

Stratification and Germination of Arkansas Oak Acorns

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Results indicate there are approximately 390 Arkansas oak acorns per pound. Germination is best when acorns are stratified for 120 days.

Arkansas oak (*Quercus arkansana* Sarg.) is a medium-sized tree reaching 70 feet in height and 2 feet in diameter. Its distribution is limited largely to the sandy soils and hills of southwestern Arkansas, southeastern Alabama, northern Florida, and southwestern Georgia. The leaves, which are remotely three-lobed, are similar to those of blackjack oak (*Quercus marilandica* Muench.). The bark closely resembles that of water oak (*Quercus nigra* L.), being smooth when young, but becoming rough with scaly ridges when older (1). This tree has been suggested as a hybrid between blackjack oak and water oak (5), but it is now considered a separate species (2).

Oaks are commonly classified into two groups: the white oak group and the red oak group. With a few exceptions, the members of the white oak group produce acorns that do not require stratification. Acorns of the red oak group may require from 30 to 120 days of cold stratification for optimal germination.

Arkansas oak belongs to the red oak group, and its acorns require

an overwintering period before germination. Little information is available concerning the cold stratification requirements and acorn yields of Arkansas oak. This information is needed by nursery personnel for efficient seed handling and growing of seedlings. This study was conducted to determine the number of acorns per pound and to determine the cold stratification requirements of acorns from Arkansas oak.

Materials and Methods

Approximately 5 pounds of acorns were collected in Nevada County, Ark., in October 1982. All acorns were washed, and those obviously defective were discarded. Clean acorns were weighed into five 1-pound samples. The number of acorns per pound was determined for each of the five samples.

Next, acorns were randomly divided into five subgroups of 150 each and soaked overnight in water. Each of the five subgroups was cold-stratified for either 0, 30, 60, 90, or 120 days in moist sand at 2° C. Stratified acorns were planted approximately 1 centimeter deep in number 8 styroblocks containing a 1:1 mixture of peat moss and vermiculite, and they were watered three times weekly. Germination was tallied when any part of the epicotyl was visible above the planting medium. Germination

counts were recorded daily for 45 days.

All treatments were replicated three times with 50 acorns planted per treatment. Data were analyzed according to the techniques of McLemore and Czabator (3) utilizing an analysis of variance and Duncan's multiple range test (4).

Results and Discussion

Acorns in each of five 1-pound samples were counted. The average number of acorns per pound was 390 with a range of 387 to 393 acorns per pound.

The acorns receiving 0, 30, and 60 days of cold stratification did not show epicotyl development after 45 days (fig. 1). They did, however, show radicle development of 6, 90, and 98 percent, respectively. Epicotyl development was evident in the 90- and 120-day treatments (table 1). Mean germinations were 92.6 and 92.0 percent for the 90- and 120-day treatments, respectively. Peak germination of seeds stratified 120 days occurred an average of 3 days earlier than that of seeds receiving the 90-day treatment. Results from an analysis of variance of germination values were statistically significant at the 5-percent probability level. A Duncan's multiple range test indicated that germination of acorns stratified 120 days is significantly greater than that of acorns stratified 90 days and that germination

