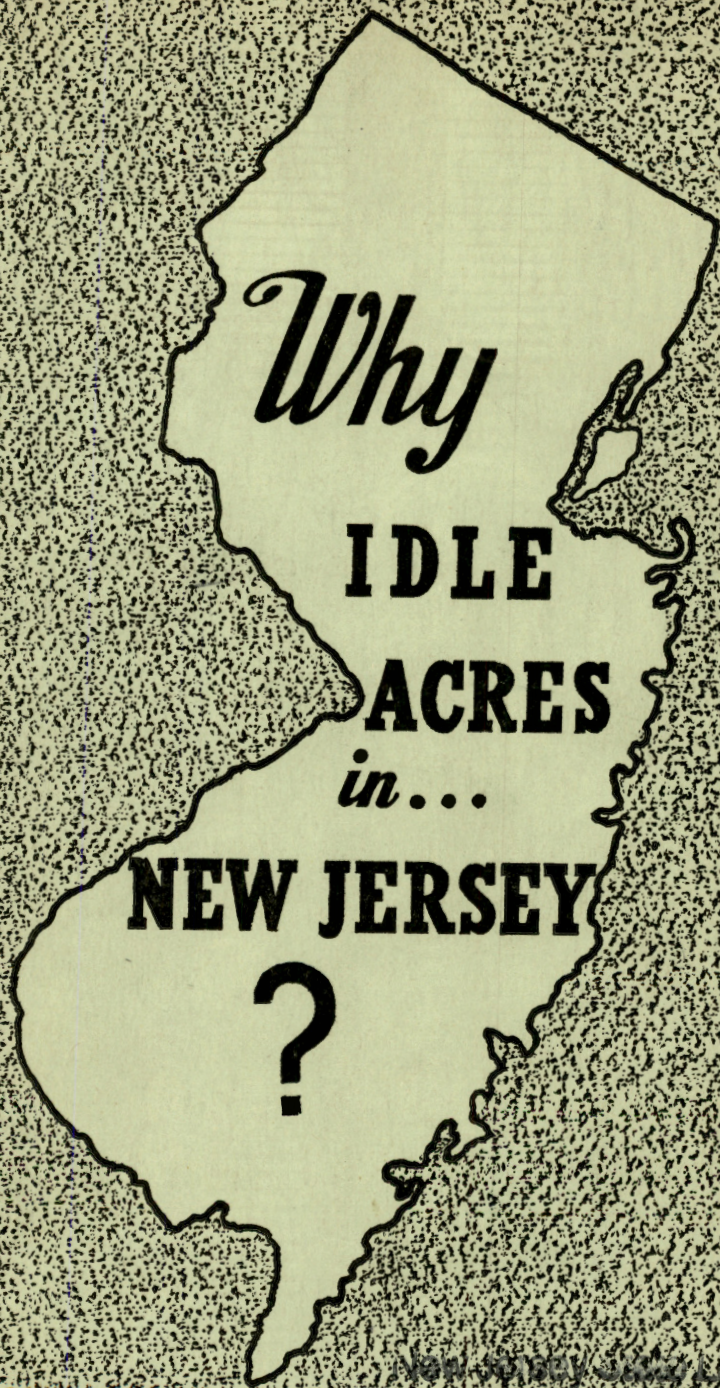
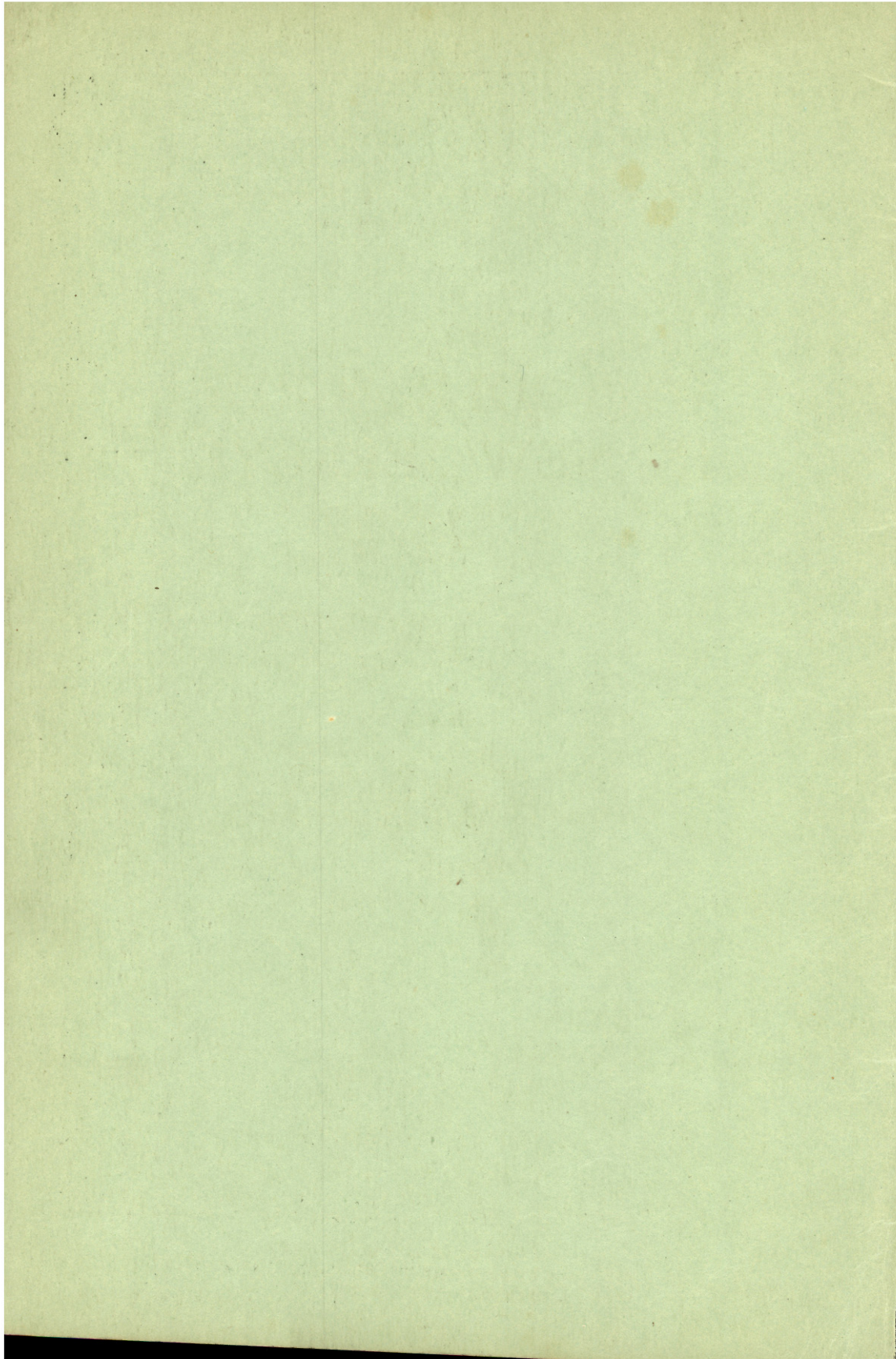


