Black-berried Elder	Pin Cherry
Virginia Creeper	Blueberry and Huckleberry
Mulberry	Flowering Dogwood
Bayberry	Red-osier Dogwood
European Barberry	Alternate-leaved Dogwood
Shadbush	Red Cedar
Hackberry	Gray Birch

Then, too, when you plant your seedlings about your school and home, you must not forget the pines, the spruces, and the hemlock that furnish shelter and nesting places for so many of our common feathered friends.



A DOUBLE RACE

These seedlings can be seen both above and below ground. It was interesting recording the speed of development of the individuals

Of course there are places to plant trees and shrubs other than in parks and around buildings. A great deal of attention is being paid just now to planting trees on old, abandoned farm land and in places that have been cut over once by lumbermen. Perhaps if your school raises some tree seedlings, some land may be found on which you can start a school forest all your own.

Winter seed boxes

By the time this Leaflet gets to you it will be too late to plant most seeds out-of-doors. One of the times when we would all like to grow seedlings is in the winter. Then anything green looks good to us.

In winter-tree seeds, as well as other green things, may easily be planted in window boxes. But, if you can find the right materials, you can build

a glass seed box that will not only allow you to see the stem of the seedling grow upwards but also to see the roots of the seedling grow downwards.

Necessary materials.— (1) Four pieces of clean glass, all the same size. Most photographers have old photographic plates which, if cleaned under hot water, do very well. (2) A small roll of adhesive tape or passe partout; (3) a couple of sheets of paper toweling or blotting paper; (4) some moss, such as sphagnum moss, that will hold moisture; (5) a wooden base on which to set the glass; (6) some tree seeds, such as maple, oak, hickory, or walnut.

Making the seed boxes.— Stick four pieces of glass together with tape or passe partout so that they make a hollow square or rectangle. Fasten this on edge to a board base with the tape or passe partout. Slip a layer of paper toweling close against the glass and all around the inside of the box you have built. So that the toweling may always be moist, pack wet moss as a filler in the center of the box. Turn the top edges of the toweling inward over the moss and at just the place where the toweling and glass meet place a seed, point downward. Over the seed, toweling, and moss lay several wringing-wet pieces of paper to keep the seed moist while it is germinating and sending down its root between the glass and the toweling.

It is absolutely necessary to keep the top pieces of blotting paper or toweling wet until the seed has sent its root down an inch or so, then the paper may be removed. It is also necessary to water the moss occasionally.

Every youngster loves a good race. When the snow piles up drifts outside, skip out and gather a few oak acorns or hickory nuts. Build some glass seed boxes and put your seeds to germinating. Watch them grow, upwards and downwards. If the roots in your box reach the bottom, build another box. Line it with toweling and fill it with wet moss. Cut your old box loose from its board base and place on the board the box you have just made. Then fasten your old box on top of the new one with tape, so that the tender root may continue to grow between the glass and the toweling down into the new box. The more perfect the joint between the boxes and the better the care given the seedlings, the faster they are likely to grow. I wonder whose seedlings will send their tops furthest up into the air and their rootlets deepest down into the glass seed box, through whose sides you can see the whole race going on. Who will win?

With this I will have to leave you to the fun of gathering tree seeds, the work of planting and of caring for them, and the joy of watching "your" seedlings grow. Perhaps you can help us to find just what some of the seedlings I have not been able to obtain, look like. The sketches of seedlings in the Leaflet are admittedly very incomplete. If you grow any seedlings not illustrated in this Leaflet, you may want to sketch them. If so, flatten the seedlings against a pane of glass; lay over it a thin piece



A GERMINATING ACORN RACE

The long taproots of these acorns served as interesting and easily measured racers

of plain white paper and on the opposite side of the glass place a light. The outline of the seedlings and the veins in the leaves may then be easily traced.

On pages 40 to 43 of this Leaflet you will find a planting table to which you may turn for help in case you or your school want to start a real forest nursery. But whether you ever grow seeds or not, if you know where the "Babes of the Woods" come from and how they get there, it will help you understand why there is much waste land in this State that once was covered with tall, valuable trees. Some day you may find that your interest in forest tree seeds and seedlings may make you better able to put such idle acres to work for you and to make those already tree-covered serve you even better.





A BLACK LOCUST

IDENTIFICATION PLATES AND LIFE HISTORY CHARTS

Acknowledgments

In addition to his own experience and studies which have been called upon in the preparation of the Life History Charts and Identification Plates, the author acknowledges his indebtedness to the various publications listed below which have been drawn upon freely. He is particularly grateful also for the guidance and assistance generously and freely given to him by Professor E. Laurence Palmer, under whose supervision this Leaflet has been prepared, and to Professors Samuel N. Spring of the Department of Forestry and K. M. Wiegand of the Department of Botany for careful and painstaking reviewing.

Much of the seed used in growing the seedlings was obtained through the willing cooperation of Mr. Conyers B. Fleu, Jr., a dealer in tree seeds.

The following list includes not only books which will be found useful in studying woody plants in general, but also what few references there are on the particular field covered by this Leaflet —“Seeds and Seedlings of Woody Plants” or “Babes of the Woods.”

TREES IN GENERAL

North American Trees. Nathaniel Lord Britton. Henry Holt and Company, New York. 1908.

Our Native Trees and How to Identify Them. Harriet L. Keeler. Charles Scribner's Sons. New York. 1917.

Illustrated Flora of the Northern United States, Canada, and the British Possessions. Nathaniel Lord Britton and Addison Brown. Charles Scribner's Sons. New York. 1913.

IDENTIFICATION OF TREES

Pennsylvania Trees. Joseph S. Illick. Bulletin 11. Pennsylvania Department of Forestry. Harrisburg, Pennsylvania. 1919.

Manual of the Trees of North America (exclusive of Mexico). Charles Sprague Sargent. Houghton, Mifflin Company. New York. 1922.

New England Trees in Winter. A. F. Blakeslee and C. T. Jarvis. Bulletin 69. Storrs Agricultural Experiment Station, Storrs, Connecticut. 1911.

The Trees of Vermont. G. P. Burns and C. H. Otis. Bulletin 194. Vermont Agricultural Experiment Station, Burlington, Vermont. 1916.

Trees of New York State, Native and Naturalized. H. P. Brown. Technical Publication 15. New York State College of Forestry, Syracuse University, Syracuse, New York. 1921.

Trees of Indiana. C. C. Deam. Publication 13. Department of Conservation, State of Indiana, Indianapolis, Indiana. 1921.

SHRUBS IN GENERAL

Our Northern Shrubs and How to Identify Them. Harriet L. Keeler. Charles Scribner's Sons. New York. 1925.

Shrubs of Indiana. C. C. Deam. Publication 44. Department of Conservation, State of Indiana. Indianapolis, Indiana. 1924.

Vermont Shrubs and Woody Vines. L. R. Jones and F. V. Rand. Bulletin 145. Vermont Agricultural Experiment Station, Burlington, Vermont. 1909.

GOVERNMENT PUBLICATIONS

Requests for information on the following may be addressed to the Forester, Forest Service, Washington, D. C.:

Forest Service Bulletins
Forest Service Circulars
Forest Planting Leaflets
Silvical Leaflets
Farmers' Bulletins

SEEDLINGS

A Contribution to Our Knowledge of Seedlings. Sir John Lubbock, Bart. D. Appleton and Company. New York. 1892.

Proceedings of the Iowa Academy of Science, 1914-1917. Des Moines, Iowa. 1924.

The Nursery-Book. L. H. Bailey. The Macmillan Company. 1909.
First Lessons With Plants. Liberty Hyde Bailey. The Macmillan Company. New York. 1898.

Plants and Their Children. Mrs. William Star Dana. American Book Company. New York. 1896.

The Fly-Aways and Other Seed Travelers. F. M. Fultz. Public-School Publishing Company, Bloomington, Illinois. 1910.

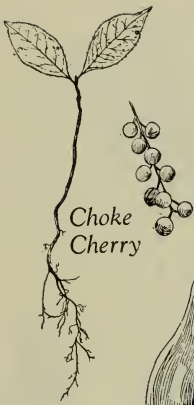
Practical Plant Propagation. Alfred C. Hottes. A. T. De La Mare Company. New York. 1925.

TREE DISEASES

Manual of Tree Diseases. W. Howard Rankin. The Macmillan Company. New York. 1918.

INSECT PESTS

Field Book of Insects. Frank E. Lutz. G. P. Putnam's Sons. New York. 1921.



