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SAND PINE CONES AND SEED

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Sand pine, a rough tree native to deep sandy soils of Florida, has recently gained favor in regeneration of adverse sandhill sites. Unlike slash pine, which has been planted widely in the sandhills, it grows well on unprepared sites. Two races are recognized--the Ocala, native to peninsular Florida, and the Choctawhatchee, found in the western part of the State (3). Cones of the Ocala race are serotinous, while those of the Choctawhatchee race are not.

A study was undertaken in 1962 to obtain information on cone and seed characteristics of both races. Differences were found in cones per bushel, seeds per pound, requirements for seed extraction, and degree of dormancy. These differences are summarized below. Additional details are reported in U.S. Forest Service Research Paper SO-19 (1).

Cones were collected from Choctawhatchee trees in mid-September and from Ocala trees in early November. Fifteen to 20 trees of each race were represented. Cones were kept separate by individual trees, and specific gravity was determined in the field immediately after cones were picked. Choctawhatchee cones opened readily at a kiln temperature of 105°F. even though specific gravities ranged from 0.85 to 1.11. There was no relationship between specific gravity and seed viability.

Serotinous cones of the Ocala race may be collected at any time after they have turned brown, as maturity is then assured. Extraction methods tested on Ocala cones were: (a) kilning at 130°F. to 140°F., (b) applying a flame directly to the cones, (c) soaking in a 1:2 ethyl alcohol-benzene solution, and (d) immersing in boiling water. The most efficient of these methods is the last. Scales separate in 5 to 15 seconds after immersion, and if cones are removed from the water promptly there is no impairment of seed viability. After the seal on the scales is broken, cones open completely in 24 hours when dried in a kiln at 100° to 110°F.

The Ocala race has the larger cones and seeds. Choctawhatchee cones averaged 1,010 per bushel with a range of 630 to 1,310, while Ocala cones averaged 830 and varied from 450 to 1,100. After most of the empties were removed, seeds per pound averaged 56,100 for the Choctawhatchee race and 47,200 for the Ocala. The Woody-Plant Seed Manual (4) reports 75,000 seeds per pound, but does not distinguish between races. Moreover, this last value was probably derived from samples with high proportions of empty seed.

Choctawhatchee cones yielded 0.62 pound of seed per bushel after wings and trash had been removed. New cones from the Ocala race gave 0.58 pound, while those maturing a year earlier yielded 0.77. Such year-to-year variations in production are common in pines (5).

Liquids of varying specific gravities were tried for separating full and empty seeds in small lots. Flotation in 95-percent ethyl alcohol gave excellent results for both races, and soaking for as long as 5 minutes did no harm.

Because Ocala trees typically bear an accumulation of cones of many ages, seed viability was tested for cones of three age classes: current crop, 1 year old, and 2 or more years old. Fifteen trees were represented in these tests. Viability declined with each increase in cone age. Seed from new cones averaged 93-percent germination as contrasted to 83 percent for seed 1 year old and 56 percent for that 2 or more years old. Commercial collections of Ocala cones should exclude those older than 1 year, since their exact age cannot be readily determined by coloration or position, and viability is apt to be low.

Seed dormancy and methods of speeding germination were studied with lots from 10

trees of each race; Ocala seed was subdivided again into the three cone ages for each tree. The pregermination treatments evaluated are shown in table 1, along with their effects. Czabator's (2) germination values, which take into account both speed and completeness of germination, were used in making comparisons.

Choctawhatchee seed was mildly dormant. Stratification for 14 days boosted both rate and total germination, but increasing the length to 28 days gave little added response. Dormancy of Ocala seed varied with cone age. Seed from new and 1-year-old cones germinated promptly without presowing treatment, and none of the treatments stimulated germination significantly. Older seed was slightly dormant. While cold stratification speeded germination, it decreased total viability substantially. Thus, stratification is not recommended for seed from the Ocala race.

Sand pine seed is easily stored. When dried to 10-percent moisture, seed of both races was held for 2 years at 25°F. with no loss in viability.

TABLE 1.--Laboratory germination of Choctawhatchee and Ocala races of sand pine seed subjected to various pregermination treatments

Pregermination treatment	Peak germination	Germination value	Final germination [1]
	[Choctawhatchee Race]		
	Day		*Percent*
None	17	15.38	88
14-day stratification	11	26.27	93
28-day stratification	10	27.90	94
24-hour soak in water	13	20.66	92
24-hour soak in H_2O_2	14	18.07	89
	[Ocala Race]		
Seed from new cones			
None	10	32.03	94
14-day stratification	9	34.33	96
28-day stratification	8	35.86	93
Seed from 1-year-old cones			
None	10	24.07	89
14-day stratification	10	26.60	90
28-day stratification	10	25.27	84
Seed from cones 2 or more years old			
None	15	10.92	70
14-day stratification	14	8.22	54
28-day stratification	11	5.70	43

[1] Germination tests conducted with 100 percent sound seed from 10 different trees of each race.

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