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DIVISION OF FORESTS AND PARKS
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY



New Jersey
Department of Conservation and Development
Division of Forests and Parks

WHY IDLE ACRES IN NEW JERSEY?

By NELSON T. KESSLER
Senior Assistant Forester



TRENTON, NEW JERSEY
July 1, 1937

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A red pine plantation bordering the Lopatcong Water Company reservoir in Warren County. Reforestation controls erosion and regulates stream flow.

Why Idle Acres in New Jersey?

By NELSON T. KESSLER, *Senior Assistant Forester*

LAND A TANGIBLE ASSET

The greatest asset which man has at his command is land. It is probably the only form of wealth which has any permanent lasting value. From it come all of our basic natural resources, on it we raise the farm crops necessary for subsistence and from it we cut the timbers to build our homes and manufacture the many diverse products derived from the forest. The land should be considered a heritage from the past, to be held in trust by present generations and passed on to the future in a productive condition. Instead, however, it has been exploited and abused to an extreme degree, without consideration as to the various types and classifications of land, or the uses to which it is best adapted.

ONE MILLION ACRES IDLE IN NEW JERSEY

We have in our own State of New Jersey more than one million acres of idle, abandoned land which is totally unproductive. Comprising nearly one fourth the area of the entire State, this land in its present unproductive condition, is a burden to the rest of the State, and constitutes an economic problem which is rapidly becoming more acute with each passing year. Much of it is potential forest land which should never have been cleared for agricultural purposes. Too poor for farming, much of it stony, steep and subject to erosion, the common sense solution to its use is to put it back to work growing timber crops, regulating stream flow and creating a favorable environment for wild-life.

IDLE LAND HURTS EVERYONE

On every hand idle acres furnish mute evidence of this serious land problem. Many people do not realize that this idle land situation affects every individual citizen of the State. Yet—this vast unproductive area influences the tax bill (and the rent bill) of every citizen, because productive land in other sections—including city real estate—is obliged to carry a higher tax burden to offset the non-revenue producing idle land which is not paying its share.

NEW JERSEY IMPORTS NINE-TENTHS OF LUMBER USED

This idle land situation not only has an unhealthy effect upon the tax structure, but consider also the fact, that while this land lies idle, the State also imports nine-tenths of the lumber used within its borders. New Jersey pays millions of dollars annually for lumber shipped into the State, and tacked to this is an annual freight bill of several million dollars. Most of this imported lumber comes from the South and from the far West. A considerable proportion of all stocks of lumber in New Jersey lumber yards today consists of Western species, chief among which is Douglas Fir from Washington and Oregon. Douglas Fir is used extensively in New Jersey at the present time, having largely superseded southern yellow pine because it is cheaper in price, although the Longleaf pine from the South is superior in quality.

STEADY RISE IN LUMBER PRICES

But New Jersey is not the only State dependent upon imported lumber. New England, the Middle Atlantic States and the Middle West are all drawing heavily upon the South and the far West, for among all these states, not one is able to meet its needs for lumber from within its own borders. Here are no less than twenty states,



A Warren County plantation of mixed pine and spruce which contained nineteen thousand board feet of sawlogs at thirty-four years of age.

all dependent upon a far distant region for lumber supplies. Can these states, including New Jersey, continue to secure lumber from the South and West at present prices? Past experience is decidedly to the contrary. The history of lumber prices in the past shows that, over a period of years, the tendency of prices has always been upward. This rising cost has been partly due to the fact that the lumber industry has always been a transient industry, moving from cut-over timber lands in one section of the country, to virgin stands in another region. Thus, the source of supply has constantly moved farther and farther from the point of consumption, with corresponding rises in freight costs. But what is more important, is the certainty that lumber prices will continue to advance gradually as the supply of virgin timber in the West becomes depleted, and that prices are likely to be considerably higher in the not far distant future. The man who owns a good stand of mature timber in New Jersey will then be able to cut and sell it at a profit.