Choke
Cherry



Black Cherry



Pin Cherry



June Berry



Mountain Ash



Pear



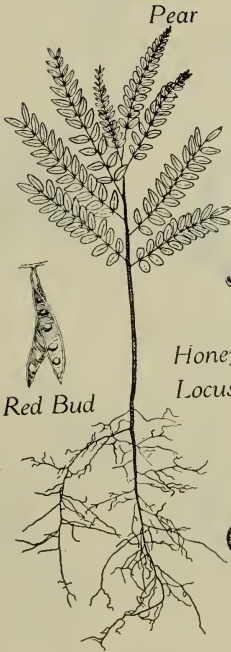
Plum



Peach



Apple



Honey
Locust



Black Locust



Kentucky
Coffee Tree



Thorn Apple



Red Bud



Tree of Heaven



Wafer Ash



Basswood



Horse-Chestnut Flowering Dogwood



Red Osier



Staghorn Sumac



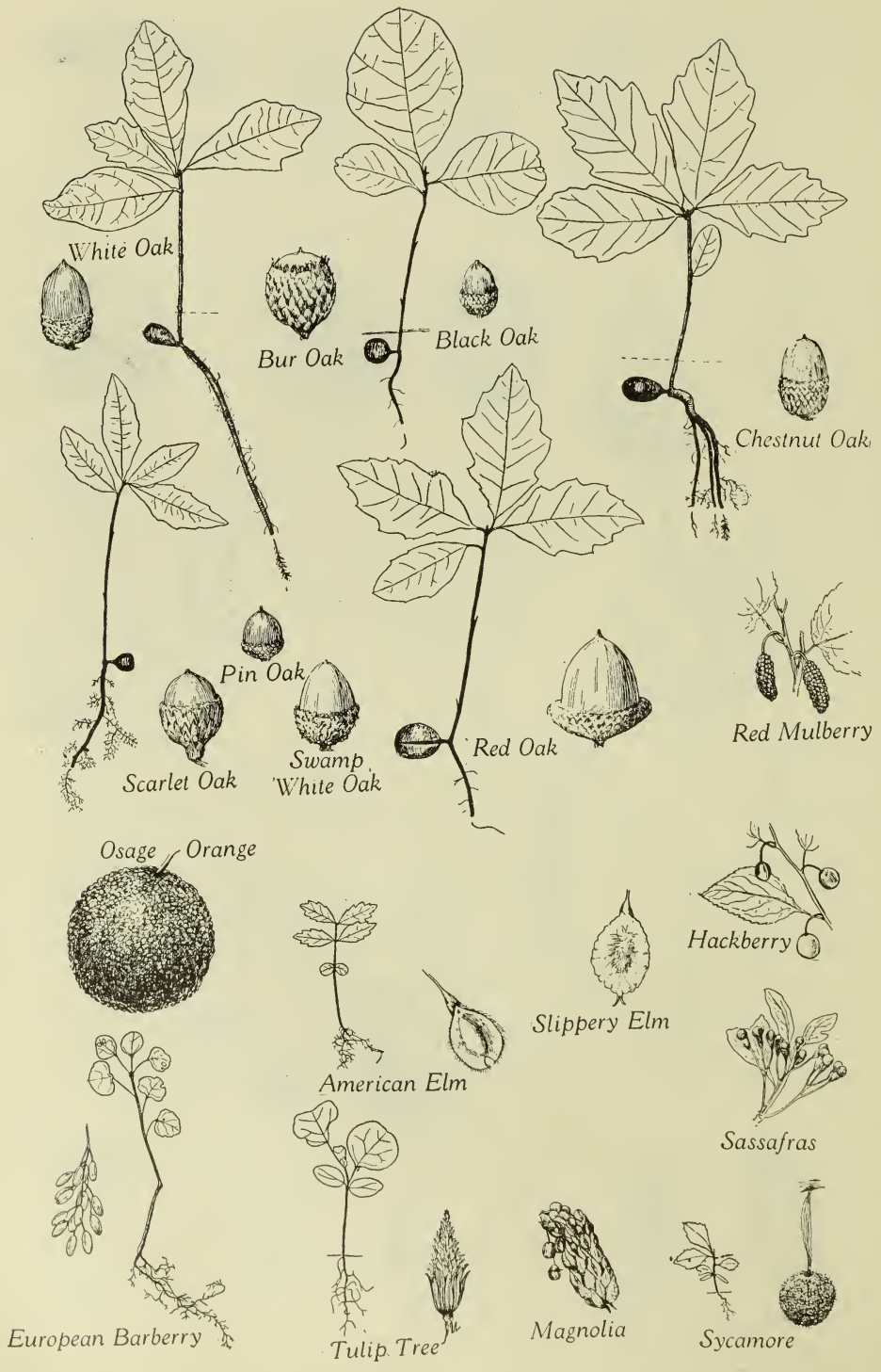
Smooth
Sumac



Poison
Ivy Sumac



Laurel





Nanny Berry



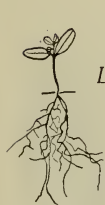
Green Ash



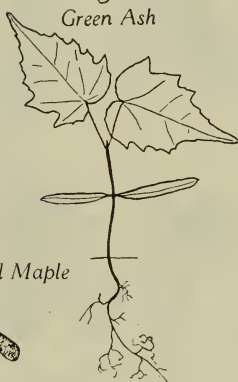
Black Ash



White Ash



Lilac



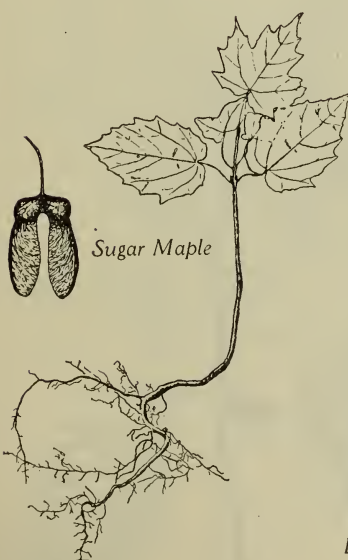
Red Maple



Norway Maple



Sycamore Maple



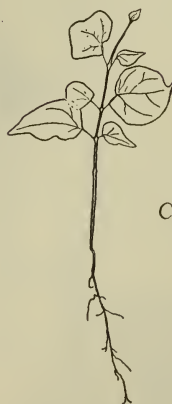
Sugar Maple



Striped Maple



Catalpa



Box Elder

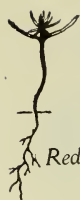




Ground Hemlock



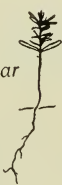
Hemlock



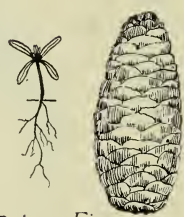
Red Cedar



White Cedar



Larch



Balsam Fir



Red Spruce



White Pine



Red Pine



Pitch Pine



White Spruce



Norway Spruce



Ginkgo



Black Spruce





Smooth Willow



Crack Willow



Shining Willow



Black Willow



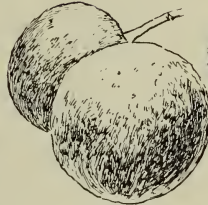
Pussy Willow



Big-Toothed Aspen



Cottonwood



Black Walnut



Butternut



Yellow Birch



Alder



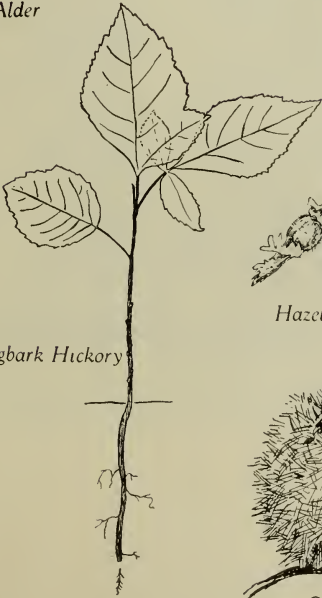
Hop Hornbeam



Blue Beech



Black Birch



Shagbark Hickory



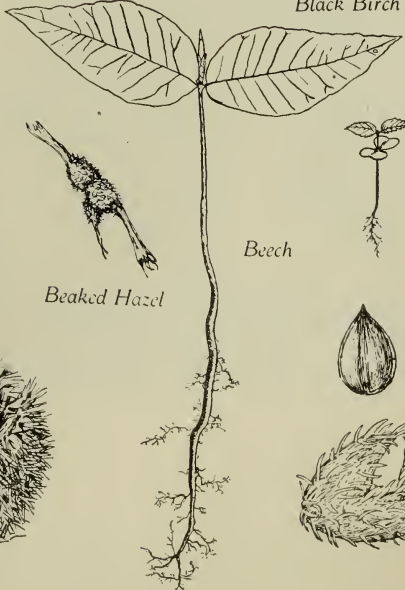
Hazel



Beaked Hazel



Chestnut



Beech

PLANTING TABLE

	Kind of tree or shrub	Appearance of fruit	Appearance of "seed"	When the seeds ripen
1	Ash, White*	Clusters; 1-winged keys	Long, bluntly awl-shaped||	September
2	Basswood*	Small, round, nut-like	Small, oval, not bony||	October
3	Beech	Small, prickly bur	Smooth, triangular nut||	October
4	Birch, Yellow	Small, oval, cone-like	Minute, circular-winged||	September
5	Butternut†	Large, pointed nut	Bony, jagged, rough nut||	October
6	Box Elder†	Medium; 2-winged	Wings of equal size||	September
7	Catalpa	Long, cigar-shaped pod	Light, thin, 2-winged	October
8	Cherry, Black	Small, purple, clustered	Bony, ridged on one side||	August to September
9	Coffeetree, Kentucky	Large, thick, broad pod	Large, oval, thick-walled	October
10	Cottonwood§	Long string of tiny pods	Minute, cottony, hairy||	May or early June
11	Elm, American†	Small, thin-winged disk	Not separable from wing||	Middle of May
12	Hackberry	Small, sweetish berry	Sculptured, bony seed	Early autumn
13	Hickory, Pignut**	Medium; thin-husked nut	Roundish, smooth nut||	October
14	Hickory, Shagbark**†	Medium; thick-husked nut	Angular, ridged nut||	October
15	Locust, Black	Small, thin, brownish pod	Small, brownish black||	September
16	Locust, Honey	Long, twisted, brown pod	Medium, oval, brown	September
17	Maple, Red	Small 2-winged samara	Wings of equal size||	May to early June
18	Maple, Silver	Large 2-winged samara	Wings of unequal size||	Late April or in May
19	Maple, Sugar**†	Medium 2-winged samara	Wings of equal size||	September
20	Maple, Norway†	Large 2-winged samara	Wings of equal size||	September
21	Mulberry	Resembles a blackberry	Minute, smooth, hard||	July or early August
22	Oak, Red*	Shallow-cupped acorn	Large, smooth, roundish||	October
23	Oak, Black	Deep-cupped acorn	Small, striped, roundish||	October
24	Oak, White	Shallow-cupped acorn	Small, smooth, oval nut||	October
25	Oak, Chestnut	Shallow-cupped acorn	Large, long, oval nut||	October
26	Osage Orange	Very large, orange-like	Resembles cucumber seed	October
27	Sycamore	Large, rough, brown ball	Minute, awl-like	October to November
28	Tulip**†	Large, upright, cone-like	Curved, wings ski-like||	September to October
29	Walnut, Black**†	Large, thick-husked nut	Bony, rough nut||	October
30	Mountain Laurel*	Roundish, woody capsule	Minute, dark brown	September to October
31	Dogwood, Flowering†	Scarlet, oval drupe	Small, grooved stonell	September to October
32	Dogwood, Red Osier†	Whitish, oval drupe	Small stonell	September
33	Shadbush†	Small, red, apple-like	Very small, numerous	June or July
34	Witch-Hazel†	Small, woody capsule	Small, shiny-black	August to September
35	Chestnut, Horse†	Large, green, spiny	Large, brown, lustrous	October
