

injury during handling and sowing because of softening of the seed coats. Germination during stratification may also occur, particularly if temperatures during stratification are not rigorously controlled.

Although drenches in the fungicide benomyl significantly reduced the populations of seed coat microorganisms, laboratory germination did not increase as a result. There are indications that such drenches might improve nursery performance. Clearly this is an area that deserves further investigation.

Table 3.--Longleaf pine seed performance under laboratory conditions for various presowing treatments (Test 2)

Presowing treatment ^{1/}	Seedlot								
	MS-88	MS-86-1	MS-86-2	LA-86-6	LA-86-5	MS-87	LA-86-2	LA-86-1	Avg.
	<u>Germination (%)</u>								
Control	78ab	80a	56a	64ab	64a	81a	58a	57a	67.4
Soak, 24-hr	73b	68b	40b	56ab	55a	67b	43b	57a	57.3
Stratification, 7-day	77ab	77ab	26c	53b	55a	70ab	44b	58a	57.6
Benomyl drench, 15-min	82ab	79a	52a	66a	64a	80a	57a	66a	68.4
60-min	85a	78ab	54a	64ab	65a	81a	60a	62a	68.6
	<u>Peak day</u>								
Control	7.0	7.5	7.5	8.5	8.0	6.7	7.0	9.0	7.6b
Soak, 24-hr	7.0	7.5	7.3	6.7	8.0	6.0	7.0	6.7	7.0ab
Stratification, 7-day	6.7	7.0	7.0	6.3	7.0	5.7	6.7	6.3	6.6a
Benomyl drench, 15-min	7.0	8.0	7.0	8.0	8.0	7.0	7.5	8.0	7.6b
60-min	7.0	7.5	6.7	7.5	8.5	7.0	7.0	7.5	7.3b

^{1/} The benomyl drenches were at a concentration of 1 tsp. (4.15 g) per gallon of water; stratification at 34°F followed a 24-hour water soak at ambient temperatures.

^{2/} Laboratory tests were conducted under standard conditions (AOSA 1980) and are based on three replications of two dishes of 100 seeds each per treatment-replication combination. Peak day (Czabator 1962) is the number of days to reach maximum daily germination.

^{3/} Treatment means, within columns for seedlots, followed by the same letter are not statistically different at the 0.05 level. Due to a seedlot-treatment interaction, letters are given separately for seedlots within treatments of germination percentages. Letters are shown only for average treatment means in the peak day data.

RECOMMENDATIONS

The following recommendations include significant factors that are essential to longleaf pine seed performance:

1. Collect longleaf pine cones when they are fully mature (near a specific gravity of 0.89) and hold the cones only for 3 to 4 weeks before processing. Do not delay processing of the cones beyond 4 weeks.

2. Maintain kiln temperature between 95° and 105°F. As soon as the cones open, remove seeds from the kiln. Dry seeds to moisture contents below 10% by placing in a seed drier on clear, dry days when the ambient relative humidity is low.
3. Dewing the seeds only after they have been dried to moisture contents of less than 10%. Use dewing equipment designed for longleaf pine to ensure that the wings are reduced to stubs without injury to the seed coats.
4. Store the dry, dewinged seeds in sealed containers at subfreezing temperatures, preferably near 0 F.
5. Conduct germination tests when seeds are placed in storage and again before use, if storage is longer than 1 year. If stratification is considered, conduct paired germination tests (stratified and unstratified lots) reproducing the presowing conditions that duplicate operational procedures--i.e., water soaking as used in stratification.
6. Consider control of seed microorganisms if lots are of low quality. Use sterilants or fungicide soaks, depending upon their effectiveness in field tests.

Table 4.--Longleaf pine seed performance under laboratory conditions for various presowing treatments (Test 3)

Presowing Treatments	Seed moisture content	Seedlots								Avg.
		MS-88	MS-86-1	MS-86-2	LA-86-6	LA-86-5	MS-87	LA-86-2	LA-86-1	
	2/	<u>Germination (%)</u> ^{3/}								
Control	7.7	84	64	61	62	62	84	65	66	68.4a ^{4/}
Soak										
4-hr.	31.1	77	46	58	62	59	80	70	61	64.1b
8-hr.	36.9	78	53	50	57	56	80	74	65	64.1b
16-hr.	46.1	71	50	50	60	46	78	58	58	58.7c
24-hr.	52.1	76	40	54	60	48	76	59	57	58.7c
		<u>Peak day</u> 3/								
Control	7.7	7.5	7.5	7.5	8.5	7.5	7.0	7.5	8.0	7.6a ^{4/}
Soak										
4-hr.	31.1	7.0	7.5	7.5	7.5	7.0	5.3	7.5	7.0	7.0b
8-hr.	36.9	7.5	6.7	7.5	7.0	8.5	5.3	7.5	7.0	7.1b
16-hr.	46.1	7.0	5.7	7.0	6.7	7.2	5.7	7.0	7.0	6.7c
24-hr.	52.1	8.0	6.3	7.0	6.0	7.7	5.0	6.3	6.7	6.6c

^{1/} Ambient water soaks for the lengths of time indicated.

^{2/} Seed moisture contents are averages for the eight seedlots and are expressed on a dry weight basis.

^{3/} Laboratory tests were conducted under standard conditions (AOSA 1980) and are based on three replications of two dishes of 100 seeds each per treatment- replication combination. Peak day (Czabator 1962) is the number of days to reach maximum daily germination.

^{4/} Treatment means, within columns for averages, followed by the same letter are not statistically different at the 0.05 level. No seedlot-treatment interaction occurred.

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