Does it seem logical then, for New Jersey to continue paying out millions of dollars annually for imported lumber, including shipping charges all the way from the Pacific coast? Is it common sense to permit one million acres of New Jersey land to continue idle and unproductive? Would it not be sound judgment to reforest this land and gradually build up permanent forest industries and forest communities here in our own State to furnish employment for our own people?

WHO WILL DO THE JOB?

The land acquisition program of the Department of Conservation and Development calls for the acquisition, over a ten year period, of 365,000 acres of State Forest land in definitely specified sections in various parts of the State.

However, to keep administration costs down, these proposed State Forest areas must of necessity be concentrated in reasonably compact units. Consequently, there can be included in these units, only a small percentage of the idle land in need of reforestation. It is obviously impracticable even to consider state acquisition of all the idle land, because most of it is in comparatively small holdings, scattered far and wide all over the State. Who then, will reforest a large part of New Jersey's idle land?

THE STATE LOOKS TO THE PRIVATE OWNER

From the standpoint of profit to the individual landowner, there can be no question but that tree crops or forest plantations will pay him better than no crop at all. There is no profit in weed-covered

idle fields. There is no profit in washed out gullies and eroded land. Erosion is one of the most serious aspects of the idle land problem, a threat to the security of the New Jersey farmer and a menace to the State as a whole.

The cost of establishing a forest plantation is not expensive. The cost of reforesting an acre of bare land in North Jersey will average \$10.00-\$12.00, including the price of the stock and the cost of planting. This same plantation, when the timber is mature and ready to cut, should be worth not less than \$200.00 per acre at present prices. But, as has already been explained, lumber prices will undoubtedly be considerably higher in the future than they are today. Hence, there are indications of very substantial profits in the future.



A four-year-old red pine plantation in Sussex County. Reforestation will put New Jersey's idle land to work.

But regardless of whether the timber is ultimately harvested or not, the plantation has a constant potential value in direct proportion to its age and accordingly raises the sale value of the land on which it is growing. Bear in mind also, the fact that woodland is usually assessed at a lower rate than other lands and consequently pays less tax.

It is sound policy for landowners to plant their idle land. The State looks to them to do their part in helping to solve the idle land problem and offers them assistance.

STATE SUPPLIES PLANTING STOCK

To encourage reforestation, the Department of Conservation and Development supplies New Jersey farmers and landowners with planting stock, at the production cost price, which at the present time amounts to \$4.00 per thousand two year old seedlings and \$7.00 per thousand three year old transplants. These seedlings and transplants can be purchased at cost, by any landowner or farmer in the State, provided he owns not less than 10 acres of land, and that he agrees to use the stock only to reforest idle land.

STATE FOREST NURSERIES

The Department operates two State Forest Nurseries which have a total area of 32 acres and are capable of producing 12,000,000 two year old seedlings and 1,000,000 three year old transplants annually. These nurseries have been set up upon a sound business basis, with strict attention also to the development of and adherence to cultural methods which insure production of the thriftiest stock possible for successful field planting. The tree seed sown in these nurseries is purchased from definitely specified sources where climatic conditions approximate New Jersey conditions as closely as possible. Seed of species native to the State are collected from the New Jersey State Forests and other sections, under the supervision of Department foresters. Seed is collected only from the straightest, tallest and most thrifty trees. Close attention is also given to maintaining the soil in the nurseries in a high degree of fertility by the application of manure, commercial fertilizers and soy bean cover crops grown in rotation with trees.

THE WASHINGTON CROSSING NURSERY

The Washington Crossing Nursery was established in 1926 and is located at Washington Crossing, Mercer County. It comprises 20 acres of fertile land and lies within the boundaries of Washington Crossing State Park. In this Nursery are produced most of the seedlings and transplants used in reforesting land in the Northern part of the State. The maximum annual capacity of this Nursery is 6,000,000 two year old seedlings and 1,000,000 three year old transplants.

Seedbed areas in the Nursery are equipped with automatic irrigation lines which provide an ample water supply. Much of the Nursery work is done by power equipment, but during certain seasons of the year, particularly during the spring shipping season, a large



A section of the Washington Crossing State Forest Nursery. White pine seedbeds in the foreground.

amount of hand labor is required. Nursery work is exacting, in that nearly all operations must be carried out according to schedule. Seed must be ordered a year or more in advance; as soon as the seed is delivered it must be tested to determine its germinative energy that the nurserymen may know how much seed to sow per seedbed; shipping and transplanting must be completed if possible before the weather becomes dry or stock losses are apt to occur; seedbeds must be prepared and the seed sown as soon as the transplanting has been finished, or, if there is a great deal of transplanting to be done, seeding must be started before transplanting is finished and both operations carried on at the same time. Some species are quite susceptible to damping off and root rot diseases, necessitating treatment of seedbed areas with formaldehyde and organic mercury compounds to avoid loss of stock. Insects are also troublesome at times and control measures must be promptly started to keep these pests under control.

The principal tree species grown at the Washington Crossing Nursery are listed below, with the percentage of each approximately as shown:

Red Pine	50%	Japanese Larch	3%
White Pine	20%	Other Species and	
Scotch Pine	10%	Hardwoods	7%
Norway Spruce	10%		

THE GREEN BANK NURSERY

The Green Bank State Forest Nursery is located in the little town of Green Bank, Burlington County, and was established in 1930. It has an area of 12 acres and is capable of producing about 6,000,000 trees annually. It is contained within the boundaries of the Green Bank State Forest and can be considerably enlarged at any time in the future if expansion becomes necessary. This Nursery is devoted largely to the growing of species native to the South Jersey Coastal Plain, commonly known as the Pine Belt. About 70 per cent of the stock produced consists of Shortleaf pine which is the most valuable timber tree of the southern part of the State.

