

IMPORTANCE OF SEED SOURCE AND THE NEED OF TREE SEED FARMS*

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Most foresters in the Lake States are convinced that as a general rule, our native or near-native species are best adapted for large-scale reforestation, using seed sources fairly close to the planting site. Also there is general agreement that seed should come from trees of good form and vigor.

There are already a number of experiments and observations in the Lake States which highlight the importance of using our native species rather than exotics.

Also from numerous European observations on provenience tests, we have rather excellent guides which should be able to steer us in our collection of seed, pending the maturation of our own provenience tests.

Let us review briefly some of these observations and experiences, in Europe as well as in the United States.

RESULTS OF PAST EXPERIENCE

The results of past experience in northern Europe indicate that tree seed should generally be planted within a zone varying by not more than 1° C. (almost 2° F.) during the growing season from that of the original

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habitat of the trees. In terms of latitude it means moving seed not more than about 90 to 150 miles from its original habitat, nor more than about 100 to 200 yards in elevation. In some cases the maximum is set at 380 yards.

European experience has also been that cheap seed collected from low, bushy trees, easy to collect from, especially from rather distant sources, is a rather poor investment.

In our own experience in Wisconsin, we have had rather poor results with exotics, particularly with Scotch pine, and to a lesser extent with Norway spruce (Stoekeler and Rudolf 1949). The poor results with the former species makes one rather dubious about broadening the program of planting Scotch pine for Christmas trees. Red pine on the other hand is a perfectly good Christmas tree. Those that escape marketing for Christmas trees, would seem rather sure to grow into good stands of high value, clean-boled pulpwood or sawlogs.

One of the early advocates of a better tree seed program in the Lake States was C. G. Bates (1927) who suggested certification of seed, and the setting aside of tree seed farms (Bates 1920) of the best natural and planted stands for future seed collection. He suggested progeny tests to verify the value of the various geographic strains.

Subsequently, Baldwin and Shirley (1936) proposed a forest seed program for the U.S.

Results of provenience tests in Minnesota on red pine (Rudolf 1947) would seem to bear out the need for a seed certification program. Its urgency is accentuated by the need of reforestation as much as 10 or 12 million acres of idle or semi-productive land (Rudolf 1950) in the Lake States.

In 1952, 24 state, federal, and soil conservation districts in the three Lake States produced a total of 67.6 million trees (Forest Service 1952). The total acreage planted in the three states in the three states in the one-year period ending June 1952 is reported as 69,030, including all classes of land ownership.

THE U. S. D. A. SEED POLICY OF 1939

Until more precise information is available, it would be well to consider the adoption or adaptation of the general principles in the U.S.D.A. Seed Policy of 1939. In brief, this policy recommends use of seed of known origin from within 100 miles or 1,000 feet in elevation of the planting site (U.S.D.A. 1939).

HOW GOOD IS THE PRESENT CONTROL OF SEED SOURCE?

The past policy in seed collection to meet the demands of the huge planting program generally has been to purchase cones in the open

market. NO doubt, the bulk of the seed for the plantings made in each of the Lake States originates within the state. Also a fairly **good proportion** of the seedlings produced **from it** probably are planted within 100 miles of the source as recommended (to conform in a fashion to the limit stated) in the U.S.D.A. seed policy. But there is virtually no control over the quality of stands the seed or cones come from, and even less **over** the type **of** individual trees from which they are collected.

PROPOSED TREE SEED FARMS

The current lack of reasonably close control over the origin of seed should cause serious consideration of the establishment of tree seed farms. Eventually in the course of three or four decades, we may perhaps have a start on the planting of a considerable acreage of tree seed orchards, all of which are progeny of elite parent trees selected by tree breeders.

Tree seed farms, as I consider them, are areas of the best existing natural or planted trees of known origin, at least 10 acres in size ^{2/} and with trees at least one-third to one-half of full maturity, but preferably older. In the stand as a whole, the trees ought to be of good form, generally free from appreciable insect or disease infestation, and of good growth rate and vigor.

Such tree seed farms should probably be located about 800 feet away from stands of the same species, which are inferior in form or growth rate, to minimize cross-pollination. The distance **could** perhaps be reduced if the tree breeders find adequate evidence that it would be safe to do so.

It would be desirable in commercial (non-commercial, if necessary) thinning operations to rogue out the trees which are crooked, wolfish, heavy-limbed, forked, diseased, and perhaps insect infested.

There should be records of these selected stands, giving accurate information as to location, ownership, tree species, age, size and quality of trees, and other pertinent facts.

Tracts that have been obviously "high-graded" or stripped of their better growing stock should be avoided.

