USE REQUIREMENTS

Timber and wood quality. What size and quality of timber will be wanted from our future forests?

FUTURE SIZE AND QUALITY REQUIREMENTS FOR SOFTWOOD TIMBER TREES IN THE NORTHEAST

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If foresters are able to influence the future tree population of the Northeast, four conifers are likely to be of commercial importance, namely white pine, red pine, spruce, and hemlock. Let us then speculate a bit about the future. If forest management continues to be primarily a matter of protecting wild forest lands from fire and other destructive factors, then we can expect all conifers to dwindle in area, volume, size, and quality. Some spruce will continue to inhabit certain swamps and mountains. Hemlock will prevail here and there since of all conifers it gets along best with hard woods. White pine is likely to decline since old-field stands when cut revert to hardwoods and in the future there will be less abandoned agricultural land for reseeding. Red pine most likely will continue to be a favorite tree for planting, but there will be fewer old fields available for tree planting as population increases and spreads out into the rural areas. In general, under present conditions and trends, the conifers will continue to give ground to the hardwoods.

If well-trained foresters, farsighted business men, and public-spirited politicians unite in establishing by law an economic and political climate, attractive to the investment of substantial capital in timber growing, trend favoring the conifers is likely to begin. It has happened in certain democratic countries in Europe. It could happen here. We know that the world-wide timber shortage is in conifers. Hardwoods, being more exacting, can only be grown to best advantage on the more productive, well-watered sites. In general, such sites are likely to be needed for future agricultural expansion. In the Northeast, because of uneven stony ground and a climate somewhat unfavorable to agriculture, there is an appreciable area likely to be available for growing hardwoods. However, most of our land available to forestry, although now clothed with hardwood weed trees, is actually better suited to the growing of conifers.

It should be the highest hope of every patriotic citizen to see this country remain strong economically and to continue to be a beautiful and healthy place in which to live. Fine, highly productive forests are vital to this end. The best hope for truly satisfactory forestry seems to lie in the

intensive cultivation of the best species, on the best lands and in the most strategic locations. This philosophy has become accepted as the most successful in agriculture. I have faith that silviculture in the Northeast will tend toward the more scientific and intensive practices. It is from this premise that I will state my views as to future size and quality requirements of our conifers. To avoid obvious prejudices let us take them in alphabetical order starting with hemlock.

Eastern hemlock at its best can never hope to be more than a second-rate tree as conifers go. Yet under simple cultivation it can be greatly improved as a producer of utility boards and dimension lumber. By starting with dense reproduction, released early from the suppression of an overwood, hemlock is capable of making a very good yield on a short rotation, Short rotations should be encouraged since experience tends to show that the technical quality of hemlock wood declines with age. Hemlock in pure dense stands under management produces good strong wood with small knots, relatively free from shake. Shake is prevalent in old hemlock growing in mixture with hardwoods, where individual trees are exposed to strong wind pressure in winter when the hard wood leaves are off. Hemlock has good nail-holding capacity, which makes it a good, cheap board for crating, subflooring, and sheathing. Fast-grown hemlock is less apt to split in nailing. A special virtue of the tree, silviculturally, is its ability to compete successfully with hardwoods. Its insect and disease enemies are not to be considered too serious. The most obvious future use for hemlock is framing lumber for small wooden buildings. Two and three-log trees 16 to 18 inches d.b.h. can be grown on average sites in 60 years, more or less. These should be large enough to produce dimension lumber up to 2 x 8 or 2 x 10's.

Red pine is the second best pine of the Northeast for lumber. It owes its present popularity almost entirely to its adaptability to planting. It has remained relatively free from serious insect and disease enemies, at least in the more favorable northerly locations. It is a tree of especially good form when grown in stands of proper density. The lateral branches are reasonably small and tend to die early. It is an excellent tree for poles. Red pine grows very well on good sites in early life. Height growth culminates early at about 80 years more or less. Red pine is a wood of good texture, strength, and workability. It has, however, certain undesirable characteristics, especially its tendency to warp and twist. This is due to the prevalence of spiral grain. Planted red pine in regions of relatively heavy snowfall is subject to butt crook caused in the sapling stage by melting and freezing of deep snow late in winter. This produces compression wood in butt logs. The branches of red pine die early, which causes the lumber produced from unpruned trees to contain an excessive number of black rotten knots. Red pine pruned at the proper time will produce desirable lumber for natural finish and knotty panel of good appearance. The sound knots have good color and finish well. The wood of red pine is probably slightly better as to workability than the wood of the southern pines. It is doubtful if it is enough better, however, to command a better price. The future of red pine is reasonably well assured as a favorite tree for planting, especially on relatively dry sites. One thing which would curtail its use would be the discovery of an effective method of eliminating white pine weevil damage in white pine plantations. Incidentally, we have undoubtedly overlooked a good bet in not having as yet perfected a good workable method of using red and white pine

as mixture in plantations. The usual alternate row mixture has, in general, been a failure. It seems reasonable to expect that red pine plantations are likely to be grown on a 6o to 80-year rotation, producing crop trees up to 16 or 18 inches d.b.h. Trees over 80 feet in total height are likely to be exceptional, except on the best sites. It seems highly desirable that trees which are expected to reach 12 inches d.b.h. or more should be pruned to one log length. This might entail the pruning of approximately 200 trees per acre. It seems quite likely that certain owners having special uses in mind will find it desirable to prune a few especially fine trees on the best sites to two or more log lengths and retain them longer.