A portion of the stock grown in the Green Bank Nursery is planted on privately owned land, but most of it is used in reforesting State Forest areas in the Coastal Plain. Incidentally, many people have the opinion that South Jersey consists of scrub growth and that trees will not reach large size in this section of the State. Nothing could be farther from the truth. South Jersey years ago possessed excellent stands of pine, oak and cedar, and with forest fires under control, will produce valuable timber in the future. There

are in fact numerous small stands of fine shortleaf pine in isolated locations which have escaped fire. These furnish an example of what the South Jersey Pine Area can be, if fire is prevented.

The Green Bank Nursery is completely equipped with an automatic irrigation system and the necessary power machinery for efficient operation. A well constructed service building and packing house has also been erected, and includes the original pump house, which is now a part of the basement of the main structure. Due to the fact that deer are very numerous in this section it was found necessary to build an eight foot fence around the nursery to keep the deer from eating the trees in the seedbeds. The establishment of this nursery marked a step forward in helping to restore a portion



Evergreen seedlings require partial shade during the first growing season in the Nursery. Lath shades provide half shade.

of the State's idle land area in South Jersey to productivity. Other species raised at the Green Bank Nursery, in addition to shortleaf pine, include pitch pine, white pine, Virginia pine, loblolly pine, southern white cedar, red gum and small quantities of other kinds.

SPECIES RECOMMENDED FOR REFORESTATION

The choice of species depends to a large extent upon the type of soil upon which the planting is to be done and upon the products which the planter desires to produce. Thus, one man might be

interested in planting spruce for the Christmas tree market, another might wish to grow trees for fence post use and many will merely wish to plant a general purpose stand to reforest their land. While trees do vary considerably in their soil and moisture requirements, many species of trees will grow on land which is too poor for farm crops. Hardwoods are often desirable for planting on the better soils, but, as a rule, evergreens are more easy to handle. Evergreens are adapted to poorer soils, the cost of planting is usually less and they establish themselves more readily than most hardwoods. Although hardwoods are grown in the State Nurseries, the bulk of the production consists of evergreens because of their greater adaptability under general conditions.

It is well for the prospective planter to bear in mind that mixed plantations of two or more species are in many respects preferable to pure plantations of only one species. Natural pruning takes place earlier in properly mixed plantations and the form of the individual tree is improved. Insect pests and diseases are more easily controlled. In locations where it is possible to market small material, the products derived from early thinnings in wisely mixed plantations oftentimes exceed in value those secured from pure plantations. Thus, for instance, in a mixed plantation of red pine and red oak, the oak would be likely to have more value as a product of an early thinning than the pine.

The following information will help forest planters decide what kinds of trees to order. Department foresters will gladly advise, without charge, those who are in doubt concerning what to plant.

Red Pine (*Pinus resinosa*) still seems to be the most desirable tree for general reforestation use in North Jersey and it produces high quality lumber. It will be a profitable choice on almost any site, except very dry, sterile slopes or wet ground. It grows rapidly and is comparatively free from insect pests and diseases.

White Pine (*Pinus strobus*) is one of the most valuable timber trees of the Northeastern States and produces high quality lumber adapted to many varied uses. It is a native North Jersey tree and will grow rapidly on a variety of soils excepting those soils which are very dry and sterile or excessively wet. Pure white pine plantations are frequently attacked by the white pine weevil, an insect which bores into and kills the terminal shoot. On the other hand, mixed plantings of white pine and other species—such as red pine, Scotch pine and Japanese larch—have a tendency to discourage attack by this insect and reduce the injury considerably. White pine is also subject to infection by a blister rust disease, but infection is possible only when the tree is growing near currant or gooseberry bushes,

which are the alternate host plants necessary for the disease to complete its life cycle. The disease cannot spread from pine to pine, but only from pine to currant or gooseberry and from currant and gooseberry to pine. However, wild currant and gooseberry do not occur extensively in New Jersey and in many sections these plants are absent entirely. Also, the State Department of Agriculture is conducting a systematic project to eradicate currant and gooseberry in sections where these plants have been found. Furthermore, it has been found that eradication of currant and gooseberry bushes—both wild and cultivated—within a radius of 300 yards of a white pine plantation, will protect the plantation from infection to a reasonably certain degree. The planting of white pine is therefore recommended, provided it is mixed with other species.

Scotch Pine (*Pinus sylvestris*) grows thriftily on poor soils and is a desirable choice to plant on sites where red pine and white pine will not grow. The quality of its lumber is inferior to white pine and red pine, but it is nevertheless a tree which grows rapidly on extremely poor soils. This is the common pine of Europe.

Norway Spruce (*Picea excelsa*) is also a native European species, but it has been planted extensively in this country for many years. It grows best on moist but well drained soil and endures considerable shade. It does not thrive in swamps or on excessively dry land. Growth is quite rapid, after a slow start for the first three or four years, and the species produces the characteristic light, soft spruce lumber, inferior to pine in some respects, but quite valuable for many purposes. This species is also quite widely used for Christmas trees.

Japanese Larch (*Larix leptolepis*) is a species which comes from the Orient as its name indicates. It grows with remarkable rapidity and does not seem to be exacting in its soil requirements. This species has been planted in New Jersey only within the past ten or fifteen years. Its future value has therefore not yet been proved. Its moderate use is recommended but it should be planted only in mixture with other species. Planted in mixture with white pine, it may have a tendency to discourage weevil attack on the pine, due to its rapid growth and the consequent light shade which it would furnish to the terminals of the white pine. The genus *Larix* of which this species is a member, is characterized by wood which is heavy, hard and durable in contact with the soil. This tree loses its needles in the Fall, being one of the few deciduous conifers.