36	Pine, White**†	Long, thin-scaled cone	Small, mottled, winged	August
37	Pine, Red**†	Medium, plump cone	Small, brown, winged	Early autumn
38	Pine, Pitch	Prickly, persistent cone	Small, black, winged	Early autumn
39	Pine, Scotch*	Small, blunt cone	Small, mottled, winged	Early autumn
40	Fir, Balsam†	Long, upright cone	Very small, winged	Autumn
41	Larch, American	Very small cone	Minute, brown, winged	Autumn
42	Spruce, Red	Small, firm cone	Minute, brown, winged	Autumn
43	Spruce, Norway**†	Long, cylindrical cone	Small, dark brown, winged	Autumn
44	Hemlock	Very small cone	Minute, brown, winged	Late summer
45	Cedar, Red†	Small, bluish berry	Minute, smooth, bony	Autumn

* Desirable timber and nut-producing trees, plantations of which on favorable soil should prove profitable

† Difficult to transplant because of long taproot. Plant the seeds in permanent sites in field whenever possible.

‡ Desirable around schoolhouse or home as ornamentals.

§ Easily grown from cuttings. Not advisable to grow from seed.

|| The structure here described is not technically the seed.

PLANTING TABLE

	When to collect	Number of seeds per pound*	Per cent which should germinate	Treatment before storing or planting	How to store
1	October to December	8,000	35 to 50	Remove wings	Bury in sand
2	September to October	4,500	5 to 50	Remove stems	Bury for two seasons
3	October to November	1,400	70 to 80	Remove husks	Bury in sand
4	September	424,000	65 to 80	Crush seeds from cone	Sow at once
5	October to November	16	75 to 80	Remove husks	Bury in sand
6	September to November	12,500	40 to 60	Remove wings	Bury in sand
7	Fall or winter	19,500	40 to 70	Remove pod	Cool, dry, place
8	August to September	4,500	75 to 80	Remove pulp from seed	Bury in sand
9	October to December	230	70 to 75	Remove seeds from pod	Cool, dry place
10	May or early June	.....	75 to 95	Plant as gathered	Sow at once
11	As soon as ripe	94,000	50 to 75	Plant as gathered	Sow at once
12	October to December	2,600	70 to 80	Not separable from pulp	Sow soon after collecting
13	Fall; before squirrels	210	50 to 75	Remove husks	In bags in sand
14	Fall; before squirrels	90	50 to 75	Remove husks	In bags in sand
15	Fall or winter	25,400	50 to 75	Pour hot water on seeds†	Cool dry place
16	Fall or winter	2,800	60 to 80	Pour hot water on seeds†	Cool, dry place
17	May or early June	18,400	25 to 60	Remove wings	Sow at once
18	May	21,000	25 to 50	Remove wings	Sow at once
19	October	7,000	30 to 50	Remove wings	Sow at once
20	October to January	.....	40 to 70	Remove wings	Sow at once
21	July to August	.....	75 to 95	Wash and separate	Cool, dry place
22	March or early April	128	75 to 95	Remove cap	Sow at once
23	March or early April	.....	75 to 95	Remove cap	Sow at once
24	October	208	25 to 90	Remove cap	Sow at once
25	October	184	25 to 90	Remove cap	Sow at once
26	October to November	12,140	60 to 95	Remove seeds from ball	Cool, dry place
27	Fall or winter	225,000	10 to 50	.....	Freeze in a dry place
28	October	18,000	0 to 10	None	Sow at once
29	October to November	34	75 to 80	Remove husk	Bury in sand
30	October to March	.....	.....	Remove seed from capsule	Cool, dry place
31	October	4,200	Good	Cut fresh from seeds	Bury for two years
32	October	.....	.....	Cut fresh from seeds	Bury for two years
33	June or July	.....	.....	Cut fresh from seeds	Bury for two years
34	September to October	.....	Good	Remove seeds from bur	Store dry for two years
35	October to November	.....	Good	Remove bur	Bury and freeze
36	Early September	26,800	75 to 90	Shake seeds	Put in
37	September or October	61,400	70 to 80	from	bottles
38	Stay for years on tree	68,200	70 to 80	cones	or
39	October to March	68,400	70 to 80	and	bags
40	October to November	43,800	40 to 60	break	in a
41	October to November	.....	50 to 75	off	cool
42	October to November	131,400	50 to 60	the	dry
43	October to December	59,400	60 to 80	wings	place
44	September to January	200,000	20 to 40		
45	October to December	17,600	5 to 75	Cut flesh from seeds	Bury for two years

* This will vary greatly, depending upon the year, the region, and the site.

† These seeds may be stored dry over winter but must have boiling water poured over them before being planted in the spring. Let them soak over night.

