IMPROVING PREDICTIONS OF SEED PERFORMANCE IN NURSERIES BY MODIFYING LABORATORY GERMINATION TESTS

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Nursery managers and seed technologists have sought for many years ways to improve the predictability of seed performance on nursery beds because germination is often less than in laboratory tests; probably due to less than ideal environmental conditions. Efforts have been made to develop vigor or stress tests that would enable the nursery manager to predict field performance more accurately. However, these efforts have been generally unsuccessful, so germination percentages from standard tests remain the accepted means of estimating performance. Tests were recently conducted to determine if predictions of field germination could be improved by modifying laboratory tests to more closely approximate the soil temperatures and day lengths encountered at the time of sowing.

Six half-sib sources of shortleaf pine (Pinus echinata Mill.) seeds were used to evaluate 3 germination environments, 4 pregermination treatments and 3 replications. Tests were conducted over a 2-year period with differences between years being slight modifications in pregermination treatments. The germination environments were: (1) standard lab conditions (72°F and 16-hour photoperiod), (2) modified lab conditions (60°F and 12-hour photoperiod), and (3) field nursery conditions. Pregermination treatments during the first test were 0-, 30-, and 60-day prechilling. The fourth treatment was 60-day prechilling plus a 3-day aerated water soak. In the second test, the same 6 half-sib families were given 0, 15, 30, and 45 days of prechilling with and without 3 days of aerated water soaks following prechilling. Germination of 2, 100-seed trays was measured in the laboratory for each treatment combination 3 times a week for 28 days. In the Alexandria Forestry Center nursery, 2 replications of 4 rows (50 seeds per row) were oriented across beds and spaced 6 inches apart, resulting in a sowing density of 25 seeds/ft^2. Germination in the nursery was measured weekly.

Germination on nursery beds was both less and slower than under standard lab conditions, particularly with no or short periods of prechilling (Table 1). In test 1, germination under the modified lab conditions (60°F) closely approximated nursery performance when seeds were prechilled for 60 days.

Table 1.--Germination percentages and values for shortleaf pine seed lots subjected to different germination conditions

Germination conditions	Germination period				Germination value			
	0	30	60	60+	0	30	60	60+
	-----Percent------							
Lab at 60°F	0	17	62	70	0	0.6	5.7	8.0
Lab at 72°F	80	91	90	88	14.9	31.3	31.2	25.7
Nursery	45	79	76	77	2.1	9.6	11.4	12.6

Data from test 2 (not shown) again indicated that modified laboratory tests may improve the predictibility of germination tests. The key to making this system work is determining by monitoring for several years the average nursery soil temperatures at the time of sowing. This can easily be done by data recording equipment. This information can then be used to modify lab germination testing conditions. Improved estimation of field germination will result.

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