

TECHNICAL NOTES

Optimum Temperatures for Germination of Winterfat¹

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Highlight

Seeds of winterfat (*Eurotia lanata*) collected four consecutive years at a site in central New Mexico were tested at temperatures from 33 to 110 F. Optimum temperatures for germination were 50 to 80 F. Germination was practically complete within 5 days at 59 F or higher.

Previous literature has indicated that the temperature requirements for germination of winterfat (*Eurotia lanata* (Pursh) Moq.) have been only partly resolved (Hilton, 1941; Springfield, 1968a; U. S. Forest Service, 1948; Workman and West, 1967). To learn more about the effects of temperature on the germination of winterfat, a series of tests were conducted at temperatures from 33 to 110 F.

Seeds were collected in the fall each year from 1966 through 1969 from a group of plants at an experimental site 15 miles west of Corona, New Mexico. Elevation of the site is 6,300 feet, annual precipitation 15 inches, and the soil is a sandy loam that grades into a clay loam at depths of 8 to 12 inches. All seeds were stored in paper bags at 38 to 42 F from the date of collection until germination was tested (within one year) to minimize losses in viability (Springfield, 1968b, 1968c).

Size of the seeds, as well as other undetermined morphological and phys-

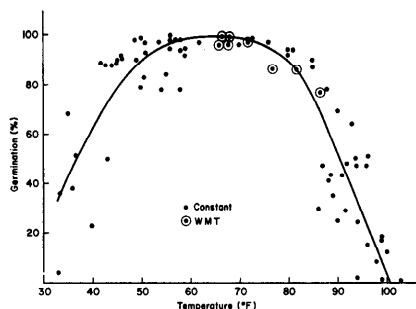


FIG. 1. Germination of winterfat seeds at constant and alternating temperatures in 10-day period. (WMT = weighted mean of alternating temperatures.)

iological characteristics, varied from year to year:

Date collected	Number of seeds per pound
11/16/66	206,400
11/ 1/67	170,700
11/ 1/68	189,300
10/29/69	149,800

Germination procedures were standardized. Four replicates of 50 seeds each were put in petri dishes filled with 100 ml of vermiculite and 60 ml of distilled water. Two layers of germination blotter were put on the vermiculite. Seeds were dusted with a thiram³ fungicide and placed on top of the blotters, which remained moist throughout the test. A total of 76 germination tests were conducted during the four years. All tests were made under controlled temperatures, either in a modified refrigerator or in a germinator programmed for specific temperature conditions. A seed was classed as germinated when the cotyledons and radicle together measured one-half inch long and were completely detached from the seed coat.

Optimum temperatures for germination were from 50 to 80 F (Fig. 1). The

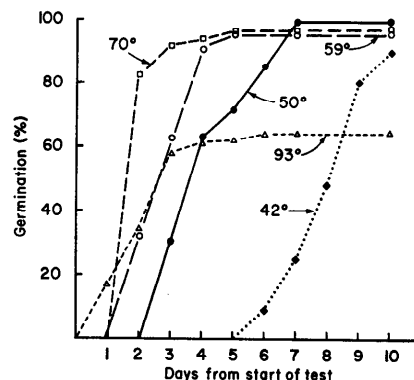


FIG. 2. Speed of germination of 1969 winterfat seeds at different temperatures.

most conspicuous feature of the curve in Figure 1 is the flat top—germination exceeded 90% over a relatively wide range in temperature.

In Figure 1, alternating temperatures (tabulated below) are expressed as weighted means (WMT); for example: $(80 \times 8 \text{ hr} + 60 \times 16 \text{ hr}) \div 24 = 66.7$.

Weighted mean	Corresponding alternating temperatures
66	76(12) + 56(12)
67	80(8) + 60(16)
68	76(12) + 60(12)
72	85(8) + 65(16)
77	90(8) + 70(16)
82	95(8) + 75(16)
87	100(8) + 80(16)

Germination appeared to depend on the high temperature in the alternation. For example, when the WMT exceeded 75 F—that is, when the high temperature exceeded 90 F for 8 hours—germination seemed to be depressed. On the other hand, germination was very good at WMT's of 66 to 72 F.

The relationship between germination and temperature was essentially the same for each of the four collections. The 1969 seeds germinated better than the others, despite the fact that each year temperature responses were tested eight to ten months after collection, the period when seeds theoretically were near peak viability. Compared with the other three collections, the 1966 seeds appeared to lack vigor;

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³This article reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

they germinated poorly, especially at the higher temperatures. Size of seed could have been a factor, since the 1966 seeds were appreciably smaller than the 1969 seeds.

Germination began the second or third day at most temperatures (Fig. 2), and was practically complete within 5 days at temperatures of 59 F or higher. Germination was delayed at the lower temperatures. At 35 F, germination of the 1968 seeds was not complete until the 20th day.

Winterfat seedlings appeared especially vigorous at temperatures from 40 to 70 F. By contrast, seedlings

seemed to lack vigor at temperatures of 90 F or higher. These results, together with additional observational evidence, indicate winterfat responds best to temperatures of less than 80 F.

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