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Germination of Sweetgum Seed in Response to Light

ABSTRACT. Cold, moist stratification essentially removes the light requirement for germination of sweetgum seed.

As an aid in the development of techniques for direct-seeding sweetgum (*Liquidambar styraciflua* L.), the germination of stratified and unstratified seed in response to light was studied at the Southern Hardwoods Laboratory.

Seed was collected from a mature tree near Stoneville, Mississippi, in the fall of 1963 and stored overwinter (for 5 months) at 35°F and 10-15 percent moisture content. Eight lots of 300 seeds were then selected and randomly assigned to temperature regimes of either 60 and 75°F or of 85 and 100°. Each lot was divided into sublots of 50 seeds. Half of the sublots were stratified for 4 weeks at 35°, and the other half were returned to storage. After 4 weeks, stratified and unstratified seeds were germinated at both temperatures under three light conditions: continuous light at 200 foot-candles, 15 minutes' exposure daily to 200 foot-candles, and no light.

Seeds were germinated in distilled water in petri dishes. Dishes were placed in germinators, and the thermostats were changed daily to give nine hours at the high temperature of each assigned range and 15 hours at the low. Preliminary trials had indicated that variations in temperature improve germination of sweetgum seed.

Light in the germinators was supplied by a 50 w. incandescent bulb and a 20 w. Champion "daylight" fluorescent bulb (F20T12/D). Dishes for the no-light and 15-minute treatments were wrapped in black plastic sacks and covered with aluminum foil. Dishes for the 15-minute treatments were exposed daily in the germinators.

Germination was counted daily, the no-light seeds under a green safe light and the 15-minute treatments at the end of the exposure period. A seed was considered germinated when its radicle had pierced the coat.

After 21 days, total germination and rate of germination were calculated on the basis of the number of full seeds (determined by cutting tests on the ungerminated seeds). Czabator's peak values (*3*), which express rate of germination, and arc-sin transformations of the total germination percentages were used in analyses of variance.

Light significantly increased (0.01 level) both rate of germination and total germination (Table 1). Lengthening the exposure from 15 minutes daily to continuous light increased the total germination, but the increase, although significant (0.05 level), is hardly of practical importance.

Both stratification and the higher temperatures reduced the influence of light. With stratified seed, temperature appeared to affect rate rather than completeness of germination. Unstratified seed germinated excellently in light at the higher temperatures, less well in darkness; at the lower temperatures its germination was virtually nil. All interactions of light, temperature, and stratification were significant at the 0.01 level.

Brunk and Hansbrough (*2*) reported stimulation of sweetgum germination by 100 foot-candles of light at a temperature regime of 60 and 75°F, but not at 85 and 100°. The present study supports their findings, although they did not report stratification data for their seed. It also indicates that seed of sweetgum resembles that of other hardwood species in its reaction to light, temperature, and chilling (*1, 4, 5*).

Although these data were obtained from seed of a single tree, they strongly indicate that stratified seed may be sown without regard to light as a major factor in germination.

Table 1.—Average Total Germination and Peak Value of Stratified and Unstratified Sweetgum under Two Temperature Regimes and Three Light Conditions

Light	60 and 75° F		85 and 100° F	
	Stratified 4 weeks	No stratification	Stratified 4 weeks	No stratification
	Total germination (percent)			
Continuous	97.9	3.4	100.0	99.3
15 min. daily	97.3	.0	98.6	97.3
None	94.6	.0	98.6	36.7
	Germination peak value			
Continuous	7.9	0.2	21.9	13.4
15 min. daily	7.6	....	19.5	11.3
None	6.4	....	17.5	2.8

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Franklin T. Bonner
Southern Forest Expt. Sta., Forest Service, U.S. Dept. Agric., New Orleans, La.