PLANTING TABLE

	When to plant	How deep to plant	How thickly to sow	Height at end of one year (inches)
1	Spring	$\frac{1}{2}$ inch	Scatter thickly	6 to 9
2	Early fall	$\frac{1}{2}$ inch	Scatter thickly	6 to 12
3	Early spring	$\frac{1}{2}$ inch	2 inches apart	3 to 6
4	As soon as ripe	Barely covered	Scatter thickly	4 to 10
5	Early spring	1 inch	3 to 6 inches apart	10 to 18
6	Spring	$\frac{1}{2}$ inch	Touching in rows	10 to 14
7	Spring	1 inch	$\frac{1}{2}$ inch apart	14 to 30
8	Spring	1 inch	2 to 3 inches apart	4 to 6
9	Summer	1 inch	2 to 3 inches apart	3 to 6
10	Early summer	$\frac{1}{2}$ inch	Thickly in shallow drill	20 to 30
11	As soon as gathered	$\frac{1}{2}$ inch	Scatter thickly	5 to 10
12	As soon as ripe	$\frac{1}{2}$ inch	1 to 2 inches apart	6 to 12
13	Spring	1 to 2 inches	3 to 6 inches apart	2 to 6
14	Spring	1 to 2 inches	3 to 6 inches apart	2 to 6
15	Spring	1 inch	2 to 3 inches apart	18 to 20
16	Spring	$\frac{1}{2}$ inch	2 to 3 inches apart	6 to 14
17	June	1 inch	$\frac{1}{2}$ inch	6 to 10
18	June	1 inch	$\frac{1}{2}$ inch	12 to 20
19	Fall or spring	1 inch	$\frac{1}{2}$ inch	6 to 12
20	Early spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch	6 to 10
21	Spring	$\frac{1}{2}$ inch	Scatter thickly	8 to 10
22	Fall or spring	1 $\frac{1}{2}$ inches	3 to 6 inches apart	6 to 20
23	Fall or spring	1 $\frac{1}{2}$ inches	3 to 6 inches apart	6 to 12
24	As soon as ripe	1 $\frac{1}{2}$ inches	3 to 6 inches apart	5 to 9
25	As soon as ripe	1 $\frac{1}{2}$ inches	3 to 6 inches apart	5 to 10
26	Spring	$\frac{1}{2}$ inch	1 inch apart	10 to 15
27	Spring	$\frac{1}{2}$ inch	Scatter thickly	.....
28	As soon as ripe	$\frac{1}{2}$ inch	Scatter thickly	4 to 6
29	Spring	1 $\frac{1}{2}$ inches	3 to 6 inches apart	10 to 18
30	Early spring	Barely covered	Scatter thickly	2 to 4
31	Spring	$\frac{1}{2}$ inch	Touching, in rows	.....
32	Spring	$\frac{1}{2}$ inch	Touching, in rows	.....
33	Spring	Barely covered	1 inch apart	.....
34	Fall	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	.....
35	Spring	1 inch	5 to 8 inches apart	10 to 18
36	Spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	2 to 3
37	Spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
38	Spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$
39	Spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$
40	Spring	$\frac{1}{2}$ inch	Touching, in rows	.....
41	Spring; in the shade	$\frac{1}{2}$ inch	Touching, in rows	2 to 3
42	Spring	$\frac{1}{2}$ inch	Touching, in rows	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$
43	Spring	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	2 to 3
44	Spring	$\frac{1}{2}$ inch	Touching, in rows	2 to 3
45	Fall; in sand	$\frac{1}{2}$ inch	$\frac{1}{2}$ inch apart	1 $\frac{1}{2}$ to 3

PLANTING TABLE

	Best minimum transplanting age (years)	Where seedlings will develop best (soil preferred)	Tolerance of trees and shrubs under shade	Approximate price of seed per pound, 1926	United States Forest Service publications
1	2	Well-drained pastures	Intolerant	\$1.00	<i>Cir. 92</i>
2	2	Rich, loamy, moist	Tolerant	1.50	<i>Cir. 63</i>
3	2	With maple and birch	Very tolerant	1.25	
4	2	With beech and maple	Intermediate	2.50	
5	1	Rich, moist	Intolerant	0.25	
6	1	Fair, moist to wet	Intermediate	\$0.25	<i>Cir. 86</i>
7	2	A variety of soils	Intolerant	1.50	<i>Cir. 82</i>
8	2	A variety of soils	Intermediate	1.00	<i>Cir. 94</i>
9	1	Deep, rich, moist	Intolerant	0.75	<i>Cir. 91</i>
10	1	Moist	Very intolerant	1.50	<i>Cir. 77</i>
11	2	A variety of soils	Tolerant	\$1.00	<i>Cir. 66</i>
12	2	A variety of soils		1.50	<i>Cir. 75</i>
13	1	Deep, moist	Intermediate	0.25	<i>Sil. Le. 48</i>
14	1	Hillsides and ridges	Intolerant	0.25	<i>Cir. 62</i>
15	2	Fair, gravelly	Very intolerant	1.00	<i>Cir. 64</i>
16	1	Good, moist	Intolerant	\$0.75	<i>Cir. 74</i>
17	2	Hilly, ground, not dry	Tolerant	2.50	
18	2	Moist to wet	Tolerant	1.00	<i>Cir. 76</i>
19	2	Well-drained, rocky	Tolerant	1.50	<i>Cir. 74</i>
20	2	Fair, moist	Tolerant	1.00	
21	2	Waste, rocky lands		\$3.50	<i>Cir. 85</i>
22	2	A variety of soils	Intolerant	0.25	<i>Cir. 58</i>
23	2	Dry uplands, poor soil	Intolerant	0.35	
24	2	A variety of soils	Intolerant	0.30	<i>Cir. 106</i>
25	2	Dry uplands, ridges	Intolerant		<i>Bul. 135</i>
26	2	A variety of soils	Intolerant	\$1.25	<i>Cir. 90</i>
27	3	Moist bottomlands	Tolerant	0.75	
28	2	Deep, moist	Intolerant	1.00	<i>Cir. 93</i>
29	1	Fertile, moist	Intermediate	0.15	<i>Cir. 88</i>
30	2	Woodland, acid	Very tolerant	5.00	
31	2	Moist, rocky, shaded	Tolerant	\$0.25	
32	2	Moist, wet, fair	Intolerant	1.50	
33	2	Banks and hillsides	Tolerant	4.00	
34	4	Moist, shady	Very tolerant	1.50	
35	1	Deep, moist to dry	Intolerant	0.75	
36	3	Old fields and pastures	Intermediate	\$ 4.50	<i>Cir. 67</i>
37	3	Gravelly or sandy ridges	Intolerant	22.50	<i>Cir. 60</i>
38	2	Dry, sandy, or rocky	Intermediate	6.50	
39	2	A variety of soils	Tolerant	2.75	<i>Cir. 68</i>
40	4	Moist to swampy sites	Very tolerant	3.50	<i>Bul. 55</i>
41	2	Moist to wet lowlands	Very intolerant		<i>Cir. 59</i>
42	4	A variety of soils	Tolerant	\$6.00	<i>Bul. 544</i>
43	3	A variety of soils	Tolerant	2.00	<i>Cir. 65</i>
44	3	Damp, organic	Very tolerant	6.50	<i>Bul. 152</i>
45	3	A variety of soils	Very intolerant	1.00	<i>Cir. 73</i>

* Cir. = circular; Sil. Le. = silvical Leaflet; Bul. = bulletin. These may be obtained free or at a small cost from Superintendent of Documents, Government Printing Office, Washington, D. C. Only the references in italics are obtainable however; the others are out of print.

