Vermont Vegetable and Berry News – May 18, 2009

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FROST PROTECTION IN STRAWBERRIES
Adapted from Marvin Pritts, Cornell University

Strawberry growers occasionally delay the removal of straw mulch in spring to delay bloom and avoid frost. Research has demonstrated, however, that this practice also results in reduced yields. Also, applying straw between the rows just prior to bloom will insulate the soil from the air. This will increase the incidence of frost injury as solar radiation will not be absorbed by the soil and reradiated at night. If additional straw is to be applied between the rows in spring, delay its application for as long as possible before fruit set.

Overhead irrigation is frequently used for frost control because flowers must be kept wet during a freeze in order to provide protection. As long as liquid water is present on the flower, the temperature of the ice will remain at 32F because the transition from liquid to ice releases heat. Strawberry flowers are not injured until their temperature falls below 28F. This 4 degree margin allows the strawberry grower to completely cover a field with ice and yet receive no injury from frost. However, if insufficient water is applied to a field during a freeze event, more injury can occur than if no water was applied.

At a minimum, apply water at 0.1 - 0.15 inch per hour with a fast rotating head (1cycle/min). Water must be applied continuously to be effective. A water source of 45 to 60 gal/min-acre is required to provide this amount of water. Under windy conditions, heat is lost from the water at a faster rate, so more water is required to provide frost protection. The colder the air temperature and/or the greater the wind speed, the larger the amount of water that must be applied in order to protect the crop from frost injury. (See the table at www.fruit.cornell.edu/Berries/strawpdf/strfrostprotect.pdf).

Strawberry flowers are most sensitive to frost injury immediately before and during opening. At this stage, temperatures lower than 28F likely will injure them. However, when strawberry flowers are in tight clusters as they are when emerging from the crown, they will tolerate temperatures as low as 22F. Likewise, once the fruit begins to develop, temperatures lower than 26F may be tolerated for short periods. The length of time that plants are exposed to cold temperatures prior to frost also influences injury. Plants exposed to a period of cold temperatures before a frost are more tolerant than those exposed to warm weather prior to a frost. A freeze event following a period of warm weather is most detrimental.

Row covers do not provide you with additional degrees of protection, but they do buy time on a cold night as flower temperatures will fall less rapidly inside a cover. Often the temperatures fall so slowly under a row cover that irrigation is not needed. If irrigation is required, less water is needed to provide the same degree of frost protection under a row cover. Water can be applied directly over the row covers to protect the flowers inside.

BLUEBERRY SUSCEPTIBILITY TO FROST DAMAGE
(adapted from North Carolina State Univ.)

In the spring, temperatures must drop below 28 degrees F for economic losses to occur on highbush blueberry. The temperature at which freeze injury begins to occur depends on the stage of development from dormant flower buds through young fruit. During the winter, dormant flower buds of highbush blueberries will survive temperatures as low as -20 to -30 degrees F, but as flowerbud swell progresses, cold tolerance decreases. By the time individual flowers begin to protrude from the bud, temperatures below 20 degrees F will begin damaging the most exposed flowers. When corollas have reached half of their full length, temperatures below 25 to 26 degrees F will kill the complete flowers. When the blossoms are open, a temperature of 27 degrees F for more than a few minutes causes damage. Immediately after corolla drop and before the berry begins to swell is the most sensitive stage. A few minutes below 28 degrees F will result in damage. As the berry begins to enlarge, susceptibility is similar to the critical temperature of 28 degrees for open blossoms.

SEEDCORN MAGGOT AND WIREWORMS
(Ruth Hazzard, in UMass Vegetable Notes)

Seed corn maggot attacks seeds, especially larger seeds like corn, beans and peas, as well as seedlings of a wide variety of plants. The fly is nearly identical to cabbage and onion maggot flies, but it seems to become active somewhat earlier. Eggs are laid on soil surface near sprouting or decaying seeds, organic plant residue, or organic soil amendments such as manure or seed meals. Decay from soil pathogens or previous insect feeding makes seeds or seedlings more attractive to seedcorn maggot. Moist, freshly turned soil is preferred over dry or saturated soil. Eggs hatch in 2 to 9 days depending on temperature, and maggots burrow down to find food. The maggot is yellow-white, legless, with a pointed head and is about a quarter inch long when fully grown. Damage may be to the seed itself or to roots, stems or cotyledons.

