MORE ON STRATIFICATION OF PINE SEED IN POLYETHYLENE BAGS

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Recently, studies of seed stratification using polyethylene bags showed distinct possibilities of this simplified method of breaking dormancy of pine seed. Hosner et al.,[1] stated that "... storing small samples of moistened (loblolly) seed in polyethylene bags shows promise as a substitute for stratification in sand as a pregermination treatment to break dormancy." Similar results are reported by T. V. Lehto[2] who found loblolly pine
14 seed stratification in polyethylene bags more economical, more flexible, and more convenient. In correspondence and personal discussions with the writer, T. F. Swofford, of the Region 8 Seed Testing Laboratory, notes that polyethylene bag stratification of loblolly pine compares favorably with treatments in sand and peatmoss; total germination resulting from all three treatments was about the same, and the speed of germination was identical for all three for 30- and 60-day stratification periods.

In August 1959, we initiated an exploratory study to find out whether this method of stratification might be feasible using larger quantities of seed. Specifically, our purpose was to determine if the positive results reported by others on small seed samples could be duplicated with larger seed lots of both loblolly and slash pine. The results, as reported here, may be of interest to nurserymen, direct seeders, and research workers planning more intensive tests of polyethylene bag stratification.

Experimental Procedure

The test as set up used only one stratification treatment- -polyethylene bags--plus an untreated control. We did not include any of the standard stratification treatments; the polyethylene bag technique had already been demonstrated as effective for small lots of seed, and the point being tested in this study was its effectiveness with larger seed lots.

In establishing the study, 100-pound lots of slash and loblolly seed were subdivided for treatment according to the following scheme:

Treatment and lot size	No. of replications
Polyethylene bag stratification:	
25 pounds	1
10 pounds	3
5 pounds	3
100 seed	4
Untreated control, 30 pounds	1

After each sample lot was weighed, the seed was placed in burlap bags and submerged in tapwater until thoroughly wet. Then each treated sample was poured out into a polyethylene bag, and sealed and labeled. All samples, both stratified and unstratified, were placed in cold storage and remained there for 60 days at temperatures of 36-38° F. During the stratification period the seedlots were inspected periodically and kept moist by adding water whenever needed.

At the end of 60 days, representative samples of seed were drawn from all treatment lots for standard germination tests to reveal differences, if any, between treatments and size of seed lot in stratification.

1 Hosner. F. John, et al, Storing loblolly pine seed in polyethylene bags as substitute for stratification. Jour. Forestry 57:495-496. 1959.

2 Lehto, T. V. Stratifying pine seeds in plastic bags. American Nurseryman, April 1960.

Results

The results obtained from these germination tests indicate that polyethylene bag stratification is quite feasible for operable seed lots up to 5 or 10 pounds, but is somewhat risky with lots as large as 25 pounds.

For loblolly pine, as expected, stratification. resulted in much higher germination rates than no treatment, as indicated:

Treatment and lot size	Total normal germination percent at 30 days[1]	Days required to reach 90 percent total germination
Polyethylene bag stratification:		
25 pounds	80.0	20
10 pounds	84.8	20
5 pounds	89.5	15
100 seed	89.6	17
Untreated control, 30 pounds	44.7	26

[1] Based on total number of seed or "apparent germination percentage."

The table shows a drop of almost 10 percentage points in total normal germination as between the very small sample of 100 seed and the large sample of 25 pounds of seed. There was practically no difference between germination rates of the 100-seed and 5-pound samples. It is also interesting to note that the 100-seed and the 5-pound lots reached 90 percent of their total germination in substantially fewer days than the larger lots being tested.

Stratification of the slash pine seed resulted in general depression of germination rates. (Slash seed is known to respond erratically to stratification treatments of any kind.) The rates of germination obtained with this species were as follows:

Treatment and lot size	Total normal germination percent at 30 days[1]	Days required to reach 90 percent total germination
Polyethylene bag stratification:		
25 pounds	60.6	11
10 pounds	63.9	9
5 pounds	63.7	9
100 seed	86.2	8
Untreated control, 30 pounds	85.2	13

[1] Based on total number of seed or "apparent germination percentage."

Germination of the very small (100-seed) lot of stratified slash was about the same as that for the untreated control seed. There is a sharp drop in germination rate, however, as seed are stratified in larger lots.

Conclusions

It had been demonstrated previously that stratification of small, 100-seed sample lot; in polyethylene bags gives equally as good results as conventional methods of stratification in peat moss or sand. Tests were needed, however, to see if larger, more practical lot: of seed could be stratified using the same technique with comparable results. This was the primary purpose of the present study; we needed to determine if polyethylene bag stratification of larger seed lots resulted in the same germination as polyethylene bag stratification of 100-seed lots. On the basis of our results, we conclude that seed lots as large a.

5 pounds in size may be stratified in polyethylene bags with no ill effects or loss of germination.

Our tests using 10-pound seed lots gave fairly good results, but the loss of about five percentage points in total germination might be unacceptable. The 25-pound seed lot seems to be too large to handle and, furthermore, the germination loss of almost 10 percent and the 5-day increase in germination period make it appear undesirable. However, this is the weakest point in our test, since we had only one replication of this treatment. It might be that with some modification of the technique even such large lots could be stratified using polyethylene bags with no losses in germination.

The 5-pound seed lot seems to be the best size, at least as far as these tests are concerned. Lots of this size are easy to handle, and total germination is as great as that from smaller seed lots. If stratification of loblolly or slash seed is called for, and if the nurseryman wishes to employ a simpler, cleaner technique than use of sand or peat moss, then we would recommend that he use polyethylene bags and seed lots of about 5 pounds in size.