Shortleaf Pine (*Pinus echinata*) also known locally as "two needle" pine is the most valuable pine species native to the South Jersey Coastal Plain. It occurs usually in mixture with oak on the

better soils but is also found in pure stands. This tree produces lumber of good quality and it is the species most favored for planting on the sandy soils of South Jersey.

Pitch Pine (*Pinus rigida*) is the most common pine of South Jersey growing everywhere throughout the sandy pine belt. It also occurs scattered along the ridge tops in the northern part of the State. Although the quality of its lumber is somewhat inferior, pitch pine has considerable value for planting in South Jersey because it will grow in the poorest soils and it is extremely fire resistant. Its lumber is used mainly for box boards and construction purposes.

Loblolly Pine (*Pinus taeda*) is native to the Southern States and occurs as far North as Maryland and Delaware. It has been planted in South Jersey for a number of years and grows very rapidly. However, its future use is somewhat in doubt due to the fact that it is very seriously affected by a blister rust disease of which the alternate host plant is Sweet Fern, and Sweet Fern is one of the most common plants to be found in the Coastal Plain.

Southern White Cedar (*Chamaecyparis thyoides*) is the native South Jersey swamp cedar and produces a soft, easily worked but quite durable wood. Among the many products manufactured from this tree, are boat boards, shingles, lath, posts, poles and rustic furniture. White cedar grows quite slowly in very dense stands. In spite of its relatively slow growth, a market for cedar products in small sizes is usually close at hand. Consequently it is possible to make some profit from the products of early thinnings in cedar stands.

Hemlock (*Tsuga canadensis*) although it is one of the most beautiful trees in the woods, has comparatively little timber value and its exacting site requirements limit its use for reforestation. It is grown in the State Nurseries in small quantities.

Balsam Fir (*Abies balsamea*) is native to the Northern States and does not occur naturally in New Jersey. Small quantities of this species are being raised in the State Nurseries to determine its possibilities for the Christmas tree market. It is a desirable tree for Christmas tree use because it usually has an attractive form and holds its needles well.

Red Oak (*Quercus rubra*) is one of the most valuable hardwood species of North Jersey. Although its wood is not of as high quality as the White Oak, its faster growth rate makes it the most desirable of the oaks for reforestation. Railroad ties, mine props, piling, flooring, and posts are but a few of the uses for which its wood is valued. It prefers a deep well drained soil for best development.

Tulip Tree (*Liriodendron tulipifera*) commonly called yellow poplar in the lumber trade, is very exacting in its soil and moisture requirements and is very intolerant of shade. It is a typical bottomland hardwood species and requires a deep, rich, moist but well drained soil. Where these requirements are met it will grow quite rapidly, producing a long clear stem, clear of branches for a considerable height. Its wood is of high quality and like white pine, adapted to many varied uses, such as cabinet work, interior trim, sash and door construction and basket veneer. There is usually a good market for this species.

Black Locust (*Robinia pseudoacacia*) is a fast growing tree which produces heavy, hard, strong wood, very durable in contact with the ground. It is much in demand for fence posts, railroad ties, insulator pins or for any purpose where a strong durable wood is required. It is also a good tree to plant to control erosion, because its roots form a dense network in the soil. Unfortunately this tree has one very severe insect enemy, the locust borer, which riddles the trunk and limbs. Damage by this insect is certain to occur if black locust is planted on poor soils. The only possible chance of growing this tree to fence post size is to plant it only on the very best well drained alkaline soils and in mixture with other species, such as white pine, Japanese larch, red oak and yellow poplar. Black locust is a legume,



Transplanting red pine seedlings with the Yale transplant board in the State Forest Nurseries.

and, like other members of the legume family, it will not grow well on acid soils. It is intolerant of shade. Black locust should receive consideration in game management plans as a source of food supply for birds. Its fruit is a bean pod which is retained on the tree far into the winter.

NURSERIES SHIP TREES IN APRIL

Although the Department begins accepting orders for stock the preceding Fall, about October 1st, practically all reforestation in New Jersey is done in the Spring of the year. Fall planting is not recommended at all in North Jersey because of the danger that frost action will heave seedlings and transplants from the ground. It is also true that the Fall season is more apt to be dry in both North and South Jersey.

The planting season usually extends from April 1st to May 15th, but if possible, it is advisable to finish planting by the first of May because dry weather frequently occurs after this date. The first stock shipments are usually sent out from the Washington Crossing Nursery during the last week in March or the first week in April. South of Trenton it is usually possible and advisable to begin planting about ten days earlier. Consequently the Green Bank Nursery usually begins to ship seedlings and transplants from the Nursery about the 15th or 20th of March. The Spring shipping season is a busy time at the Nurseries, for millions of little trees are shipped within a period of two or three weeks.

All shipments travel by express (F.O.B. Nursery) small orders packed in cartons and large orders in veneer crates, with the roots protected by moist sphagnum moss. A circular, in which is included planting instructions, is mailed to the planter a day or two before his order is shipped, in order that he may know approximately when his trees will arrive at the local express office.

HEELING IN

As soon as the trees arrive at the express office, they should be removed to the vicinity of the planting site and heeled in in a cool shady spot. Heeling in consists of digging a trench one foot deep and one foot wide, with one side cut at a 45 degree angle. (See Fig. I.) The bundles of seedlings should be untied and placed against the sloping side of the trench, the roots covered with moist soil and firmed slightly. The trees should then be watered as illustrated, and if planting cannot be done within a day or two water should be applied as often as is necessary to keep the roots moist.