The wireworm is slender, jointed, usually hard-shelled, with three pairs of legs, and tan brown in color. This is the immature stage of the click beetle, which deposit eggs on soil during May and June. Grasses, sod and sorghum-Sudangrass are favorite egg-laying sites. Eggs hatch to become wireworms that feed below-ground on seeds, roots, tubers and other plant tissue. Wireworms feed for several years before pupating and emerging as adults. Thus, a wireworm problem in the spring probably means there was an attractive grass crop present sometime in the past 3 to 5 years. Wireworms also prefer wet soils and moderate temperatures; they migrate up to reach warmer soils, but down to avoid excessive cold, heat, or drought.

Unfortunately, practices that enhance organic matter in the soil may actually worsen seedcorn maggot and wireworm problems. For example, one field where both seedcorn maggot and wireworm caused significant damage to early peas had been rotated through two years of rye cover crop to build organic matter. Another instance occurred after a thick winter cover of vetch and rye. Conditions that cause slow seed emergence (cold, wet soils) favor seedcorn damage, while those that favor faster crop growth (warmer soils, moderate moisture) help the crop get established before damage occurs.

Where possible, delay planting for several weeks after a cover crop is incorporated to help reduce seedcorn maggot problems. Often growers use floating row cover over early crops in order to exclude insect pests, only to find that these seedling pests cause trouble right underneath the cover. Both pests overwinter in soil, especially where there is a lush cover crop, and they will seek out food and egg-laying sites as soon as they become active in spring. That includes your prized transplants!

If you discover after planting that a field is infested with seedcorn maggot or wireworm, not much can be done to cure the problem except to wait and replant. Timing for replanting should be made based on assessing the size of the maggots infesting the field. If the maggots not full grown (smaller than ¼ inch long), wait 10 days to replant; if they are full grown, replant after 5 days. If wireworms are found, wait to replant until soil temperatures are above 70 degrees F, which forces them deeper into the soil.
Soil insecticide application for control of seedcorn maggot and wireworm is most effective when made prior to planting or laying plastic; however registered products are limited; see 2008-09 New England Vegetable Management Guide (www.nevegetable.org/). Insecticide seed treatments, applied commercially to the seed, also target these pests and reduce damage. Using transplants avoids these pests EXCEPT where plants are set under row cover or in areas that are already heavily infested.

SUBSCRIBE TO UMASS VEGETABLE NOTES

University of Massachusetts Extension produces an excellent vegetable newsletter full of timely crop and pest information during the growing season (like the article above). There is much more detail, including color photos, and advice on specific materials for pest management, than you'll find in this Vermont newsletter. Veg Notes are available free of charge by e-mail, sent weekly as a pdf file. Sign up at: https://list.umass.edu/mailman/listinfo/vegnotes. Veg Notes are also available in hard copy, mailed to you, for $40/year, payable to UMass. Send check with your name and address to: Marilyn Kuzmeskus, Ag. Engineering Building, UMass, Amherst MA, 01003.

MANAGE GREENHOUSE HUMIDITY WITH VENTILATION AND HEATING

(adapted from UMass Extension Floriculture www.umass.edu/umext/floriculture/)

Managing excess humidity in the greenhouse helps prevent foliar diseases. A combination of ventilation and heating is one tool for doing that. Ventilation exchanges moist greenhouse air with drier air from outdoors. Heating is necessary to bring outdoor air up to optimum growing temperature, and also increases the capacity of the air to carry moisture, thus avoiding condensation. Neither practice alone is as efficient as both combined. Ventilation without heating would chill the greenhouse and the crop, and heating without venting the moist air would raise the temperature beyond optimum levels and result in excessive heating costs.

The method and time it takes for heating and venting will vary according to the heating and ventilation system in the greenhouse. To vent the humid air in greenhouses with vents, the heat should be turned on and the vents crack open an inch or so. When doing this the warmed air will hold more moisture (RH), escape from the greenhouse through the vents and be replaced with outside air of lower RH. This natural rising of the air will result in a greenhouse of lower relative humidity.

In houses with fans, the fans should be activated and operated for a few minutes and than the heater turned on to bring the air temperature up. The fans should then be shut off. A clock could be set to activate the fans. A relay may be needed to lock out the furnace or boiler until the fans shut off so that both the fans and heating system do not operate at the same time and flue gases are not drawn into the greenhouse.

The venting and heating cycle should be done two or three times per hour during the evening after the sun goes down and early in the morning at sunrise. The time it takes to exchange one volume of air depends on several factors including whether or not fans are used and, the size of the fans and vents. For some greenhouses it may take as little as 2-3 minutes air exchange. For greenhouses using natural ventilation, it may take 30 minutes or longer. Heating and venting can be effective even if it is cool and raining outside. Air at 50°F and 100% RH (raining) contains only half as much moisture as the greenhouse air at 70°F and 95% RH.