STIMULATION OF FLOWER AND SEED PRODUCTION IN SLASH PINE

by

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A greatly stepped-up reforestation program in the Southeast has emphasized the problems of obtaining an adequate seed supply, which in turn means sufficient annual quantities of the highest quality seed obtainable. To enhance the quality of slash pine seed, seed-production areas and seed orchards have been established, the former being thought of as a temporary measure until the seed orchards come into full production. Although release in itself usually increases seed crops, additional measures are considered necessary to stimulate premature and abundant flowering of slash pine in seed-producing areas. Work on other species of pine has indicated that stem-injury, root-pruning, and application of fertilizer are effective in this respect.

The results of two studies on flower stimulation of slash pine are presented here. In both studies the treatment effects were evaluated in terms of female flowers rather than cones so that any subsequent damage to cones by destructive agents would not complicate interpretation of the results.

Study I.

In this study an attempt was made to stimulate 6-year-old planted slash pine to flower prematurely. The following treatments were applied in April 1954: partial girdling, strangling by wire, root-pruning, and fertilization in amounts of 5, 10, and 15 pounds per tree of a 3-12-6 mixture. During the latter part of February 1955, all the female flowers were counted on the upper three whorls of each tree.

Only 1 tree in the unfertilized plots produced flowers, versus 26, and 31 flowering trees in the fertilized plots. Only 3 trees bore flowers in the plots which received no stem-injury, versus 22 and 56 flowering trees for the strangled and girdled plots, respectively. The differences were even greater in terms of flowers produced by treatment. The following conclusions were made from this experiment;

1. Application of fertilizer was effective. An increase in the amount of fertilizer beyond the initial 5-pound application, however, had no added effect,

2. Stem-injury also had a stimulating effect but the effect of partial girdling was much greater than that of strangling by wire.

3. Root-pruning substantially increased the number of flowering trees.

In September 1956, all mature cones were harvested in this experiment. Only 32 percent of the 755 flowers counted in 1955 had developed into mature cones.

Study II

The second study attempted to stimulate greater flower production on a 20-year-old seed production area already in production. Treatments included partial girdling and application of fertilizer. Two fertilizers were used, 7-7-7 and 3-18-6, at the rate of 20 and 40 pounds per tree. The treatments were applied in April, 1954. During the latter part of February, 1955, all buds and all female flowers were counted ona sample branch from each tree. The total number of flowers per branch was divided by the total number of buds to arrive at the number of flowers per bud.

The following conclusions were made from the study:

1. Applications of fertilizer resulted in an average flower production increase of 59 percent.

2. The 7-7-7 fertilizer with its high nitrogen content provided a greater stimulus for flower formation than did the 3-18-6 with its high phosphorus content.

3. Girdling the trees increased the flower crop significantly and the effect was independent of dosage and type of fertilizer.

A second flower-count, one year later, showed that these effects persisted, with the exception of those due to the type of fertilizer.

Summary

Root-pruning, partial girdling, and fertilization proved to be effective treatments in inducing 6-year-old saplings to flower prematurely. A combination of these three treatments caused 30 percent of the saplings to flower; less than 1 percent cf the untreated saplings flowered. On 20-year-old, cone-bearing trees, application of 20 pounds of 7-7-7 fertilizer raised the flower crop 120 percent; girdling increased it 70 percent. A combination of these treatments resulted in 180 percent more female flowers. Similar differences in percent were noted a year later.

The poor harvest of mature cones in Study I led to an examination of breeding records at the Lake City (Florida) Research Center. These records showed that only 30 to 45 percent of the pollinated flowers yielded mature cones. Counts on the complete 1956 cone-crop of 13 trees, with an average of more than 1 bushel per tree, showed that only 55 percent of the cones were sound. These figures indicate that the full benefits of flower stimulation will become available only with adequate cone protection.