

# GERMINATION OF LOBLOLLY PINE SEED HASTENED BY SOAKINGS IN AERATED COLD WATER

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In preliminary tests, soaking loblolly pine seeds in cold, aerated water for 28 days stimulated germination nearly as well as conventional cold stratification, and better than hydrogen peroxide soaks or water soaks without aeration. The water aeration method is easy and inexpensive, and eliminates the dangers of heating and molding, which are present in stratification.

The tests were run to compare stratification, soaking in hydrogen peroxide solutions, and soaking in aerated water. Hydrogen peroxide soaks were recommended for loblolly seeds by Carter and Jones (1). Fowler (3) found that soaking in aerated water hastened the germination of white pine seeds.

### Methods

Loblolly seeds for the tests were from three lots collected in central Louisiana. They had been stored for 1, 3, and 5 years. Empty seeds were removed from the lots by water flotation.

Two random samples of 100 seeds were chosen from each lot for each treatment. Treatments in-

cluded a control (no treatment), normal stratification for 28 days at 34°F., water soaks with and without aeration, and soaks in hydrogen peroxide solutions (1-percent by volume), some in conjunction with stratification. Treatments were at one of two temperatures: 34°, which is the normal stratification temperature, and 72° or room temperature, which has most often been used in the past for soaks. Soaks lasted for 4, 10, or 28 days. Including the control, there were 13 treatments. They are listed in table 1. All were completed on the same day.

Germination was tested by standard laboratory methods for 28 days at 72°. Peak germination and Czabator's (2) germination value, which takes into account both speed and completeness of germination, were computed for each sample.

### Results and Discussion

Seeds were moderately dormant before treatment. The controls had a germination value of 12.9 and reached their peak in 17 days. All treat-

TABLE 1.—Average germination of seeds by treatment

Pregermination treatments	Germination at 28 days <sup>1</sup>	Peak germination	Germination value <sup>2</sup>
	<i>Percent</i>	<i>Days</i>	
Stratification with water for 28 days at 34°F.-----	99	10	30.5
Soaked in aerated water at 34° for 28 days-----	95	10	28.0
H <sub>2</sub> O <sub>2</sub> soak at 34° for 4 days; stratified 28 days with water-----	86	10	24.1
H <sub>2</sub> O <sub>2</sub> soak at 34° for 4 days; stratified 28 days in polyethylene bags-----	79	10	21.0
Stratification with H <sub>2</sub> O <sub>2</sub> for 28 days at 34°-----	80	10	20.6
H <sub>2</sub> O <sub>2</sub> soak for 4 days at 34°-----	85	10	19.6
Soaked in aerated water at 34° for 10 days-----	90	13	19.4
Water soak for 4 days at 72°-----	92	13	18.6
H <sub>2</sub> O <sub>2</sub> soak for 4 days at 72°-----	87	13	17.3
H <sub>2</sub> O <sub>2</sub> soak for 10 days at 34°-----	88	12	17.3
Water soak for 4 days at 34°-----	82	15	14.0
Control-----	84	17	12.9
Water soak for 10 days at 34°-----	60	10	9.8

<sup>1</sup> Germination tests conducted with sound seeds only.

<sup>2</sup> Germination values within the same bracket are not significantly different at the 0.05 level.

ments improved the speed of germination; about half of them reduced the days needed for peak germination to 10. Total germination was little affected by most treatments. The obvious exceptions were a 10-day water soak at 34°, which reduced viability, and normal stratification and a 28 day aerated water soak, which both improved viability. Total germination, peak germination, and germination value are shown by treatment in table 1.

Germination values, which ranged from 9.8 to 30.5, were the most sensitive measure of treatment effects. Aerated cold-water soaks hastened germination almost as much as conventional stratification, and more than all other treatments except a cold hydrogen peroxide soak followed by stratification.

Although aerated water soaks will require further evaluation before they can be recommended, they show great promise. Large lots can be treated in this manner without dangers of heating and molding such as are present in stratification. Seeds can be soaked in their storage drums by equipping the drums with valves for air and water lines.

Except where time is limited, hydrogen peroxide treatments appear less promising. As a wetting agent in cold stratification, the hydrogen peroxide solution was less effective than water alone. Hydrogen peroxide soaks, when not combined with stratification, were statistically (0.05 level) no better than any treatment except the unaerated water soak for 10 days at 34°. Apparently, the oxygen in the water for the 10-day soak was depleted, because total germination was reduced.

### Literature Cited

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