Name	RED PINE <i>Pinus resinosa</i> Ait.	AMERICAN LARCH <i>Larix laricina</i> (Du Roi) Koch.	BLACK SPRUCE <i>Picea mariana</i> (Mill.) BSP.	SHINING WILLOW <i>Salix lucida</i> Muhl.
Abundance	Locally common	Fairly common	Locally common	Common
Common locality	Gravelly ridges to dry, sandy plains	In swamps and other moist locations	Damp woods and swamps	Along streams and in wet places
Range	Distinctly a northern tree, Nova Scotia and Quebec, south to Pennsylvania, and west to Minnesota	A transcontinental species, Newfoundland to West Virginia, west to British Columbia, and north to Alaska	A transcontinental species, Labrador to Alaska, and south to Pennsylvania and Wisconsin	Newfoundland to Manitoba, and south to Pennsylvania, Kentucky and Nebraska
Trunk diameter	2 to 3 feet	1 to 2½ feet	1 to 2 feet	Up to 8 inches
Shape	Trunk straight, tall; branches stout; crown broad and open	Trunk straight; branches slender; crown pyramidal	Trunk straight, tapering; crown narrow, irregular, conical	Trunk short; ascending branches forming a broad crown
Height	60 to 80 feet, rarely 100	30 to 70 feet	20 to 40 feet	Up to 20 feet
Bark (old)	Reddish brown; shallowly fissured into broad, flat ridges	Roughened, with thin, close reddish brown, roundish scales	Thin; gray-brown; separating into irregular scales	Smooth, thin; brown to reddish brown; bitter
Leaves	In sheathed clusters of 2's; 4 to 6 inches long; dark green; flexible; persistent 3 to 5 years	Clustered on short lateral spurs; triangular in cross section; ¾ to 1½ inches long; deciduous	Bluish-green; four-sided; ½ to ¾ inch long; blunt-pointed; standing out from all sides of the twig	Alternate, simple, broadly lance-shaped, with long-pointed apex and short stem; stipules present; margin with 16 teeth to an inch
Roots	Lateral roots stout, rapid growing, making tree wind-firm	System broad and shallow, with many strong fibrous roots	Root system shallow and spreading	Shallow, fibrous root system with strong laterals
Twigs	Stout, light reddish brown, not downy, roughened near end of each year's growth by leafstalks	Slender, smooth, pale orange-colored to reddish brown; short, spur-like, lateral branches numerous	Rough, stout, brown with yellowish tinge; covered with rusty to black hairs	Shining, bitter, thin brown to yellowish brown; buds smooth pointed, covered with a single yellowish brown scale
Nature of wood	Resinous, light, hard, close-grained, pale red; weight 30.3 pounds per cubic foot	Heavy, hard, durable in contact with the soil; weight 38.8 pounds per cubic foot	Light, soft, weak, pale yellowish white; weight 38.8 pounds per cubic foot	Soft, weak, not durable; reddish brown; weight 28 pounds per cubic foot
Uses of wood	Heavy construction, piles, masts; a good substitute for white pine	Fence posts, telegraph poles, railroad ties; roots used in ships	Rarely sawed into timber because of its small size; a good pulp wood	Not commercially important
Nature of flowers	Staminate flowers ½ inch long, clustered; pistillate flowers whorled, short-stalked, scarlet	Staminate flowers yellowish; pistillate reddish, borne on lateral branches of previous year; both on same tree	Staminate and pistillate on same tree; both are reddish, cone-like structures about ½ inch long	Staminate and pistillate flowers borne as drooping catkins 1 to 2 inches long on separate trees
Time of flowering	May	May	May	April or May
Pollination	By wind	By wind	By wind	By wind
Nature of fruit	A cone about 2 inches long, conical when closed, spherical when open; scales unarmed	A brownish, blunt cone, ½ to ¾ inch long, with 10 to 15 scales	A dull, grayish brown cone, about 1½ inches long; cone scales with jagged margins	A short-stalked, straw-colored to greenish capsule, ½ inch long
Fruits shed (time)	Autumn of second season	Matures in one year	Autumn	May or June
Fruit distribution	Wind, squirrels	Wind blown, winged seeds	By wind	Wind-blown, winged seeds
Nature of seedlings	1½ inches high at end of first year; stem woody, light brown; cotyledons 6 or 7; leaves dark green, 1 inch long	Short, fairly stout; cotyledons, usually 4 to 6; growth very rapid	½ to 1 inch high at end of first year; cotyledons usually 6; leaves light green above, ½ of an inch long	
Enemies	Remarkably free from injuries	Larch case bearer; a rust on the leaves; the larch sawfly is destructive in the North	Spruce bud worm; cone gall	Oyster-shell scale, and a rust on the leaves
Use to man	A very valuable timber tree, much used in reforestation, desirable ornamentally	Valuable as listed above; especially adapted to wet situations where other species will not thrive	Valuable as pulp for paper; spruce gum is collected from wounds made in the trunk; spruce beer is made from fresh twigs	Acts as a soil binder on areas where erosion is to be feared

SPECKLED ALDER <i>Alnus incana</i> (L.) Moench	BLACK OAK <i>Quercus velutina</i> Lam.	CHESTNUT OAK <i>Quercus Montana</i> Willd.	AMERICAN ELM <i>Ulmus americana</i> L.
Locally common	Very common	Common	Common
Swamps and stream borders	Dry uplands, gravelly plains, and ridges	Dry hillsides and rocky slopes	Prefers rich bottom lands
Newfoundland to Saskatchewan, south to Pennsylvania and Nebraska	Maine, west thru Ontario to Minnesota, and south to Florida and eastern Texas	Maine to Ontario, south to Alabama and Tennessee	Newfoundland, west thru Canada to Rocky Mountains, and south to Florida and Texas
Up to 5 inches	3 to 4 feet	1 to 3 feet	3 to 5 feet
A shrub or small tree, often found in clumps of several stems	Trunk usually continuous; crown deep, irregular, oblong	Tall and columnar, or with spreading branches	Variable; trunk often divided into several large branches, vase-like
8 to 20 feet	50 to 80 feet	50 to 70 feet	From 75 to 100 feet
Smooth; grayish brown with prominent whitish lenticles	Rough, ridged; broken by cross fissures; inner bark yellow, bitter	Thick; brown to black; deeply fissured into broad ridges	Thick; grayish; roughened by irregular furrows and ridges
Alternate; simple; 3 to 5 inches long, with doubly or irregularly serrate margins; apex acute	Alternate; simple; from 4 to 6 inches long, from 2 to 4 inches wide; commonly shallow-lobed near the ground, deep lobed above	Alternate; simple; oblong, 5 to 9 inches long; 2 to 4 inches wide; margin with coarse rounded lobes	Alternate; simple, egg-shaped; base uneven; short-stalked; upper surface somewhat rough
Large and strong, developing many root suckers; shallow	Strong tap and secondary roots	Strong tap and secondary roots; deep going	Shallow and extensive
Slender, grayish brown, finely hairy, with conspicuous whitish lenticles; buds distinctly stalked, reddish; bud scales 3, visible	Stout, reddish brown, angular, longitudinally ridged; buds large, angular completely covered with pale hairs; buds at branch tips clustered	Stout, light orange to reddish brown, smooth, bitter; buds at branch tips clustered about terminal buds, sharp-pointed; scales light brown, hairy at apex	Slender, smooth, reddish brown; terminal bud absent; base of twig marked by persistent ring-like bud-scale scars
Soft	Hard, heavy, strong, tho not tough; checks in drying; weight 44 pounds per cubic foot	Heavy, hard, strong, tough, ring-porous, durable; weight, 47 pounds per cubic foot	Heavy, hard, strong, coarse-grained, tough, hard to split; weight 40 lbs. per cu. ft.
For gunpowder and charcoal	Of slight value except for fuel; substitute for red oak	Railroad ties, fencing, fuel, construction; bark rich in tannin	Cheese boxes, cooperage, planking, wheel hubs, and in shipbuilding
Staminate and pistillate on same tree; both are formed the previous autumn; pistillate becomes purple in spring	Staminate and pistillate on same tree; staminate in hairy tassels from 4 to 6 inches long; pistillate much shorter	Staminate and pistillate on same tree; staminate tassels yellow, 2 to 3 inches long; pistillate grouped on stalks	In slender drooping clusters, greenish in color
March or April	May	May	April, before the leaves
By wind	By wind	By wind	By wind
A woody, cone-like strobile, remaining on tree all winter	An acorn, maturing in 2 seasons; nut $\frac{1}{2}$ times as long as broad, $\frac{1}{2}$ enclosed in cup	An acorn, maturing in 1 season; nut 2 to 3 times as long as broad, $\frac{1}{2}$ enclosed in cup	A flat seed surrounded by a wing about 2 inches long; green
Autumn	October	October	May
By wind	Squirrels and by rolling	Squirrels and by rolling	By wind
	2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ inches high at end of first year; stem long, thin greenish; leaves at first scales, later obovate, unlobed; cotyledons 2, buried; taprooted	Usually 3 to 4 inches high at end of first year; stem greenish, thin, long; cotyledons 2, buried; distinctly taprooted; leaves at first scales, later normal	From $\frac{3}{4}$ to 1 $\frac{1}{2}$ inches high at end of first year; stem long, thin; leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, normal in shape; cotyledons 2, oval, $\frac{1}{2}$ of an inch long
A fungus sometimes causes a swelling or distortion of the catkins, called "tumefaction"	The oak midrib gall and a common white wood rot (<i>Fomes ignarius</i>)	Oak bullet gall and a common white wood rot (<i>Polyporus</i>)	Fall cankerworm; spring cankerworm; elm borer; a wood rot of the trunk
Of value as soil binders along stream, thus checking erosion	Of small importance as a timber species. A yellow tanning dye (quercitron) is obtained from inner bark	Wood an excellent substitute for white oak; bark especially rich in tannin, used in tanning leather	Wood used as described above; the most valuable of all our trees for streets, parks, and lawns because of its magnificent form

