

# LOSS OF SHORTLEAF PINE FLOWERS UNDER NATURAL CONDITIONS - A PROBABLE EXPLANATION FOR HIGH LOSSES IN CONTROLLED POLLINATIONS

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For some time, controlled pollinations of shortleaf pines in the Tennessee Valley Authority breeding program have shown a low rate of success; only 40 percent of pollinated flowers produced mature cones. This figure agrees with that of Snyder and Squillace (1966) for the southern pines. Soon after the first crosses were made, these flower losses provoked the question of whether they were caused by the bagging and/or hand pollination process, or whether they were the result of a natural phenomenon common to both bagged and unbagged flowers. Snyder and Squillace did not answer this question. Either type of loss could be compensated for by more than doubling the required number of pollinated flowers, a choice that would also more than double the workload. However, a procedural cause might be corrected, thereby saving much effort.

To determine the primary cause, a study of percent cone maturity under natural pollination con-

ditions was conducted. Flowers from tagged limbs on at least two ramets of six different clones were counted at flowering, 2 months later, and at harvest. Results are shown in the tabulation: From 47.8 to 79.5 percent of female flowers failed to mature depending upon clone; the overall value, 39 percent, is very close to that from controlled pollinations. Though no attempt is made to explain the clonal variation, some of it is likely caused by the differences in flowering time and, therefore, differences in pollen availability. But controlled pollination data also show variation among clones and among specific crosses within clones (same female, different males).

Results from this test, then, indicate that 50 percent or higher cone losses might be expected even under natural conditions in shortleaf pine. The recommendation from this work is that good records of flowers pollinated and cones matured from these crosses be kept by clone. This information should allow for a better estimate of number of pollinated flowers required to produce a given number of cones. This figure along with seed-per-cone data taken during extraction of control-pollinated cones will enable the breeder to pollinate the appropriate number of flowers to obtain specific numbers of seed.

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### *Retained Flowers in Natural Pollinations*

Clone	Count at flowering Number	Retained after 2 months Percent	At harvest Percent
1 .....	249	32.9	20.5
2 .....	165	52.7	45.5
3 .....	154	63.3	33.2
4 .....	46	63.0	52.2
5 .....	713	58.5	46.3
6 .....	142	51.4	29.6
Overall	1,469	53.4	39.0

### Literature Cited

- Snyder, E. B., and Squillace, A. E.  
1966. Cone and seed yields from controlled breeding of southern pines. USDA Forest Service Res. Pap. 50-22.