

Frost Tolerances of Cranberry Fruit

UMass Cranberry Station

In the late summer and into the fall, cranberry frost tolerance is estimated based on the developmental stage of the plants and the color of the fruit. These estimates are based on observations and controlled temperature experimentation. The photos in this fact sheet show the stages and fruit color associated with various degrees of cold tolerance. Observations should be made by looking into the vine canopy; do not separate the vines or remove the fruit or uprights.

Summer – 30°F tolerance



Flowers, pinheads, and small berries, Howes shown.



Pinheads and sizing green fruit, Stevens shown.

White to light blush fruit – 28°F tolerance

Note: fruit may have a yellowish appearance



Early Black



Howes



Ben Lear



Stevens

Deep blush on exposed fruit surface – 27°F tolerance



Early Black



Howes



Ben Lear
Note: approaching 26°F
tolerance



Stevens

Deep blush over entire fruit – 26°F tolerance



Early Black



Howes



Ben Lear



Stevens

Red – 25°F tolerance



Early Black



Howes



Ben Lear



Stevens

Cold hardiness of cranberry fruit. Newly formed green fruit are sensitive to temperatures below 30°F. Late in the summer, the fruit turn white and then develop a faint blush on the exposed surfaces. This transition is associated with increased hardiness; the fruit will now tolerate 28°F. As the fruit continue to color, hardiness increases and the fruit can tolerate increasingly lower temperatures (see the table below). For all varieties studied, tolerance is the same for each color through the red stage (25°F tolerance). However, as the fruit reach deep red and maroon stages, their tolerances differ by variety and maturity.

For each of the varieties, maximum cold hardiness (tolerance) was associated with full mature color (maroon in the table below) but as noted, the actual tolerance temperature differed. At full maturity, 95% survival after short (1-2 hr) exposures to temperature as low as 18°F has been observed in Early Black, Howes, and Stevens, BUT not consistently from year to year. Ben Lear never survived temperatures below 24°F. In some years, over-ripe fruit (2 weeks after maximum color) showed **loss** of tolerance, with all varieties damaged by 22°F or lower. The tolerances listed in the table below and in the photo captions reflect a conservative representation of the available research data.

The fruit tolerance table is based on **color** development, which is used as a visual guide to ripening, a chemical and physiological process. It is not the color that confers increased tolerance to freezing, but rather the internal chemical and physiological changes in the berries that accompany the increase in color. As noted on page 1, color should be assessed in the field by looking down at the vines, since the lowest fruit buried in the canopy often remain white late into the season. Those berries are likely somewhat protected by the vine canopy and the internal chemical/physiological changes that occur even in the absence of color development.

Frost Tolerances of Cranberry Fruit				
Maturity level*	Early Black	Howes	Stevens	Ben Lear and new hybrids
Green	30°F	30°F	30°F	30°F
White to light blush	28°F	28°F	28°F	28°F
Deep blush exposed surface	27°F	27°F	27°F	27°F
Deep blush	26°F	26°F	26°F	26°F
Red	25°F	25°F	25°F	25°F
Dark red	24°F	24°F		
Deep red	23°F	23°F	23°F	24°F
Maroon (1-2 wk. later)	23°F	23-20°F	22°F	24°F
Late season (end Oct.)	23°F	23°F**	23°F**	24°F

*Note that each variety will reach a given stage on a **different** date. Generally, Early Black, Ben Lear, and many of the newest hybrids will color early and Howes, Stevens, and some new hybrids will color later.

**loss of tolerance when over-ripe

Dark Red – 24°F tolerance

Early Black and Howes only



Early Black



Howes

Deep Red – Tolerance varies by variety



Early Black 23°F



Howes 23°F



Ben Lear 24°F



Stevens 23°F

Maroon – Tolerance varies by variety

1-2 weeks after Deep Red



Early Black 23°F



Howes 23°F.

To as low as 20°F in some years; return to 23°F two weeks later



Ben Lear 24°F

(never lower)



Stevens 22°F

return to 23°F in 1-2 weeks.

May 2019. UMass Amherst Cranberry Station.
E. Wareham, MA 02538 <http://ag.umass.edu/cranberry>

Author/Photography: Carolyn DeMoranville
Additional photography: Krystal DeMoranville

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, the Massachusetts Agricultural Experiment Station and the UMass Cranberry Station under Project No. MAS00999. Additional funding provided by the Cape Cod Cranberry Growers Association. The University of Massachusetts is an Affirmative Action/Equal Opportunity Institution.