

Germination rate of Arizona cypress improved by better cone collection techniques and seed pregermination treatments

by
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Past experience has shown that one of the foremost nursery problems with Arizona cypress (*Cupressus arizonica* Greene) is erratic and variable seed germination. This study was designed to try to identify some of the causes for the wide variation in germination percentage among seed lots and to test several modern pregermination treatments in an effort to obtain more uniform and complete germination.

Methods

Seed for this study were collected from four plantations in central Alabama. Cones were taken from a total of 36 vigorous trees, with a maximum age of 11 years. Cones were separated on the basis of seed and cone color as follows:

1. Green-Cones that were brown and contained ivory colored seed. These were judged to be immature second-year cones.
2. Brown-Cones that were brown and contained brown seed. These were judged to be fully mature cones. 2 to 5 years old.

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3. Gray-Cones that were gray and contained brown seed. These cones were judged to be over 5 years old.

The terms green, brown, and gray are also used to describe seed from the respective groups.

Two sets of germination tests were conducted. The first set was conducted with brown seed only and involved nine pregermination treatments as shown in table 1. All germination tests in this set were conducted under two light and two temperature regimes. Light regimes were as follows: (1) Dark except when germination counts were taken, and (2) 16 hours of light per day. Temperature levels were: (1) Constant 72° F, and (2) 68° F at night and 85° F by day.

The second set of tests was designed to determine whether germination varied by cone class. All seed lots received the same pregermination treatment and germination tests were all conducted under the same conditions. pregermination treatment consisted of a 24-hour soak in 0.1 percent citric acid followed by a 30-day clay stratification. Germination tests were conducted

at an alternating temperature of 68°-85° F with 16 hours of light per day.

In both sets of tests, seed lots of 100 seeds per treatment were used and each treatment was replicated six times. Germination tests were run for a 29-day period with number counts of germinated seed taken every second day.

Differences among the pregermination treatments were investigated by an analysis of variance and tested with Duncan's, new multiple range test. Data from the test for differences in germination of seed from different cone classes were tested by a paired "t" test. All tests were made at the .05 level of probability.

Results

The data from all tests were recorded as percentage of full seed germination at the end of the 29-day test.

The analysis of variance indicated there were no differences in germ lion percentage attributable to light levels. There was no valid test for differences caused by temperature levels, since temperature levels were con-

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TABLE 1.—Pregermination treatments and average percentage of full seed germination following 29-day germination tests

Treatment No.	Treatment	Average percentage of full seed germination ¹
1	24 hr. water soak, no stratification	67 d
2	24 hr. water soak, 15 days cold stratification	76 bed
3	24 hr. water soak, 30 days cold stratification	87 ab
4	24 hr. 0.1% citric acid soak, no stratification	70 cd
5	24 hr. 0.1% citric acid soak, 15 days cold stratification	81 abc
6	24 hr. 0.1% citric acid soak, 30 days cold stratification	92 a
7	24 hr. H ₂ O ₂ soak, no stratification	69 ed
8	72 hr. H ₂ O ₂ soak, no stratification	73 cd
9	72 hr. water soak, no stratification	74 cd

¹Averages with the same letter are not different at the .05 level of probability.

Discussion

Proper cone collection and pregermination seed treatment seem to afford significant improvement in germination of Arizona cypress seed. Care should be taken during cone collection to avoid picking both second year, immature cones and extremely old, gray cones. These types of cones yield seed with significantly lower germination values than seed from mature cones of an intermediate age. If a large percentage of green immature seed is harvested despite all care taken during collection, the sowing rate should be adjusted upward to obtain satisfactory seedling densities in the nursery beds.

Seed should be given a 24-hour soak in either plain water or a 0.1 percent citric acid solution, followed by a 30 day cold stratification period. In this study, the citric acid soak resulted in a 5 percent higher total germination than the water soak with the 30-day stratification period for both. When there is insufficient time available to stratify seed properly, they should be soaked in water for 72 hours.

founded with room effects in which the experiments were conducted. Differences among pregermination treatments were significant. Of the pregermination treatments tested, treatment 6, a 24-hour soak in 0.1 percent citric acid solution followed by a 30-day cold stratification, was best. This treatment resulted in 92 percent full seed germination (table 1). The poorest combination tested was treatment 1, a 24-hour water soak with no stratification, which resulted in 67 percent full seed germination. Neither of the 11212 soaks significantly increased germination percentage over that of treatment 1.

The citric acid soak treatments (4, 5, & 6) gave significantly better germination percentages than did the comparable water soak treatments (1, 2, & 3). Over all stratification periods, the average difference in germination between the citric acid and water soaks was slightly greater than 4 percent.

Not unexpectedly, length of cold stratification had a greater effect upon germination than did the soaking treatment. The average difference in germination between no stratification and 30 days stratification, over all soaking treatments, was 21 percent.

Germination counts every 2 days showed a similar germination peak for all treatments of approximately 11 days. Results of the test for differences in germination among cone classes are shown in figure 1. Seed from the brown cone class gave a significantly higher germination percentage than seed of either of the other two cone classes. Seed of the gray cone class were not significantly different in germination from seed of the green cone class. In some cases, seed which was originally classed as green turned brown during storage or during the course of the experiment. These were the only green seed which showed any appreciable germination.

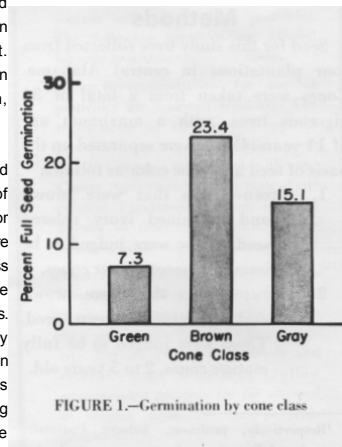


FIGURE 1.—Germination by cone class