Outstanding planted stands of native species could be admitted as tree seed farms providing geographic origin were rather definitely established, the trees were of good form and growth rate, and the stand were at least one-third of rotation age.

Local plantations of exotics to be used as seed sources for the production of long-range crops like pulpwood, veneer, or sawlogs, would have to meet the same rigid restrictions as for planted native species, and

2/ A lesser acreage could be permitted for desirable exotics.

we might consider adding the proviso that the stand must show considerable ability to regenerate naturally.

Minimum ages for various species to qualify as tree seed farms are tentatively suggested as 25 years for jack pine and 40 years for red pine, white pine, white spruce, and black spruce. By that time, tendencies toward poor climatic adaptability may have shown up, as well as undesirable traits such as crookedness of central stem, heavy limbs, and susceptibility to disease and insects.

The need of tree seed farms seems to be most urgent for red pine, jack pine, white spruce, white pine, and black spruce, in the order named. As we learn more about successful regeneration of hardwoods, red oak, yellow birch, basswood, and sugar maple are certain to be added to the list.

Besides cultural measures, such as thinning, to promote good growth of trees, I can readily visualize the eventual use of fertilizers applied in tailor-made dosages to selected stands to encourage seed production.

Tree seed farms should be set up in tracts with comparatively good stability of land ownership, and where there is an avowed intention for continuity of the tract for this purpose. Stands in state forests, county forests, national forests, and industrial forests would seem to be especially suited for tree seed farms. Certain exceptionally fine privately-owned stands, notably on large estates and those held for recreational purposes, might also be satisfactory as tree seed farms. Individual smaller tracts such as farm woodlots might qualify providing authorities could convince the landowner of the value of the tract as a seed tree farm, and offer some type of inducement, financial and otherwise, to treat the stand as such.

PROPOSED SEED COLLECTION ZONES

Seed from the tree seed farms would have to be certified, if not stand-wise, at least to the extent of a county or other zonal designation for it, so nursery sowings could be kept separately. For the more immediate future the best that probably can be hoped for is to divide each state into three or four broad zones for seed collection. Such zones could be developed from those tentatively set up for red pine (Rudolf 1947) or they might be derived from climatic maps (U.S.D.A. 1941).

As a further study is made, a finer subdivision may be warranted, for example, in areas near the Great Lakes where in a distance of around 40 miles there is as much as 0 to 40 days' difference in the frost-free period.

Open market purchases of cones could be rather readily segregated into these zones. Seed from the extractories could be kept separate by zones and used for nursery seeding and distribution to tree planters in that

zone. 1/ Complete adherence to the proposed zoning scheme may not be feasible in the near future, but still a high percent of the trees would then be planted in a climatic belt varying not more than 1° or 2° C. (approx. 2 to 4° F.) from the site of the parent trees.

Some seed from northern zones will, of necessity, have to be moved to the more southerly zones, because of the virtual absence of the spruces and good quality red pine there.

SUGGESTED METHODS OF IMPROVING CONTROL OF SEED SOURCE

In the meantime, even before seed tree farms are set up, we can obtain some control of the type of stands and trees from which cones come, as follows:

1. **A method** which has been used is to have pickers follow behind a logging operation during the period of seed ripening, and to have a forester or trainee designate the individual felled trees from which cones may be picked.
2. In some instances an agreement can be made to fell selected trees or cut out the tops of heavily laden spruce or fir trees during the period of seed ripeness, several months in advance of the regular logging operation, using cutting and picking crews hired by the landowner.
3. Another method involves hiring crews to pick cones or seed, under supervision, from selected stands or even from designated trees within selected stands. Payment could be made on a per-bushel or other unit of measure basis, so as to provide production incentives.
4. A fourth method is to contract the picking of cones from selected stands with the small forest landowner or reliable commercial seed dealers. This might include some cones from squirrel cuttings and squirrel caches.

Any of the four above methods would be superior to open market purchase of uncertified cones or seed. The seed would, no doubt, be somewhat more expensive but cost of seed is a small factor in the overall cost of production of trees. For instance, a pound of red pine seed currently costing \$12.50 per pound will produce about 25 thousand 2-2 transplants, which sell at \$20 per thousand. The seed cost is then only 50 per thousand trees produced, or 2.5 percent of the production cost. Even if the cost of seed were doubled by exercising more control of its collection, the cost of stock would be raised only a little.

3/ The Forest Service in the Lake States, in effect, has done this for quite a period of years, keeping collections separate by national forests, and as much as possible planting the trees produced on the forest where collected.

An educational program is needed among commercial cone collectors and those extracting such cones, to put across the idea of more care in selection of stands and trees from which to pick cones. Prospective purchasers of certified seed also need to be convinced that a premium price is warranted for select seed of known origin.

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