

## What can fruit growers do if a freeze is coming?

You cannot fight Mother Nature, but when frost or freeze conditions occur in fruit orchards, vineyards and fields, growers can work to minimize the potential damage.

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Categories: fruit, apples, blueberries, cherries, peaches, grapes

### Spring Freezes:

Spring freezes are feared by all fruit growers. The risk of losing all or part of your crop focuses their attention every spring. As plants start to grow in the spring, they become susceptible to warmer and warmer temperatures. As the buds swell, they can be damaged by temperatures above 20F. See: [Freeze damage depends on the susceptibility of the bud or flower](#). At bloom temperatures below 29F damage open flowers and most flowers die before the temperatures drop to 25. Reference tables of the critical temperatures that damage different fruit are posted as a PDF file at [Critical Minimum Temperature Chart](#). This chart allows you to quickly see if the projected lows are in the range that will hurt your crop.

The type of freeze matters, Windy conditions called Advective or wind freezes are almost impossible to protect from. Freezes under relatively calm conditions offer more opportunities for growers to work with. See: [What are radiation freezes?](#)

Growers need to think of ways they can minimize or replace the heat lost during the freeze.

### Mitigating Activities (potential temperature gain):

- Frost fans mix warm air into the orchard when inversions are present. (perhaps 2 to 5°F). Check the MSU Enviroweather Tower sites for inversion information – [Sparta Tower](#), [Williamsburg Tower](#)
- Under-tree micro-sprinklers will provide heat from groundwater into the orchard. Start the system a couple of hours before temps get too cold to prevent freezing up the system. (perhaps 2 to 4°F). Unlike overhead sprinklers it is not critical that the ice stay wet because the ice forms on the ground not on the flowers.
- Over-head sprinklers protect plants by using the heat given up by water when it turns from a liquid to a solid to warm the plants. Grower continuously add water which turns to ice. It is critical to keep the ice wet, and it will stay at 32 degrees F. See: [Using sprinklers to protect plants from spring freezes](#) This requires large amounts of water and the weight of the ice often breaks branches.
- Herbicide strips under tree rows help. Bare soils will absorb heat and provide radiation heat to trees overnight. (perhaps 1 to 2°F). Do NOT work soils prior to a freeze event – this situation loses heat faster than undisturbed soil.
- Mow grass drives and in-rows very close to the ground. Short grass will allow exposed soil to absorb heat all day from sunny conditions to release all night to the trees. (perhaps 1 to 2°F)
- Wet soils absorb more daytime heat because the water can load a lot of heat and radiates heat back out at night. Irrigate to wet dry soils as much as possible before the frost event. Start trickle early enough to thoroughly wet orchard before the frost. Run irrigation (trickle) the all night of the freeze. Trickle will probably freeze up during the frost event. (perhaps 1 to 2°F)
- Check your irrigation system. Crack the valves on manifolds to avoid freeze damage to irrigation systems.
- Nutrient sprays could strengthen fruitlets to resist freezing temps. (perhaps 0.5 to 1°F)
- Frost protection spray products might be useful, but results are not consistent.

- If you use sprays do it several days before the freeze and not the day before as sprays before a freeze can increase freeze injury.
- Burning wood and hay will provide heat to the orchard for only small areas (a few feet) near the fire. Place small piles of firewood down the center of every row and light every other pile at 3 AM and then at 5 AM start the other piles. Each will burn to roughly 2 hours. (perhaps 1 to 4°F). Try to keep smoke to a minimum. The heat will radiate skyward right through the smoke and the smoke will slow heating after the sun comes up.

### **Characteristics of Plants that Minimize Damage:**

If cold events do occur, take your time to assess potential damage. If the weather stays cool, damage might not be expressed right away. Don't jump to conclusions about crop loss until you are sure of it - no sense in upsetting markets or labor needs until you know the whole story. Some plant characteristics to consider when evaluating damage include:

- Flowers pointing downward will not radiate their heat as much as flowers pointing up toward the sky. These tend to survive cold frost events.
- Abundant bloom. Having numerous flowers helps with the survival of some bloom in the light to moderate frost event.
- Flowers at a wide stage of development (Pink to Petal Fall) will have different critical minimum temperatures and many may survive the freeze.
- Abundant foliage. Leaves will provide protection to flowers hiding under the leaf. It will reduce radiation of heat.
- Plants on the end of rows might have more damage than the interior of the orchard or field, especially if there was wind.

### **Growth Regulators:**

- Promalin will set frost damaged apple fruits. It is the GA4+7 that does the work to set parthenocarpic (no seeds) fruits. This may work if the ovules are dead. If the pistils are dead, it will not help. The best timing in apples is tight cluster to petal fall or within 24 hours before or after a freeze event.
- Consider use of ReTain on apples and sweet cherries to extend the life of blossoms in cool conditions to maximize potential pollination and fertilization if necessary. ReTain timings are best as follows: Apple – at pink; Sweet Cherry – popcorn stage; Peaches – before bloom opens.

### **Related Articles:**

[Freeze damage depends on tree fruit stage of development](#)

[Critical Spring Temperatures for Tree Fruit Bud Stages](#)

[2013 bloom dates for southwest Michigan tree fruit crops](#)

[Probability of a hard freeze on or before a date in spring for southwest Michigan sites](#)

[What are radiation freezes?](#)

[Using Enviro-weather's regional overnight temperature report during cold events](#)

[Moist, weed-free soil retains more heat](#)

The MSU Fruit Team posted a lot of information after the spring of 2012, You can find them here: [2012 Fruit Freeze Resources](#)