TREMBLING ASPEN <i>Populus tremuloides</i> Michx.	PIGNUT HICKORY <i>Carya glabra</i> (Mill.) Sweet	HOP HORNBEAM <i>Ostrya virginiana</i> (Mill.) K. Koch	YELLOW BIRCH <i>Betula lutea</i> Michx.
Very common	Fairly common	Common	Locally common
Burned over lands and abandoned fields	Well-drained to dry ridges and hillsides	Dry, gravelly hillsides and woods	Moist uplands, stream borders, and in swamps
A transcontinental species, Newfoundland to Alaska, and south to Pennsylvania, Kentucky, and Mexico	Maine and Ontario, west to Minnesota and Nebraska, and south to Florida and Texas	Nova Scotia to Minnesota and Nebraska, and south to Florida and Texas	Newfoundland, south to Pennsylvania and along the mountains west to Minnesota
8 to 15 inches	2 to 3 feet	10 to 15 inches	2 to 3 feet
A small, rather slender tree; with an open and irregular crown	A tall, well-developed tree with angular branches and narrow crown	An open-crowned tree, made up of many slender branches	A branching, round-topped tree with pendulous branches
30 to 40 feet	60 to 80 feet	25 to 40 feet	60 to 80 feet
Smooth; yellowish green to whitish	Thin, close, narrowly ridged; somewhat like ash; never shaggy	Grayish-brown; thin, flaking off in narrow, flat pieces	At first smooth, later peeling off in thin, yellow, papery scales
Alternate; shield-shaped to nearly round, with a sharp apex and small teeth along margin; leafstalks laterally flattened	Alternate; compound; made up of 5 to 7 leaflets, from 8 to 12 inches long; leaflets usually smooth and oblong	Alternate; simple, twice as long as wide; margin doubly-toothed; veins usually unbranched except in first-year sprouts	Alternate; simple, egg-shaped; marginal teeth unequal; base rounded or slightly heart-shaped, often uneven; veins hairy beneath
Shallow, moderately extensive lateral roots which sucker readily	As with most hickories, the taproot is very well developed	Shallow	Shallow; taproot not well developed, lateral roots long
Slender, smooth, reddish brown and glossy, becoming grayish brown; roughened elevated leaf scars when older	Smooth, slender, yellowish green to reddish brown; with small oval reddish brown buds, $\frac{1}{2}$ to $\frac{1}{4}$ inch long, and smooth bud scales	Slender, dark reddish brown, often zigzag; at first hairy and green, later smooth and lustrous	Slender, with many short spurs; smooth, brownish bark with but slight wintergreen flavor; lenticels pale raised dots, becoming horizontally elongated
Light, soft, weak, light brown to white; weight 25 pounds per cubic foot.	Heavy, hard, strong, tough; flexible, light to dark brown; weight 51 pounds per cubic foot	Strong, hard, tough, light brown; sapwood whitish	Heavy, hard, strong, light reddish brown; weight 41 pounds per cubic foot
Paper, excelsior, and boxes; not important commercially	Agricultural implements, wheels, tool handles, fuel	Tool handles, mallets, levers, fence posts and fuel	Furniture, flooring, interior finish, implements, and fuel
Staminate and pistillate flowers are catkins, 2 or more inches in length, borne on separate trees	Staminate catkins pendulous, 3 to 7 inches long in clusters of 3's; pistillate in clusters of 2 to 5 spikes, $\frac{1}{4}$ inch long	Staminate and pistillate on same tree; staminate formed the previous season; pistillate erect, catkins	Staminate flowers formed in fall, developing into 3-inch yellow tassels in spring; pistillate are short, reddish green
April, before the leaves	May to June	April	April
By wind	By wind	By wind	By wind
An oblong, two-valved capsule, $\frac{1}{4}$ inch long, surrounded by a mat of soft, white hairs	A thick, bony-shelled, almost spherical nut, at first sweet, later bitter	A small, flat nutlet, enclosed in a bladder-like sac arranged in hoplike clusters	Winged seeds from cone-like catkins standing erect on branch
May or June	October	Winter	Autumn
Capsule splits, freeing seeds to the wind	Falls to ground or distributed by animals	Drop to ground and blown by wind	By wind
	2 to 2 $\frac{1}{2}$ inches high at the end of 1 year; stem stout; cotyledons 2, buried; leaves first ones simple, later ones compound; very strongly taprooted		Less than 1 inch in height the first year; leaves not unlike those on the mature tree
Oyster-shell scale, and a white wood rot of the trunk (<i>Fomes igniarius</i>)	A beetle (the lurid <i>Dicerca</i>) and a leaf spot	Fairly free from pests	Common white wood rot; a beetle, the bronze birch borer
Valuable as pulp wood, and as a covered tree especially on burned over areas	Wood useful as suggested above; fruits not edible but tree is much prized for its lumber-producing qualities	Solitary habits and small size make it undesirable species in woodlots; well adapted for parks and lawns	Valuable as a timber tree; sometimes planted as an ornamental; bark useful as tinder on rainy days

HAZELNUT <i>Corylus americana</i> Walt.	HAWTHORNS <i>Crataegus</i> sp.	CHOKE CHERRY <i>Prunus virginiana</i> L.	STAGHORN SUMACH <i>Rhus typhina</i> L.
Fairly common	Fairly common	Very common	Very common
Open woodlands and hill-side thickets	In old pastures and along fence rows	Hedgerows, stream courses, open woods	Frequents abandoned fences and dry fields
Maine to Ontario, south to Florida, and west to Kansas	Northeastern United States; range but imperfectly known	A transcontinental species, Newfoundland to British Columbia, and south to Georgia and Texas	New Brunswick to Minnesota, and south to Georgia and Alabama
Up to 4 inches	8 to 10 inches	6 to 8 inches	4 to 8 inches
A small, spreading shrub	A short, stout tree or shrub; branches slender, crooked	A large shrub or small tree; crown, narrow, irregular	A scraggy short-trunked shrub or tree; branches angular, ascending
3 to 8 feet	14 to 18 feet	20 to 25 feet	20 to 25 feet
Smooth; thin, dark brown, sometimes roughened	Thin, ashy-grey, scaly	Dark grey; slightly roughened by shallow fissures	Somewhat rough-scaly; dotted with horizontally elongated lenticles
Alternate; simple; short-stalked; smooth on upper surface, slightly hairy beneath	Alternate; simple; shield-shaped; doubly-toothed; rough-hairy; pointed at apex	Alternate; simple; oval; 2 to 4 inches long with abruptly pointed apex; margin cut by sharp slender teeth	Alternate; compound; 16 to 24 inches long with 11 to 31 leaflets, each with toothed margin, sharp point, and rounded base; smooth
Shallow and spreading	Spreading	Penetrate deep into the ground but also throw out large laterals	Spreading by means of underground shoots
Smooth, but covered with numerous pinkish hairs, standing out at right angles; buds hairy, covered with 3 to 6 scales	Stiff, grayish, armed with slender glossy spines about 2 inches long; buds shiny, bright chestnut-brown	Rather stout, smooth; reddish brown; lenticles not horizontally elongated; odor of bark rank when crushed; terminal buds not clustered	Very stout; covered with dense brownish conspicuous hairs; juice milky; pith orange-colored, large; terminal bud absent; leaf scars broad
Not important	Heavy, hard, close-grained, reddish brown; weight 45 pounds per cubic foot	Heavy, hard, close-grained, weak; weight 43 pounds per cubic foot	Light, soft, weak, streaked golden-yellow tinged with green; satiny to touch
Not used	Not important; sometimes used for canes, napkin ring, and rulers	Of no commercial value	Not important; sap spigots, picture frames, and knickknacks
Staminate catkins 3 to 4 inches long; pistillate with long slender, projecting stigma	Perfect; white; $\frac{1}{2}$ to 1 inch across, with a disagreeable odor; clustered	Showy, white, in drooping clusters, 3 to 6 inches	Staminate and pistillate on different trees, borne in lilac-like, dense yellowish green clusters
April or May	June	May or June	May or June
By wind	By insects	By insects	By insects
A sweet, edible nut enclosed in a green, bag-like covering	Oblong, bright red, usually clustered, conspicuous	A dark red juicy cherry, $\frac{1}{2}$ inch in diameter, arranged in drooping clusters; bitter	Compact, erect, cone-like red clusters, nut spherical, covered with red hairs
July and August	October	July and August	Persists thruout winter
Falls to ground, or distributed by animals	By birds, animals and by falling to ground	By birds	By birds and by being blown over the ground
	From 1 to 2 inches high at end of first year; stem stout, short; leaves normal or nearly so in shape; cotyledons 2, linear	1 to 3 inches high at end of first year; stem very long, thin; leaves up to $\frac{3}{4}$ inch long, normal in shape; cotyledons 2, oval, $\frac{1}{8}$ inch long	Stout with small compound leaves
The hazelnut weevil	The hawthorn tingis, locust leaf miner, and a rust common on the leaves	Tent-caterpillar; black-knot, a fungus disease	Hickory tussock moth; maple and oak twig pruners; a leaf mildew; twigs often frost-killed
An attractive ornamental. The nuts are extensively sold under the name of hazelnuts or filberts	A "weed" tree. Its white flowers, scarlet fruit, and autumnal color makes it ornamentally attractive	Of no commercial importance; fruit makes a good quality jelly	Commercially unimportant; bark and leaves rich in tannin; sometimes ornamentally planted