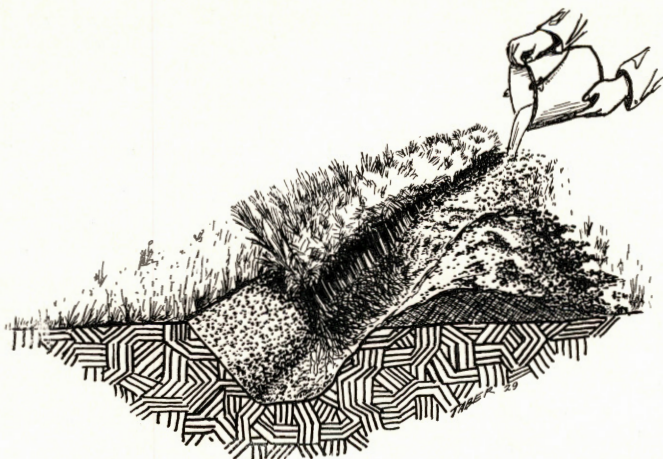


Fig. 1. Heeling in.

TREES REQUIRED PER ACRE

A tree growing in the open has plenty of room to spread out and consequently is short boled, wide crowned and limby. Such a tree is of little use for lumber because most of its wood consists of branches and its short trunk is very knotty.

Forest trees on the other hand, grow close together in competition with each other. Here again, as in all nature, is enacted the struggle for survival of the fittest. Some trees will forge ahead and become dominant trees, while others will fall behind, become suppressed and eventually die. This is the natural process in any forest stand and it is this competition between forest trees which causes them to grow straight and tall, free from lower branches and with a maximum yield of high quality lumber. The reason for planting trees close together in artificially established plantations is therefore evident. The Department recommends a 6' x 6' spacing (trees planted at intervals of six feet, in rows six feet apart) for forest planting. At this spacing approximately 1200 trees are required to plant an acre of bare land. Frequently, however, it will not be necessary to plant more than 1,000 trees per acre, due to existing growth of desirable trees which should be permitted to remain. Under certain conditions the landowner may desire to plant his trees at a closer spacing. Thus, for instance, spruce and fir grown for Christmas trees are ready for the market at about ten years after planting, and may accordingly be planted 4' x 4' apart or 5' x 5' apart, which allows ample space for their proper development.

The following table shows the number of trees which can be planted on an acre of land at various spacings.

Number of Trees		Number of Trees	
Spacing	Per Acre	Spacing	Per Acre
3' x 3'	4840	6' x 6'	1210
4' x 4'	2722	8' x 8'	680
5' x 5'	1742	10' x 10'	564

CHRISTMAS TREES

Each year at Christmas time thousands of spruce and balsam fir trees are shipped into New Jersey from the Northeast and Canada. These trees sell at prices of \$1.00 to \$2.00 per tree retail. This market presents an opportunity to make early profits from forest plantations by the sale of cut Christmas trees. The Department recommends that spruce and fir be planted in mixture with pine for Christmas tree production. The pine should be planted either 6' x 6' or 8' x 8' apart with a spruce or fir planted in the center of each one of the 6' x 6' or 8' x 8' squares. At about ten years of age the spruce or fir can be cut and sold as Christmas trees, leaving a thrifty stand of pine on the area to produce lumber and other wood products. The Department requires, however, that the trees be cut from the plantation with an axe or saw. The trees cannot be dug up and sold as potted plants, because the sale of living trees as potted plants or as ornamental trees of any kind, would constitute unfair competition with the commercial nursery trade, which is contrary to the policy of the Department.

HOW TO PLANT

Where there is an excessively heavy sod, it is advisable to scalp a square foot of turf from the spot where each seedling is to be planted. Ordinarily no further ground preparation is necessary. A light weed growth provides partial shade which is beneficial to most seedlings during the first year or two after planting.

Planting is best done by a crew of two men, one with a mattock or ordinary grubbing hoe to make the holes (Fig. II), the other with a pail of trees to do the planting (Figs. III and IV). The pail should contain a thin mixture of soil and water to cover the roots of the trees. About 400 seedlings can be conveniently carried in a sixteen-quart pail at a time. The planting hole should be deep enough to allow the roots to lie in a natural position (not doubled

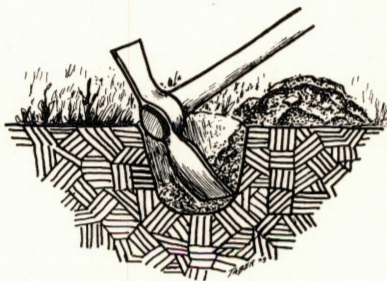


Fig. II. Dig large holes.

up), and at the same depth they stood in the nursery (Fig. III). It is not necessary that the spacing between trees be correct to the inch. Two ordinary paces will be found to approximate the distance of six feet closely enough for practical purposes. Large plantings will require more than one two-man planting crew, depending upon the size of the project. A planting crew of two men should plant about 1,000 trees per

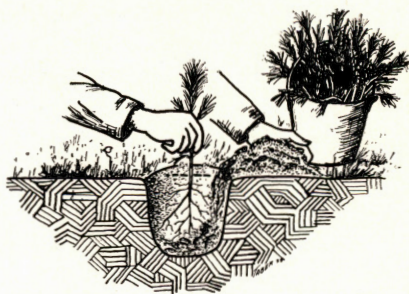


Fig. III. Do not crowd roots. Plant to same depth as in nursery. Put top soil in first, close to roots.



