THE ADAPTABILITY OF GEOGRAPHIC STRAINS OF
SHORTLEAF PINE TO LITTLELEAF SITES

By

W. A. Campbell

Although the botanical range of shortleaf pine covers a wide area in the South and Southeast, littleleaf disease occurs only on approximately one-third of the commercial range of the species east of the Mississippi River. The wide geographic range of shortleaf pine from Texas and Oklahoma in the West and Pennsylvania and New Jersey in the East suggests the possible existence of strains adapted to a variety of site and climatic conditions. One aspect of the search for pine species to replace shortleaf on littleleaf sites, is the testing of geographic strains of the species to see if any of these are either resistant to the root parasite associated with littleleaf or are better adapted to unfavorable site conditions generally tied in with the disease.

Through the cooperation of the Southern Forest Experiment Station, State Foresters and other individuals, 23 seed lots were obtained from different locations within the range of shortleaf pine. These were planted in April 1952 in the Forestry School nursery at Athens, Ga. At the present time sufficient seedlings are available from 12 of these lots for test plantings in four localities in the Southeast. These test plantings are each 2 acres in size and are located in littleleaf stands. Plots were planted during January and February, on the Oconee Forest, School of Forestry, Athens, Ga.; Calhoun Exp. Forest, Union, S. C., and the Lee Exp. Forest, Va. If time, a fourth planting will be made in Alabama in March.

These plots should furnish data on the relative performance of different strains as far as growth and survival is concerned on littleleaf sites and eventually, after 30 years or more, give an answer as to their relative susceptibility to littleaf.

Stimulation of Longleaf Pine Seed Production

Introduction

Methods used in the mass stimulation of seed production in forest trees can be classified under one of two headings: first, those which should reduce tree vigor, and second, those which should increase tree vigor.

Banding, girdling, root-pruning or modifications thereof should reduce the vigor of the tree. Several tests have been started in the South in the past few years using these techniques. Methods of stimulating seed production which should increase the vigor of the tree are fertilization, irrigation and release. This paper describes the increase in seed production of longleaf pine caused by treatments which should increase the tree's vigor, namely release and fertilization.

Irregular and infrequent occurrence of cone crops is one of the major obstacles in the regeneration of longleaf pine stands. Past studies have indicated that size of tree, degree of crowding, and fertility of soil influence the seed yield in longleaf pine (5).

Gemmer (2) described results of fertilizing, irrigating, and mulching of longleaf seed trees starting in 1927 on the deep sands in west Florida. He reported the average number of cones per tree in 1931 was: no treatment, 2; mulch, 11; water, 25; and complete fertilizer with water, 62.

In 1952 Maki (3) reported the cone production of second growth longleaf trees, comparing trees on a deep sand with trees on a sandy loam near a chicken-yard. The average annual production over a six-year period was 178 cones each for the chicken-yard trees and 85 cones each for the sand-hill trees. Additional checking showed no difference between the chicken-yard and sand-hill trees in the number of seed per cone, weight of the individual seed, germination of seed or field performance of seedlings.

In 1952, Croker (1) summarized the effect on cone production of longleaf seed tree cuttings male in the first quarter of 1949, '50 and '51. In the fall of 1951 there were 16 cones per tree on trees released for 8 months; 28 cones for trees released for 20 months; and 61 cones for trees released 32 months.

Paper presented at 2nd Southern Forest Tree Improvement Conference, Atlanta, Ga. Jan. 6-7, 1953 by Robert M. Allen, Research Forester, Southern Forest Experiment Station, Gulfport, Miss.

Procedure

A study was started in 1948 to test the effects of release and fertilization on the cone and seed production of second growth longleaf pine.

There were four treatments:

A. Untreated control
B. Release
C. Fertilizer
D. Release and fertilizer

The sample trees which were released had all dominant, co-dominant, and intermediate trees within a radius of 17-20 feet removed. The fertilized trees received an application of a complete fertilizer in February 1949 and again in February 1951. The amount of fertilizer applied the sample trees varied with their diameter: 8-inch trees received 19 pounds of 5-15-5 fertilizer per application, 10-inch trees 30 pounds, and 12-inch trees 44 pounds. The competing trees in the fertilizer treatment were also fertilized, the amount varying with their diameter and proximity to the sample tree.

In this study there were 144 trees, one-third of them located at each of three experimental forests; the Escambia, in south Alabama, and the McNeill and Harrison in south Mississippi.

Results and Discussion

There was an average of less than one cone per tree produced in each of the first two years following treatment. N o response to release and fertilization was apparent.

In the third and fourth year there were treatment differences. In 1951 the check trees produced twice as many cones as they did in 1952. The average annual cone production in these two years was 1.3 per check tree; 6.9 per released tree; 13.5 per fertilized tree; and 16.7 per tree for those released and fertilized. In both years the average cone production for each treatment was greater than the controls. In 1951 the treated trees averaged 12 times as many cones as the untreated checks and in the poorer seed year of 1952 the treated trees averaged 4 times as many cones.

Comparison of the response to release with that to fertilizer is pointless since there was only one level of each treatment in the test.

Release plus fertilizer produced more cones than release alone. However, release was not complete in this test as it is in a seed tree cutting. With complete release there might or might not have been additional response to fertilizer.

Past cone production influenced the 1951 and 1952 done yields. Half of the sample trees in this test produced no cones in the good seed year of 1948; they averaged 4.5 cones a piece in 1951 and in 1952. The trees that had produced cones in 1948 averaged 14.7 cones apiece for each of the two years, 1951 and '52. There was no significant interaction between treatment and past cone production.

In this study, a complete factorial, there were three diameter classes of trees, 8-, 10-, and 12-inches, each having one-third of the trees. The average annual cone production in 1951 and '52 was: 4.6 cones per 8-inch tree; 10.3 cones per 10-inch tree; and 13.9 cones per 12-inch tree.

Other southern pines show similar response to fertilizer and release. At the North Coastal Plains Branch of the Southeastern Forest Experiment Station a recent study showed that fertilizer stimulated cone production in a 25-year-old loblolly stand but not in a stand of 40-year-old loblolly (4). In another study they showed that loblolly which had been released produced more cones than the untreated controls (4).

Conclusions

It seems likely that fertilizer and release will stimulate cone production of all southern pines. In working with high value trees it would seem desirable to use fertilizer and release treatments to sti_mlate cone production rather than methods which would impair the rigor of the tree.

Literature Cited

(1) Croker, T. C., Early release stimulates cone production. U. S. Forest Service. Southern Forest Expt. Sta. South. Forestry Lotes, May 1952, p.4. (Processed.)

(2) Gemmer, E. W., Well-fed pines produce more cones. U. S. Forest Serv, Forest Worker 8 (5):15- 1932. Original not seen, summarized by wahlenberg, (5).

(3) Maki, T. E., Local longleaf seed years. Jour. Forestry 50: 321-322. 1952.

(4) U. S. Forest Service. Southeastern Forest Experiment Station. Quarterly Report Oct.-Dec., 1951 (Processed)

(5) Wahlenberg, W. G., Longleaf Pine. Charles Lathrop Pack Forestry Foundation. Washington, D. C. 1946.