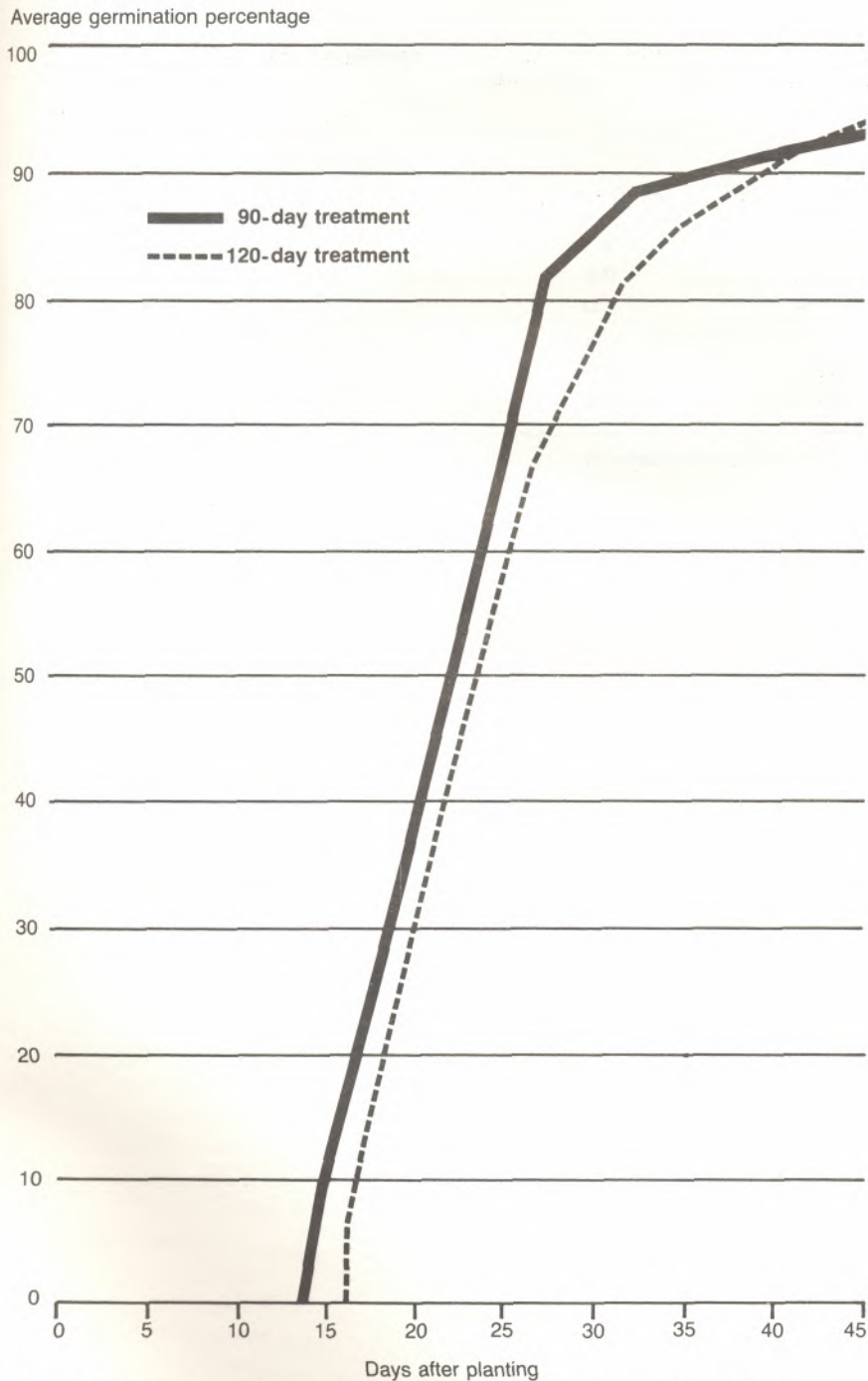


Figure 1—Cumulative germination of Arkansas oak acorns stratified at 2° C for different periods.

nation of acorns stratified 120 or 90 days is greater than that in shorter stratification periods.

Conclusion

Nursery personnel can expect Arkansas oak acorns stratified for 120 days to germinate significantly faster than those stratified for shorter lengths of time.

Table 1—Duncan's multiple range test of germination values, day of germination peak, and percentage of germination for acorns stratified up to 120 days

Stratification period	Germination value	Day of germination peak	Germination
Days			%
0	0.0c ¹	0.0	0.0
30	.0c	.0	.0
60	.0c	.0	.0
90	6.0b	33.3	92.6
120	7.9a	30.3	92.0

¹Values followed by the same letter are not significantly different at the 5-percent probability level.

Literature Cited

1. Harrar, E. S.; Harrar, J. G. Guide to southern trees. New York: Dover Publications; 1962: 709.
2. Little, E. L., Jr. Checklist of United States trees. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture; 1979. 375 p.
3. McLemore, B. C.; Czabator, F. J. Length of stratification and germination of loblolly pine seed. J. For. 59: 267-269; 1961.
4. Ott, L. An introduction to statistical methods and data analysis. Boston: Duxbury Press; 1977. 73 p.
5. Palmer, E. J. Is *Quercus arkansana* a hybrid? J. Arnold Arboretum 6(3):195-200; 1925.