Fig. IV. Firm tree in ground with heel.

eight-hour day under average conditions. Forest planting can be done quite rapidly, but that does not mean that it should be done carelessly. Be sure that no air spaces exist around the roots and above all: **Do not let the roots become dry at any time before the trees are planted.** A coniferous or evergreen seedling on which the roots have been permitted to dry is likely to be a dead seedling.

PLANTING CUT-OVER LAND

In many cases the landowner will wish to plant hardwood sprout areas from which large timber has been cut, leaving nothing but the stumps and sprout growth, usually oak. Planting of such an area will require only a few hundred (400 at most) seedlings or transplants per acre. No regular spacing can be followed in planting areas of this character. The spacing will be determined by the position of the old stumps, and in no case should a tree be planted closer than eight or ten feet from a hardwood stump. Hardwood sprouts grow very rapidly and seedlings planted too close to them will stand little chance of survival. Such planting produces an inexpensive and desirable mixed stand of hardwoods and conifers.

UNDERPLANTING

All species of trees vary in their requirements for light. Some species such as tulip, most pines, larch and locust will not grow beneath the shade of other trees. Other species such as maple, spruce,

Sketches illustrating how to plant are by W. S. TABER, State Forester of Delaware.

fir and beech will stand considerable shade, but even these cannot be expected to grow well in heavy shade indefinitely. Underplanting should only be attempted where there are large openings between old trees or where the old growth is to be removed within a few years time. The choice of species for this type of planting should be confined to those which naturally tolerate a fair degree of shade.

REPLACEMENTS

The plantation should be carefully examined during the first Winter after planting to determine its condition. Replacements should be made promptly if the percentage of failure exceeds twenty per cent of the total number of trees planted, and regardless of percentage if failure occurs in patches. Replacements will not be necessary if the percentage of failure is evenly distributed and does not exceed twenty per cent of the total number of trees planted. Normally if the planting was done with reasonable care, replacement will not be necessary.

FUTURE CARE OF PLANTATIONS

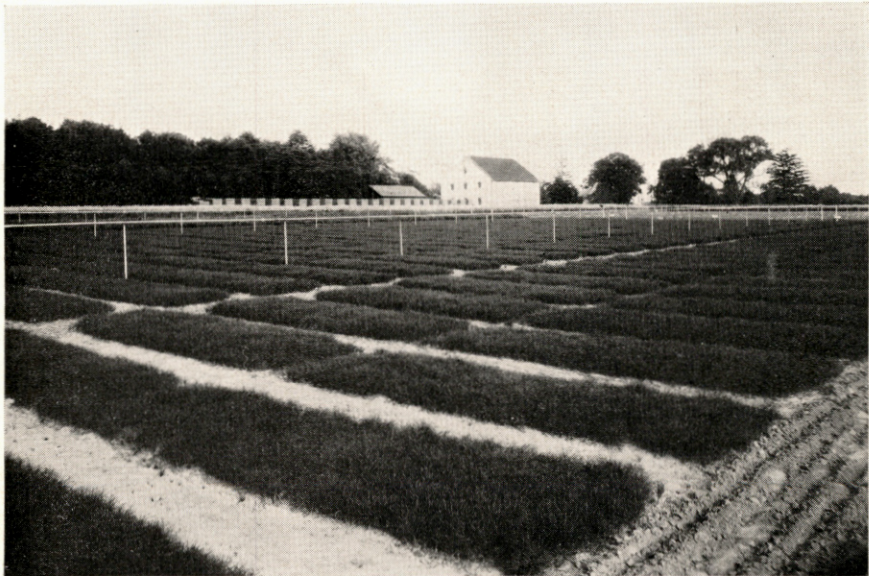
Very little subsequent care is required to keep a forest plantation in productive condition. Cultivation is entirely unnecessary and is not recommended. Inferior trees such as sumach, sassafras, wild cherry and gray birch must be removed if they grow up and overtop the planted trees. Cattle will ruin a forest plantation quickly if permitted to graze among the trees, and must be excluded. A reasonable amount of protection against fire is of course necessary. Where a plantation borders on a highway it is advisable to maintain a strip of bare ground ten feet wide along the road, if possible. This strip of ground can easily be kept in safe condition with an ordinary disc harrow.

PRESENT STATUS OF REFORESTATION

The Department first began to distribute forest planting stock in 1923, several years prior to the establishment of the State Forest Nurseries. For the first few years the stock was secured from commercial nurseries, the Department merely acting as a broker in placing the stock in the hands of the planter. However, it soon became evident that the Department would be unable to secure sufficient quantities of stock from commercial nurseries and that some species desired for reforestation use were not available from commercial sources at all. New Jersey and other commercial nurseries in this region were not interested in the business of growing reforestation stock, owing to the small margin of profit to be obtained from this class of stock. The very nature of the reforestation project dictates

that low priced stock must be available. Therefore, New Jersey, like other states and the Federal Government was compelled to establish the State Forest Nurseries, in order that this important work might go on.

Since 1923 the Department has distributed a total quantity of 18,885,428 seedlings and transplants which have been planted in all parts of the State. A portion of this stock was used on the State Forests but the greater part of it is now growing up on privately owned land, including farm lands, water company properties and lands owned by industrial corporations. Municipal water depart-



*Red pine seedbeds at the Washington Crossing Nursery in the second growing season.
Note irrigation lines and the nursery service building in the background.*

ments have also planted large quantities of stock for watershed protection. Numerous plantations have also been established by Boy Scout troops, Y. M. C. A. camps and other organizations.

