COLD ACCLIMATION IN STRAWBERRIES

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The process of developing tolerance to cold temperatures is called acclimation. Cold acclimation in strawberries begins when days get shorter in late summer. Short days alone will trigger strawberries to develop tolerance to -2° or -3°C. For further acclimation, plants must be subjected to cold temperatures, i.e. days of about 10°C and nights around 0°C. Photosynthesis is also required for cold acclimation to occur, so plants which are mulched before these conditions have been met will not be as winter-hardy.

Even when fully acclimated, or hardened-off for winter, strawberry plants are not as tolerant of cold temperatures as other perennial fruit crops. Cold injury to crowns appears as browning of crown tissue. Crowns will be killed at temperatures of -12°C to -14°C in the crown, but even tissue temperatures of -6°C to -9°C can lead to fewer leaves, leaf distortion, and fewer flowers and fruit. The extent of cold-temperature injury in strawberries is determined by many factors. These include the extent of cold acclimation, the cultivar, the part of the plant affected, the rate and duration of freezing, and cultural practices. Rapid freezes, when tissue temperatures drop 2 to 3 degrees per hour, are fatal. Although the duration of freeze also affects how much injury occurs, most injury occurs in the first 24 hours of damaging temperatures. Freeze / thaw freeze cycles will also cause more injury than consistently cold temperatures, if the thaw lasted more than 2 to 3 days.

Nutrient and water status of strawberry plants also affects cold acclimation. Excess or deficient nitrogen will inhibit acclimation. Optimum levels of phosphorous promote acclimation. Plants acclimated under dry conditions fare better than plants that are not slightly water-stressed.

Mulching is important to prevent cold-temperature injury. Snow is the best insulator against the cold, but snow is not consistently present throughout the winter in much of Ontario. Straw mulch, applied from mid-November to mid-December, provides good winter protection. Straw mulch also moderates soil temperatures and prevents freeze-thaw cycles that can damage plant roots and lift crowns out of the soil. Wheat straw or oat straw is good mulching material, applied at 2.5 to 3.5 tons per acre. This mulch should be applied after two or three good hard frosts, but before temperatures reach -7°C to -9°C for extended periods. Most growers apply mulch between mid-November and mid-December. The settled straw mulch should be about 2 to 3" thick. A light rain or snow after the straw is applied will help settle the straw so it doesn't blow away.

Be sure the straw is clean, or free from weed seeds. However, do not use straw that was treated with glyphosate before harvest. We have observed glyphosate injury in the spring on several occasions, where the straw mulch was treated with glyphosate before harvest.

More straw is needed when raised beds are used. Raised beds can be 4 to 6°C colder than flat beds, but mulching overcomes most of this negative effect. Growers who grow strawberries on raised beds covered in black plastic often use a heavyweight floating row cover, such as Typar 518, instead of straw. It is reported that the combination of black plastic lined beds, with a floating row cover, provides adequate winter protection, even in colder regions of the northeastern USA.

It's a beautiful fall. With cool sunny days, cool nights, and some hard frosts, strawberry plants will be going through the process of acquiring winter hardiness. If cool weather continues, you can say good night to your strawberry plants and tuck them in with a nice warm blanket in mid-November to mid-December. If October and November are unseasonably warm, beware of applying mulch too early.

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