RED MAPLE <i>Acer rubrum</i> L.	BASSWOOD <i>Tilia americana</i> L.	ALTERNATE- LEAVED DOGWOOD <i>Cornus alternifolia</i> L.	RED ASH <i>Fraxinus pennsylvanica</i> Marsh.
Very common	Very common	Not uncommon	Rather uncommon
Prefers swamps, but also found on hillsides	In rich woods and on loamy bottomlands	Rich, well-drained, and watered soils	Valleys, swampy lowlands, and wet places
Nova Scotia to Manitoba and south to Florida and Texas	New Brunswick to Manitoba, and south to Georgia and eastern Texas	Nova Scotia to Minnesota, and south to Alabama and Georgia	New Brunswick and Manitoba, south to Florida and Alabama, and west to Dakota and Missouri
1 to 3 feet	2 to 4 feet	2 to 6 inches	1 to 3 inches
Usually short-trunked; crown deep, broad, dense	Trunk straight, clean and with slight taper; crown dense, rounded	A small tree or more commonly a tall shrub; crown broad, dense	Similar to white ash but with more upright branches; crown close
40 to 50 feet	60 to 80 feet	10 to 20 feet	30 to 60 feet
Thick, shaggy; dark-grayish; peeling off into long plates	Dark gray; somewhat scaly and deeply and regularly fissured	Thin; reddish brown; smooth, or divided into narrow, broken ridges	Grayish brown; prominent ridges becoming scaly in time
Opposite; simple; 3 to 5 lobed; coarsely toothed; light green above, pale whitish green below	Alternate; simple; unequally heart-shaped, with incurved marginal teeth; firm in texture	Alternate, or occasionally opposite; simple; often clustered at branch tips; oval in shape; sharp-pointed; margin untoothed	Opposite; compound about 11 inches long with 5 to 9 stalked leaflets; yellowish green above, pubescent beneath; petiole hairy
Shallow, extensive, with long, strong, laterals	Lateral, deep, spreading; no taproot	Lateral roots spreading; coarse, and shallow	
Somewhat slender, shining, bright or dark red; buds red, blunt-pointed, with 4 pairs of scales	Smooth, shining, bright red to brown, usually zigzag, mucilaginous; terminal bud absent; lateral buds red, unsymmetrical	Alternate, slender, smooth, reddish, later dark green, sometimes striped with white; buds sharp-pointed with 2 to 3 brown scales	Similar to White Ash but not so stout, and covered with dense velvety hairs; rarely almost smooth
Medium hard, heavy, not strong close grained; weight 38 pounds per cubic foot	Light, soft, moderately strong, fine grained, white; weight 28 pounds per cubic foot	Heavy, hard, strong, tough, but too small to be commercially important	Heavy, hard, strong, light brown; weight 44 pounds per cubic foot
Cheap furniture, flooring, woodenware, and in turnery	Paper pulp, woodenware, cheap furniture, crating, wagons, trunks	Not used	Same as White Ash tho considered commercially inferior
Staminate and pistillate on same or different trees; in dense unstalked, scarlet clusters	Stamens and pistils in same flower, fragrant, yellowish white; flat, drooping clusters	Cream-colored; borne in many-flowered, terminal, flat clusters	Staminate and pistillate on different trees former, in dense purple, red clusters; pistillate greenish
March or April	June or July	May	May
By wind	By insects	Probably by insects	By wind
Reddish brown keys borne at end of drooping stems; wings less than 1 inch long	A woody, spherical fruit, about the size of a pea, attached singly or in groups to a wing	Bluish black, $\frac{1}{2}$ inch in diameter; borne in loose, spreading red-stemmed clusters	A single key borne in long drooping clusters; persistent
May or June	October	October	Winter
By wind	Wind	Probably by birds	Wind
From 1 to 2 inches high at end of first year; stem slender, woody; first leaves ovate, scarcely toothed, later ones normal in shape; cotyledons 2, linear	1 to 2 inches high at end of first year; stem fairly stout; leaves ovate, toothed; cotyledons 2, palmate, from 4 to 5 lobed		Up to 4 inches high at end of first year; stem stout; first leaves simple, later ones compound; cotyledons linear, about 1 inch long
The terrapin scale; imperical moth; and a "tar" spot on the leaves	Rarely attacked by fungi tho sometimes troubled by a leaf spot; basswood leaf roller	Often attacked by the leopard moth, and tent-caterpillar larvae; a twig blight	Rarely attacked by fungi and insects; oyster-shell scale
A fairly valuable timber producer; ornamentally a good tree, especially for streets and parks	A valuable timber tree; the flowers are sought by honey bees; the inner bark is sometimes made into cordage; desirable ornamentally	Ornamentally very attractive because of its form, its blossoms, its fruit, and its autumnal coloration	Economically not so important as White Ash because of its smaller size and slightly inferior lumber

SWEET FERN <i>Myrica asplenifolia</i> L.	MEADOW-SWEET <i>Spiraea alba</i> Du Roi.	HIGH BUSH BLACKBERRY <i>Rubus allegheniensis</i> Porter	VIRGINIA CREEPER <i>Parthenocissus</i> <i>quinquefolia</i> (L.) Planch.
Locally common	Common	Common	Common
Stony uplands and sterile, sandy soils	Along fence rows and roadsides in wet soil	Roadside thickets and neglected fields	Likes a variety of soils if not too wet
Nova Scotia to the Saskatchewan River in Alberta, and south to North Carolina and Indiana	New England, south along the mountains to North Carolina and west to Missouri	Thruout the eastern part of the United States and Canada	New England to Missouri and, south to Florida and Mexico
Less than 1 inch	Less than 1 inch	Less than 1 inch	Up to 6 inches
A shrub; crown open, round-headed	A slender, bushy shrub of many stalks	A straggling, prickly bush with stems both erect and nodding	A vine climbing to the tops of tall trees
1 to 3 feet	2 to 6 feet	2 to 8 feet	
Young twigs yellowish to coppery brown; older ones, black; rough	Thin; fine; yellowish brown to reddish; shredding	Old stalks russet-red to purple; armed with stout, curved prickles	Bark tight and furrowed on larger specimens; young bark grayish
Alternate; simple; fragrant; 3 to 6 inches long, less than 1 inch wide; deeply and irregularly lobed; untoothed; fern-like	Alternate; simple; oval, markedly toothed, with prominent ribs beneath; texture firm, close; short-stemmed	Alternate; compound; 3 to 5 toothed, stalked leaflets which are hairy underneath; midrib and stem armed with stout prickles	Alternate; five leaflets, the middle three are usually the longest; margins distinctly toothed; dull-green above
Long and trailing; sucker freely	Shallow and fibrous	Fibrous but not dense	Fibrous and shallow
Green or yellowish or reddish brown; sprinkled with tiny resinous dots; leaf buds minute, globular, heavy	Erect, slender, with smooth, yellowish brown bark	Green, furnished with numerous, short, coarse hairs; usually straight	Terminal branchlets more or less hairy, lateral usually smooth; tendrils equipped with discs for holding
Fragrant	Not important	Not important	Not important
Not important	Not important	Not important	Not important
Staminate and pistillate on same or different shrub; staminate catkin long, on branch end; pistillate, spherical	White with a tinge of light pink, borne on the end of the branches in fragrant spikes	Of the rose type; white, showy, $\frac{1}{2}$ inch across, forming large, cone-like clusters at ends of stalks	Clustered, individual flowers about $\frac{1}{2}$ inch across
April or May	July to September	May and June	June
By wind	By insects	By insects	By insects
A smooth, shiny, small nut enclosed in a bur-like case; fragrant		Edible; red when immature, black when ripe; seeds small, hard	An irregular cluster of blue-black berries with a bloom
September	Often remains over winter	August to September	Autumn
		By birds and by animals	Birds
A leaf rust	Leaf mildew	An orange leaf rust sometimes injures the leaves	The eight-spotted for-ester; a leaf scale; and a leaf mildew
Especially desirable ornamentally because of its fragrant leaves, twigs, and fruit. Dried leaves sometimes used to make pillows and tea	A fragrant ornamental shrub often cultivated	Valuable for its edible fruit. It is also the plant from which a score or more of our cultivated species have sprung	One of our most ornamental vines; a rapid grower; leaves turn brilliant colors in the fall