However, the present rate at which land is being reforested in New Jersey is woefully inadequate to meet the needs of the situation. At the present time, the demand for planting stock by farmers and other landowners, does not justify a nursery production in excess of 4,000,000 trees annually. Figured at the rate of 1,000 trees per acre, 4,000,000 trees will reforest about 4,000 acres of land. At this rate of planting, at least 200 years would be required to reforest the idle land in the State. In view of the magnitude of the idle land problem, such a statement seems absurd—and it is!

To keep pace with the idle land situation, the production of the State Forest Nurseries should be not less than 20,000,000 seedlings annually. As was previously explained, the Department established the State Forest Nurseries solely to encourage reforestation, by making it possible for landowners to secure planting stock at the mere cost of growing it. The Department does not make any profit on the seedlings and transplants grown in the State Forest Nurseries. The Department is ready, able and willing to produce 20,000,000 seedlings annually for the reforestation of idle land in New Jersey. However, the private landowner must decide what the production of the State Forest Nurseries shall be, for most of the idle land is in his hands—and he holds the key to the situation.

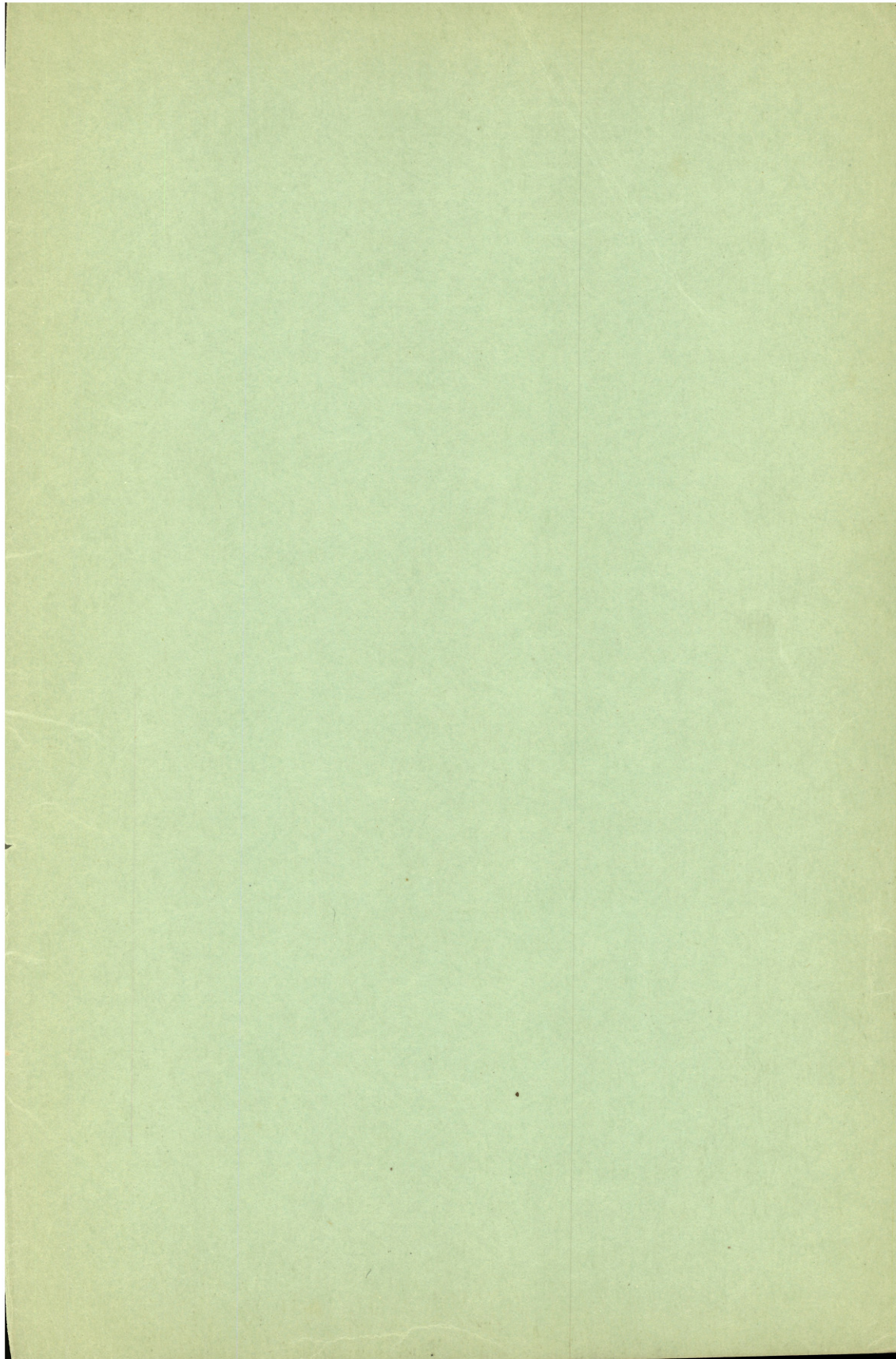


A twenty-year-old White pine plantation in Burlington County.

TECHNICAL ADVICE AND ASSISTANCE

The Department welcomes inspection of its nurseries at Washington Crossing and Green Bank. The Superintendents of these nurseries will be glad to accommodate visitors and answer questions in regard to the conduct of the Nursery Work.

Department Foresters will advise and assist landowners in the solution of reforestation and other forestry problems, and, so far as their time permits, will make personal visits to examine individual properties and recommend the species best suited for planting, upon request. Such requests should be addressed to the Department of Conservation and Development at Trenton.



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