Effect of Polyethilene and Regular Packing Methods on Ponderosa Pine And Douglas-fir Seedlings Stored Over Winter

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Shipping nursery stock without moss or other packing material on the roots permits considerable economy in packing and shipping charges. That it is practical under certain conditions has been shown by Professor John P. Mahlsted's work with ornamental nursery stock shipped completely enclosed in polyethylene bags, and by Duffield and Eide who successfully packaged Douglas-fir seedlings in such bags with granulated wet peat for 6 weeks or so. We tested its feasibility at the Mt. Shasta Nursery in 1956-57 and in 1958-59 by contrasting the method of packaging treesin polyethylene bags without packing material on the roots with out regular packing method.

Test Procedures

The packing methods used were as follows:

1. Polyethylene-bag packing. Polyethylene bags were packed with 100 seedlings completely enclosed in each bag. No .packing material was used, but seedlings were damp when packed. The bag was sealed with

a rubber band.

2. Regular Packing. The current packing method used at this nursery is to place the trees in crates with alternate layers of packing material and seedlings. Bunches of trees are laid in the crates with the tops toward the ends of the crates and the roots overlapping in the middle. Packing material is placed on the roots and stems, but not on the needles. The packing material consists of about 50 percent wood shavings and 50 percent vermiculite, well mixed and wet enough to yield a few drops of water when squeezed tightly in the hand. The crate is lined with a water-resistant paper. A space of approximately 2 inches is left in packing between the tops of the trees and the ends of the crates. The packing crates are of slat construction, which provides air circulation and protection to the terminal buds. Large trees may be packed in bales instead of crates.

The trees were stored in our cold storage plant at a temperature of 330 to 34° F. and at a relative humidity of about 92 percent. Pine seedlings can be successfully stored for several months at this temperature and no detrimental mold will develop. Arrangement of trees in storage was such that constant air movement could be maintained on all surfaces of the crates.

The stored trees were planted by planting machines or by regular hand planting. In 1957, weather and growing conditions in the Mt. Shasta area were not favorable, but both improved considerably during the following 2 years.

Observations

In the 1956-57 test, the trees were lifted after November 1, 1956, stored in polyethylene bags for 5-3/4 months by method number 1, and field planted April 27, 1957. Vigorous root and bud activity was noticeable earlier than in trees packed for storage in the regular pack. Field survivals did not differ a great deal between regular-packed trees and bag-packed trees. Each pack method averaged about 35 percent survival.

In the 1958-59 test, several thousand trees were packed in polyethylene bags in the fall of 1958 from stock lifted after November first when the trees were considered well hardened-off. Bunches of 50 trees were put into polyethylene bags and each bunch was tied with a "Twist-em" in order to keep the bundles intact. Air was pressed out of the bags so that they could be packed. They were tied at the top and no packing material was used. The bags were then packed into crates, 40 bags to a crate. The stock packed in this manner was 1-1 ponderosa pine and 2-0 Douglas-fir. These trees were stored for 5.5 months under the same conditions as in the previous experiments.

Most of the pine trees were planted by machine on a well prepared site, all brush and other vegetation having been completely removed. The trees were planted in the spring of 1959 on the McCloud District on the Shasta-Trinity Forests. Douglas-fir was planted on the Six Rivers and Klamath Forests. Trees which had been packed in polyethylene bags

were planted at about the same time as the trees in the regular pack.

The test planting on the McCloud District was examined in the fall of 1959. Survival percentage from bag pack and regular pack was the same, 94 percent, but the bag-packed seedlings appeared somewhat more vigorous than the others. We did not examine the Douglas-fir plantations, but reports from the Forests indicate that the seedlings packed in polyethylene bags had a 40 percent better survival than those from the regular pack.

Discussions and Conclusions

This study, while not conclusive, indicates the following:

1. Factors other than aeration and wet packing material may be responsible for successful storage.. Dr. Henry Hellmers found that there are indications of a relationship of seedling starch content to seedling survival.

2. Pine and Douglas-fir seedlings packaged in polyethylene bags without packing material can be stored for approximately 6 months without noticeable adverse effect on survival or vigor after planting.

We think that the bag-pack method has many advantages over the established packing procedure, especially for long cold storage, for the following reasons: (a) Trees seem to be more vigorous after planting; (b) crates are much lighter to handle; (c) no packing material is needed.

Cost of packaging might be a trifle more for the bag-pack method than for the regular pack method. However, the saving in handling and shipping will outweigh the packaging expense, so that production cost for the two methods will be about the same.

One disadvantage of the bag-pack method is that bag-packed trees are more susceptible to the detrimental effects of the sun and warm temperatures. We made some exposure tests which indicated that trees in polyethylene bags "heated" much faster than trees packed in the regular pack. "This problem can, of course, be avoided, but it is of importance and is noted for what it worth.