

Establishment and Management of Seed Orchards

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It seems that there is very little that can be added to the theory of seed orchard establishment and management. A search of the literature during the past few years indicates that every possible angle has been covered and contradicted. Rather than rehash this information that is available and familiar to all of you, I will discuss our experience with seed orchards. Each organization dabbling in seed orchards has its peculiar problems and situations which must be met in their own way so that what works best for one may not be best for another. Such things as available labor, sites, money, foresters' ingenuity or lack of it, all influence what each organization has done and is doing.

I must interject here that we have worked with the University of Florida's Cooperative program and owe much to them for their guidance. If Drs. Perry and Wang take exception to some of my statements, I hope they will kindly do so.

The obvious place to begin is with the site. Ours is a 45 acre upland hardwood site completely surrounded with hardwood drains. These drains are invaluable as isolation strips as well as fire barriers. The nearest slash pine is over one half mile away. The site is nearly in the center of a 40, 000 acre tract under fence and locked gates. There are some drawbacks to its location but fire hazard and molesting by unauthorized persons are not among them. We first planned to place the orchard at our nursery, but we would have had to cut many acres of excellent young slash pine stands to get even a meager amount of isolation.

In order to clear the site, all merchantable wood was utilized and then the brush and stumps were cut with a K-G blade mounted on a D-8 tractor, the debris was piled and burned, and then the area was harrowed three times with a Rome offset harrow. After this treatment the area was nearly as clean as an old field. A fence 7 feet high was built in order to keep out deer as well as hogs. A soil analysis at this point indicated that the soil was low in all nutrients, at least by agricultural standards, and the PH slightly over 6. The soil is loamy sand 2-3 feet thick over sandy clay and moist but not wet. The site index for slash pine is about 90 and about 100 for loblolly pine.

Our first 200 potted grafted slash pine plants were planted in August of 1956 at a spacing of 30 feet by 30 feet. They were watered several times but in spite of an abnormally dry early winter no trees were lost until they started

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to grow the following spring. These trees averaged over 8 feet tall last winter and some were as high as 11 feet. An additional growth of 3 to 4 feet has been added this spring. Since then we have planted each spring about 400 potted grafted plants. Our orchard now contains grafts from 83 clones varying in quality from good to long-shots.

Mortality has come at two times; first when the plants were out-planted, then during the second growing season. The first type of dying usually involves only the scion. The second type of mortality is characterized by a hip shaped graft with the scion enlarging in diameter while the rootstock does not grow. The plants first lean over and then die soon after. Apparently water is going up to the scion while food is not getting down to the rootstock. Some have suggested leaving limbs on the rootstock for several years in order to nurse these trees along. According to our records as of March, 1959, 77% of the scions grafted lived and were outplanted and now 42% of the scions grafted are alive. Since 4 years of grafting are involved, we still lose some of the last plants so that we will probably have as live trees 35-40% of the scions grafted.

Insects have not given any trouble. Spraying has been done only once or twice a year with Malathion for red spider. We may get into trouble later, but I don't believe in spraying only as a precaution. There is too little known about the effects of insecticides to spray when it isn't known which insects might be killed or which might be caused to become epidemic.

So far no cover crops have been planted in the orchard and it has been allowed to grow up in weeds which are mowed every May and again in August. The first mowing is after the weeds reach about maximum size and the fall mowing is partly for fire protection and also an aid in moving around for control pollinating, etc. The weed cover works out well since it doesn't seem to compete with the trees as much as a grass cover would. Continued mowing will probably cause native grasses to take over, but these should not be troublesome if they aren't heavily fertilized. A 5' diameter area is scalped around each tree at the time of planting, but these haven't been maintained.

Fertilizer is being applied at the rate of 1 cup or about 1/2 lb. of 6-12-12 per tree for 1 year old trees and 2 cups for trees out-planted 2 or more years. With the cooperation of the University of Florida, a study has been installed to find the effects of N, P, & K in all combinations using two levels of N. After two years no differences in height growth can be noted as the result of the various fertilizer treatments. However, after the first year, only the trees receiving nitrogen had female flowers, but not all trees receiving nitrogen produced flowers. No such pattern developed this year. It is questionable whether faster growth than we are receiving would be desirable. The trees now have very long succulent leaders which are particularly subject to breaking by the wind and birds. In addition to the possible loss in height growth, it is very disheartening to lose young cones on the terminals in this manner.

Female flower production has increased from 10 in 1957, to 89 in 1958, and to over 200 in 1959. All cones were control pollinated in 1958 and 1959 in order to get started on progeny testing. About 45 cones will be picked this fall. The seed will be stored for a year or two until enough can be secured to make some plantings for comparative purposes. The progeny testing will be pushed as fast as possible in order to evaluate the tree selection program.

At this point, the first phase is over and another is about to begin. The University of Florida ended its large scale grafting program this past spring and from here on, its up to us to do the propagation.

Our main effort will be with field grafting and in preparation 2, 000 seedlings have been planted in groups of 3, spaced 30' x 30'. Grafting will be started during the spring of 1960. Although we haven't done any field grafting, it seems to be the only alternative to using pots which we don't like. Slash pine grows too fast to be confined to a 1 gallon pot for one year. The roots start circling the inside of the pot and the tap root seems to be permanently damaged. Some of our otherwise healthy three year old trees which were grafted in pots are wallowing holes in the soil around their trunks during wet and windy weather indicating root support may be faulty and these trees may become subject to windthrow as they get taller.

Our other attempt at propagation will be with aird layering. Last June 100 air layers were placed on 2 year old grafted stock in the seed orchard and of these, 25 rooted. These trees are now growing very well. The ages of the trees, from which the scions had originally come, were between 20 and 30 years of age. This is a convenient method of propagation and a very low percentage of success can be tolerated since the care and supervision is negligible. Only a weekly examination after installation is sufficient.

The present seed orchard is only a step to better things. When progeny tests give some results as to which clones are worthwhile keeping, another orchard will be established with these proven clones. Although the present orchard contains many clones that are only average, it is doubtful whether they will be destroyed. The present orchards are valuable in providing experience in orchard management, in providing easy access to trees to carry on control pollinating, and of course, to supply seed of better than average quality until it is possible to have a source of proven seed.