ARROW-WOOD <i>Viburnum dentatum</i> L.	SWEET VIBURNUM <i>Viburnum Lentago</i> L.	GROUND HEMLOCK <i>Taxus canadensis</i> Marsh.	LABRADOR TEA <i>Ledum groenlandicum</i> Oeder.
Not uncommon	Not uncommon	Locally common	Locally common
Prefers moist situations and thickets	Along bodies of water in or near woods	Prefers shady, rocky, evergreen woods	In bogs and in moist places
New Brunswick to Minnesota, south along Appalachian Mountains to Georgia, and west to Minnesota	Quebec to Manitoba, south to Georgia and Oklahoma	Newfoundland to Manitoba, and south to Virginia and Iowa	Greenland, to British Columbia, and south to Massachusetts, Pennsylvania, and Wisconsin
Often less than 1 inch	3 to 6 inches	Less than 1 inch	Less than 1 inch
A tall, slender shrub; smooth, straight arrow-like twigs	Usually a short-trunked shrub; crown round-topped	A low straggling shrub; branches wide-spreading	A low, evergreen shrub; branches slender, ascending
13 to 15 feet	10 to 15 feet	1 to 4 feet	1 to 4 feet
Ashen-gray; lighter on fresh twigs	Thin; reddish-brown, divided into small scaly plates		Reddish brown to dark brown
Oval to shield-shaped; coarsely and regularly toothed; the many veins beneath prominent and straight; stem long and slender	Opposite; simple; oval, sharp-pointed; sharply and finely toothed; veins noticeably joined by veinlets; stem often winged and grooved	Alternate; linear; sharp-pointed, hemlock-like; dark green above, bright yellow-green beneath	Alternate; simple; thick; 1 to 2 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide; leathery; dark green above, rusty brown, woolly beneath
Fibrous and dense	Fibrous	Shallow and spreading	Roots or subterranean stems very large
Light brown to gray; straight and arrow-like hence the name "arrow wood"	Slender, somewhat scurfy; light red to greenish; ill-smelling when broken; terminal flower buds $\frac{1}{4}$ inch long, with a marked swelling at base	Brown, later becoming almost black; reclining to erect	Recent shoots densely covered with rusty, velvety wool
Not important	Heavy, hard, dense, with disagreeable odor	Not important	Not important
Not important	Not commercially valuable because of its small size	Not important	Not important
White, borne in broad, flat clusters, 2 to 3 inches across	Small and white, appearing in dense, many-flowered clusters, 3 to 5 inches broad	Solitary, borne in the axils of the leaves	White, star-shaped; $\frac{1}{4}$ to $\frac{1}{2}$ inch across; long-stemmed; borne in dense terminal clusters
June	May and June	April and May	
By insects and wind	By insects		
Slate-blue to black; ovoid-spherical, about $\frac{1}{4}$ inch across; borne in clusters	Bluish black, fleshy edible, sweet; clustered on slender, reddish stalks	A nut-like seed all but enclosed in a red pulpy, berry-like cup	An oblong-oval capsule, $\frac{1}{4}$ inch long, borne in nodding clusters; downy
August or September	September to October	August or September	
By birds		Birds and by falling on the ground and rolling	
		Short, slender, with needle-like leaves and fairly broad cotyledons	
	A mildew on the leaf sometimes does much damage	Fairly free from insects tho sometimes troubled by a leaf spot	A leaf rust
An attractive ornamental wood supposed to have been used by the Indians for making arrows	Propagated in parks and on private estates for its showy, fragrant flowers, attractive foliage, and edible fruit	An excellent low ornamental for use in moist, well-shaded areas	The resinous, astringent, and slightly bitter leaves have been used in the North as a substitute for tea

BLACK HUCKLEBERRY <i>Gaylussacia baccata</i> (Wang.) K. Koch.	HIGH-BUSH BLUEBERRY <i>Vaccinium corymbosum</i> L.	RED-BERRIED ELDER <i>Sambucus racemosa</i> L.	EUROPEAN BARBERRY <i>Berberis vulgaris</i> L.
Locally common	Locally common	Not uncommon	Common
Rocky hills and sandy ridges	In swamps and in moist woods	Dry woods and rocky places	Prefers a lime soil tho not particular
Newfoundland to Manitoba and Wisconsin, and south to Georgia and Tennessee	Maine to Minnesota, and south to Florida and Louisiana	A transcontinental species. New Brunswick to Alaska, and south along the mountains to Georgia and California	Introduced from Europe, and now commonly escaped thruout the northeastern States
Less than an inch	Usually less than 1 inch	An inch or less	Less than 1 inch
An erect, freely-branching shrub with an irregular spray	A tall shrub with a spreading crown; often found in clumps	A coarse shrub with many root suckers	A dense, bushy, round-topped shrub with many suckers
1 to 3 feet	3 to 12 feet	2 to 12 feet	3 to 10 feet
Grayish brown; rough	Copper-colored or tinged with red or bleached to a gray; peels	Brown; rough and warty in appearance	Young twigs brownish, becoming gray or black with age; thorny
Alternate; simple; untoothed, egg-shaped; short-stemmed; profusely dotted beneath with yellowish, resinous dots	Alternate; simple; oblong; 1 to 3 inches long; dark green and shiny above, paler and hairy below; margin: untoothed	Opposite; compound; small, red glands at base of grooved stem; leaflets 5 to 7 sharp-pointed, smooth above, downy below	On one year twigs the leaves are scattered or reduced to sharp branched spines; on older twigs, clustered, oblong in shape
Fibrous	Dense, matted, and fibrous	Coarse, spreading	Matted; astringent; sucker freely
Downy, often deep red; winter buds small, bright red	Yellowish green, often angular, with lines of hair scattered up and down them	Young stems pale, dotted with brownish lenticles; full of reddish brown pith	Ash-colored; branches arched and drooping at the ends
Not important	Not important	Not important	
Not important	Not important	Not important	Not important
Reddish yellow, one-sided bells, covered with resinous dots	White or pale pink bells, borne in stout, drooping clusters	A creamy-white pyramid, made up of small, star-like flowers which turn brown in drying	Yellow; borne in drooping, long, many-flowered clusters
May to June	May or June	April to May	May or June
		By insects	By insects
Berry-like, black, shining $\frac{1}{2}$ inch in diameter; edible; clustered	A bluish black berry, $\frac{1}{2}$ inch across; with a bloom; slightly acid; edible	Berry-like, juicy fruit, borne in scarlet pyramids; unpleasant to taste	A scarlet berry borne in drooping, elongated clusters; edible tho acid and astringent
July or August	July and August	June to July	Persists thruout the winter
Animals and birds	Birds and animals	Animals and probably birds	Birds
			Short; thin-stemmed; leaves roundish, set on long slim petioles; cotyledons 2, small, oval
Fairly free from attacks of insects and fungi	A rot sometimes affects the fruit	Attacked by the cloaked knotty-horn moth caterpillar and by a leaf mildew	A leaf rust
Produces the common huckleberry of our markets also sold as an ornamental	Produces the latest market blueberry; ornamentally desirable because of the brilliant autumnal coloring of the leaves	A magnificent early-blooming ornamental	An attractive ornamental; a harbinger of the well-known wheat rust

CLASSES OF EXHIBITS BASED ON THIS LEAFLET

These exhibits may be entered at the Rural School Exhibit, Farmers' Week, February, 1927, at the New York State College of Agriculture. See the September, 1926, Leaflet for other classes than those mentioned below.

Note.—But one exhibit of each class mentioned is permitted from a rural school. It is suggested that you hold an exhibit of your work at a school, town, or county fair, in order to decide which shall be entered. The best exhibits should be sent to the Farmers' Week Exhibit.

1. The best collection of seeds and fruits of woody plants found in the region in which you live, labelled, as far as possible, from the identification plates or from other sources.
2. The most complete exhibit of fruits of woody plants representing ways in which these are spread from place to place.
3. The best set of maps showing the ranges of at least ten different woody plants native of your county.
4. The best mount showing seedlings of woody plants, none of which are over three years old.
5. The best drawing of a seedling of any woody plant.