Spruce is a tree of real promise in the more northern parts of the Northeast and at higher elevations. However, since I have had little personal experience with its management, I. hesitate to prophesy its future. There are several species of spruce, all of which are capable of making excellent growth under favorable site conditions. The pulp people regard spruce as their special tree because of its superior fiber qualities. The native red spruce is adaptable to both extensive and intensive management under natural forest conditions, but it is not generally regarded as a good species for planting. White spruce has been the favored native species for planting. Norway spruce is reputed to be the fastest growing spruce under favorable conditions but it is somewhat damaged by the white pine weevil. Black spruce is a fine fast growing tree for planting on upland sites but few foresters have had experience growing it. This tree attains large size at maturity and we should learn more about its cultivation. Some concern over the future of spruce has been expressed because of the serious damage caused periodically by spruce budworm and spruce bark beetle epidemics. Cultivated spruce, we know from European experience, produces good lumber products. We can expect that spruce in the future will be grown primarily for pulp on a relatively short rotation. On the most favorable sites where growth is especially good, longer rotations are to be anticipated, to grow timber trees of large size and fine quality for special uses. High pruning of these trees is to be anticipated.

White pine is undoubtably the superior conifer of the Northeast for intensive forestry. It excels the others in the fact that it is a much larger tree when full grown. It is capable of increasing in height and volume development to 125 years and beyond. On average sites it attains a height of about 125 feet and may exceed 150 feet on the better sites. Pure, even-aged wild stands on the Pack Forest have produced over 100,000 board feet in 125 years on a single acre. Under good management on the better sites, and on long rotations, yields of 1,000 board feet per acre per year can be expected. Certainly no other commercial conifer in the world has a wood of finer technical qualities or of better workability, or a wood, when properly finished, which is more pleasing to the hand and eye. So long as we fully appreciate this fine tree and are willing to do what is necessary to grow it, there can be no doubt that it will be first in importance among the best conifers of the Northeast, in the future, as it has been in the past since the early Colonial days.

Our experience at the Pack Forest indicates that large white pine timber trees of the finest quality can be grown successfully. It would seem that skillful silviculture applied to favorable natural stands may be, in general, more feasible than planting. Recently, progress has been made toward better

future white pine plantations. The more important of these items of progress are

(1) Appreciation of soil deficiencies, and how to overcome them.
(2) Use of chemicals in weeding to make feasible the planting of sites where hardwoods are present.
(3) Appreciation of the importance of protecting white pine from blister rust and the weevil. We still have not as yet devised a completely satisfactory method of weevil control in plantations.
(4) Appreciation of the desirability of crowding in the early years to produce trees of maximum straightness with minimum taper and with small lateral branches.

In the field of silviculture, as applied to natural stands, we have learned some valuable lessons. Fine-formed co-dominant trees of middle age can be selected and conditioned by thinning to become an overstory above the next crop. These select trees recover rapidly from early crowding and continue to make a maximum volume growth until maturity. On average sites, this means a diameter growth of 6 to 8 rings per inch until age 125 years and a volume at that time of about 1,500 board feet. High pruning is necessary to produce the most wood of the finest quality, not only clear lumber, but boards with sound cores and clear edges. Pruning should be started early. However, it can be applied to advantage to straight small limbed trees up to 12 inches d.b.h., and to whatever height these trees have dead length. High pruning need not be feared as a source of red rot infection. The pathologists have yet to show that the disease actually does enter trees through sawedoff limb stubs. Meanwhile, pruning before red rot has entered can be regarded as the most effective method of keeping the disease out. A scattered overstory of tall trees above young pine reproduction affords, perhaps, the most effective protection against white pine weevil damage. Early thinnings in pine stands to remove coarse dominants' especially the deformed multiple-stemmed weeviled trees, before they have crowded out the co-dominants to intermediates around them, greatly improves the timber quality of the final crop.

In summary, it can be said that so long as people have any timber trees available for their use they will require the largest and finest trees of all species. The most desirable species, like white pine, will command the highest price, especially as applied to individual trees of relatively large size and containing sound wood of the finest technical qualities. The scarcer such trees become, within reasonable limits, the higher their value is likely to be. Since there is today a very limited number of potentially high-quality middle-aged trees, there is little danger of an oversupply of such trees for many years to come.

Consider the value today of a white pine forest well-stocked with stands from 1 to 70 years old, plus an overwood of select. high pruned trees averag say, 10 per acre and ranging from 70 to 125 years of age.
today's costs and lumber values, such trees at 125 years would be worth over $200 each, when standing in a readily accessible location.Back in 1900 who would have believed this could possibly happen? Such trees at that time would scarcely have had any value at all possibly a few pennies. The cost of pruning at that time would have been very little with labor at about $1 per day. Probably for as small an initial investment as $1 per acre in 1900, a present-day value of around $2,000 could have resulted.

I do not predict that a similar investment of, say, $10 per acre today is likely to result in a future value of $20,000 per acre in the year 2000. Yet we know that in the year 2000, 10 of the finest white pine trees containing 1,500 board feet each, would buy your great-great granddaughter a real nice wedding present.

How can we specify today exactly how good quality and how large our future coniferous trees should be? Of the two factors, the one we must do something about now is quality. Ultimate size will be decided by the foresters of the future but one thing is quite certain: the better trees we create through applied silviculture, the larger they are apt to become before they are cut. Any realistic economic theory is likely to favor the retention of sound, healthy, fast-growing trees, of good quality and large size, over the unsound, unhealthy, slow-growing smaller trees.

Good foresters must be keenly aware of the importance of building quality into the trees they grow. Timber quality is something that rarely happens naturally, except by accident plus several hundreds of years of survival of the fittest. If the future inhabitants of this country are to have for their use any conifers of large size and fine quality, say in the period 2000 to 2050, it will be the result of two factors: Firsts the application of constructive silviculture by us today, and second, the maintenance by law of a favorable economic climate for cultivated trees to grow in. The question is "Will both be done, and when?"