BLACK CHERRY SEEDS STORED 8 YEARS

Drying to low moisture content is necessary before storage in refrigerator or freezer.

Ted J. Grisez
Silviculturist, Forest Service, U.S. Department of Agriculture, Northeastern Forest Experiment Station, Warren, Pa.

In an earlier article in TREE PLANTERS' NOTES, Huntzinger (3) reported successful storage of black cherry seed for 3 years. This was the longest storage period reported for the species. The continuation and completion of the same study, with germination tests after 5 and 8 years of storage, is reported here. Seed stored at low MC (moisture content) in airtight containers in a refrigerator and a freezer germinated 56 and 66 percent respectively after 8 years.

Methods

Seeds used for these tests were collected from several black cherry trees *(Prunus* serotina Ehrh.) in one locality on the Allegheny National Forest in northwestern Pennsylvania. The seeds were cleaned and spread out to surface-dry for 4 to 6 hours. They were then stored at room temperature for 37 days in a polyethylene bag. Earlier tests showed that warm storage of 2 weeks or $3^1/2$ months resulted in good germination rates, whereas seeds placed immediately in cold storage germinated poorly (1). Samples of 100 seeds were then drawn for 15 replicates of each of 12 seed treatments for a total of 180 samples. This provided germination tests of three replicates after each of five storage periods - 1, 2, 3, 5, and 8 years.

The 12 treatments were combinations of three temperature ranges, two MC levels, and two storage containers: 1. Temperatures: 0° to 6° F in a freezer; 33" to 41 ° F in a refrigerator; and 68° to 74° F in a lab drawer.

2. Seed moisture contents (wet weight basis): 4 to 6 percent, attained by drying seeds in an oven about 3 hours at 90° F, and 11 to 13 percent, the MC of the seeds when the 100-seed samples were taken.

3. Containers: small glass jars or 2-mil polyethylene bags, both tightly closed.

Neither the refrigerator nor the freezer was the automatic defrost type with their characteristically dry atmospheres.

A poster failure one weekend during the first year of the study allowed refrigerator and freezer temperatures to reach 70° F. Briefer failures that resulted in less warming occurred another time or two.

Seeds for germination tests were mixed with moist peat, transferred to new plastic bags, and held at 33" to 41° F for 120 days. Germination tests were then made in sand flats in a greenhouse for 57 days in April and May A seed was considered germinated when the plumule emerged above the sand.

Germination data for the eight freezer and refrigerator storage methods were subjected to analysis of variance.

Results

Although germination rates declined steadily after the third year, three of the storage methods still resulted in satisfactory viability after 8 years (table 1). These were: storage at low moisture content in glass in the freezer (66 percent) or in the refrigerator (56 percent) and at high moisture level in polyethylene in the refrigerator (49 percent). Three methods that had been successful for 3 years were not adequate for 8 years: storage at low MC in polyethylene in either the freezer or the refrigerator or at high MC in glass in the refrigerator. No storage method at room temperature nor storage in the freezer at high MC gave satisfactory results even after 1 year.

All treatment factors and all interactions were significant at the 5-percent level after 5 and 8 years of storage, except that temperature alone (freezer vs. refrigerator) was not significant at the 8-year period.

The sudden and complete loss of viability in seed stored in glass at high MC in the refrigerator between the third and fifth years may have been caused by a depletion of the oxygen supply under temperature and moisture conditions favorable for respiration. The glass jars were less than half filled with seed

Table 1. — *Black cherry seed germination, by periods and treatments*

Treatment			Germination after storage of—				
Temp. (°F)	Moisture content	Storage container	1 yr.	2 yrs.	3 yrs.	5 yrs.	8 yrs.
	Percent		Percent	Percent	Percent	Percent	Percent
0—6	4—6	Glass jar	52.3	81.0	80.7	47.0	66.0
		Polyethylene	43.3	91.0	85.0	45.3	23.0
	11—13	Glass jar	4.0	7.3	0.7	4.3	0
		Polyethylene	1.3	5.0	0	.3	0
33—41	4—6	Glass jar	63.0	81.3	90.3	68.7	56.0
		Polyethylene	51.0	90.3	83.3	61.0	9.7
	11—13	Glass jar	72.0	88.3	77.0	0	0
		Polyethylene	67.3	79.3	88.3	77.3	49.0
68—74	4—6	Glass jar	0	0	0	0	0
		Polyethylene	2.7	0	0	0	0
	11—13	Glass jar	0	0	0	0	0
		Polyethylene	0.3	0	0	0	0

samples, and it is not known whether seeds filling large jars would have lost viability more quickly.

Although 49 percent germination resulted from storage for 8 years at high MC in polyethylene bags in a refrigerator, this method is not recommended for large quantities of seed - perhaps more than 1 pound. Only 100 seeds were packaged in each bag in this study, and a large quantity may not give the same results. For example, in an informal test with other black cherry seeds, a sample from a 1/4-pound plastic bag stored 6 years in a refrigerator resulted in 92 percent germination, while only 6 percent of a sample from the center of a 4.5 pound bag germinated. Thus, seeds from the large plastic bag and glass jars lost viability, in contrast to seed from 100-seed polyethylene bags. Although the polyethylene permits some diffusion of gases, the large quantity of seeds relative to surface area of the bag may have depleted the oxygen. Furthermore, there was wide variation among replicates in this treatment. Germination among replicates of the seeds stored in glass at low MC in the refrigerator was consistent.

Figure 1 shows the 8-year germination tests after 3 weeks, by which time more than 50 percent of all germination had occurred. It illustrates the variation in results among treatments and certain replicates.

Recommendations

Although seeds for these tests were stored 37 days at room temperature before treatment, it is probably not necessary to delay cold storage this long. Two to 3 weeks storage at room temperature improves first-year germination (1).

For refrigerator storage of black cherry up to 3 years, the type of container (excluding open-mesh bags) and seed MC are not critical, as long as the seeds are dried to about 13 percent MC (wet weight basis) or less. Surface-dried seeds have about 17 to 23 percent MC (2). If there is condensation of moisture on the inside of the container as a result of insufficient drying, seeds can germinate in storage. For freezer storage, seeds must be dried to about 5 percent MC.

For periods longer than 3 years, storage at low MC in tightly closed containers such as carboys or metal drums with polyethylene liners in either a freezer or a refrigerator is recommended.

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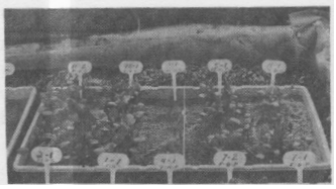

Figure 1 - *Germination* tests *of* black *cherry* seed stored 8 years. *Germination* was more than *50* percent *complete* at *this time.*

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