

Storage of Water Tupelo Seeds

by F.T. Bonner and H.E. Kennedy, Jr.¹

Southern Forest Experiment Station
USDA Forest Service

Water tupelo seeds can be stored for at least 30 months without significant losses in viability. Moisture contents of 20 percent or lower and polyethylene bags with walls 4 mils thick gave the best results at 38°F. At 14°F. seed moisture must be below 10 percent.

Interest in tree planting on swamplands of the Gulf Coastal Plain has raised questions about seed characteristics of swamp species like water tupelo (*Nyssa aquatica* L.) This note reports satisfactory methods for storing water tupelo seeds for several years. This information is needed because forest tent caterpillars (*Malacosoma disstria* Hubner) occasionally destroy tupelo flowers, making seed crops unpredictable. The Woody-Plant Seed Manual² recommends cold stratification in moist sand for overwinter storage, but gives no methods for retaining viability for 3 to 5 years. Recommendations presented here are based on studies of water tupelo seeds from two geographic sources stored under several combinations of temperature, seed moisture content, and container type.

Methods

Seeds were collected in November and December 1967 from the lower Atchafalaya River basin in Louisiana³

¹Project leader, Forest Tree Seed Laboratory, State College, Miss., and Silviculturist, southern Harwoods Laboratory, Stoneville, Miss.

²USDA Forest Service, Woody Plant Seed Manual, USDA Misc. Publ. 654, 416 p. 1948.

³Collected by J. Willis, formerly of the Louisiana Forestry Commission.

and the Tallahatchie River bottom in Leflore County, Miss. They were stored intact at 38°F. until transfer to the Forest Tree Seed Laboratory at State College in late December.

The seeds were depulped by rubbing briskly across ½-inch hardware cloth. Pulp and other trash were removed by water flotation. Moisture content at this point was 25.4 percent in Louisiana seeds and 26.3 percent in Mississippi seeds. The seeds were soaked in tapwater at 38°F. for 63 hours to insure high initial moisture content, and sublots were selected for high moisture treatments.

To obtain some seeds with lower moisture contents, sublots were spread to dry on paper toweling in the laboratory (70°-72°F., 35-40 percent relative humidity). One group was dried for 8 hours (medium moisture level), and the other group for 24 hours (low moisture level). Moisture contents were determined from weight losses of subsamples dried for 24 hours at 220°F. in a forced-draft oven.

Four storage variables were tested on seeds from each source:

Storage temperature.—46°, 38°, and 14°F.

Initial moisture content.—

Louisiana seed—29, 22, and 9 percent.

Mississippi Seed — 27, 17, and 11 percent.

Storage container — cloth bag and polyethylene bag with 4-mil wall thickness.

Length of storage—6, 18, and 30 months (1, 2, and 3 seasons).

Approximately 60 seeds were placed

in each study container. Treatments were replicated three times. Germination was tested on 50 seeds, and moisture content after storage on 10.

After storage, the samples were stratified moist for 60 days in polyethylene bags at 38°F. Germination was tested on trays of moist Kimpak under an alternating day-night regime of 8 hours light at 86°F. and 16 hours dark at 68°F. Germination was counted three times a week for 30 days. Seeds were considered germinated when their radicles emerged and showed positive geotropic response. Viability retention was judged both by total germination and by speed of germination (peak values⁴).

Results and Discussion

The original condition of both lots was good. Germinative capacities for Louisiana and Mississippi seeds were 97.5 and 88.9 percent, respectively, and peak values were 9.4 and 7.9. Both sources responded similarly to storage treatments.

Storage in cloth bags was satisfactory for 6 months under certain conditions. Overall performance in cloth bags was poor, however, and except for brief periods, storage in these containers cannot be recommended. All further comments will apply only to results in 4-mil polyethylene bags.

As expected, 14°F. was good only at the lowest moisture contents (table 1). Moist seeds did not even survive 6 months at 14°F. At 38°F. storage was very successful for both low and medium

⁴Czabator, F. J. Germination value: an index combining speed and completeness of pine seed germination. For. Sci. 386-396. 1962.

moisture levels. At the high moisture level (27-29 percent) germinative capacity was still a high 91.8 percent for Louisiana seed at 30 months, but it had decreased to 52.4 percent for Mississippi seed (table 1). Peak values were lower at the high moisture level, suggesting deterioration in spite of the 91.8 percent germination for Louisiana seed.

At 46°F. the medium moisture level was best, while the low moisture level gave curiously poor results (table 1). Germination of high moisture samples stored at this temperature was still above 80 percent, but the lower peak values again suggest seed deterioration.

Mold and fungi grew in polyethylene bags stored at 38° and 46°F., principally the latter. This growth did not appear to be correlated with viability retention, but in longer storage, the risk of damage at 46°F. should increase.

Conclusions

Water tupelo seeds, with their large cotyledons, were once assumed to be as

TABLE 1.—Germination response of water tupelo seeds from two sources stored in polyethylene bags for 30 months. Each value is a mean of three replications.

Storage Temp. (F°)	Seed moisture content and source					
	Low		Medium		High	
	La.	Miss.	La.	Miss.	La.	Miss.
	Germinative capacity					
	Percent					
14	90.4	82.0	0	0	0	0
38	87.3	89.2	83.3	87.3	91.8	52.4
46	66.9	21.6	81.5	90.3	80.8	82.9
	Germinative peak value					
14	7.5	7.1	0	0	0	0
38	7.7	6.9	6.9	7.1	6.5	3.8
46	2.7	0.8	7.6	6.7	6.5	6.4

difficult to store as acorns. This study has shown that, to the contrary, water tupelo seeds can be stored quite easily for at least three seasons (30 months). High viability was retained in seeds in polyethylene bags at 38°F. if moisture content was around 20 percent or lower. Results were good at 14°F. if seed moisture content was below 10 percent. While longer periods of storage were

not tested in this study, experience in seed storage research leads us to believe that viability of water tupelo seeds could easily be maintained for at least 5 years.

Even though seeds with medium moisture contents stored well at 46°F., this temperature is not recommended for long periods. These conditions are probably satisfactory for one season of storage, however. **▲▲▲**

Reprinted from TREE PLANTERS' NOTES, volume 24, number 4, pages 7-8. November 1973.