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# WELCOME

Welcome to the Vegetable IPM Newsletter for 2001. This newsletter will reach you weekly from now until September, and will provide updates on crops, crop conditions, insects, weeds, diseases, soils, nutrients, new products, and new ideas for management. This is IPM information in capsule form -- based on what we observe on farms throughout the state. We draw upon the UMass Vegetable Team and many other sources, including weekly vegetable publications from around the country and resources within Massachusetts -- other agencies, private consultants and growers. We hope this newsletter will be useful to you this season. We always welcome your comments and input.

To subscribe to this newsletter via mail, call Marilyn Kuzmeskus at 413-577- 0712. To join our email distribution list, email your request to rhazzard@umext.umass.edu. The newsletter will also be posted on the UMass Vegetable Program website. Our current address is (http://www.umass.edu/umext/programs/agro/vegsmfr/). Coming soon -- new web address and updated website!

# CROP CONDITIONS

No one needs to announce that its dry. Temperature extremes of heat 10-15 degrees above normal last week, followed by a serious freeze, has caused losses of corn, tomatoes, and asparagus spears. Row cover did not save frost-sensitive crops. It was strange last week to see fields being irrigated, right next to the flooded waters of the Connecticut River, full of snow runoff from Vermont and New Hampshire. The four-week precipitation is 2 to three inches below normal, cumulative temperatures about 100 Growing Degree Days (GDD) above normal, and both topsoil and subsoil moisture are declining with every passing bright sunny day. In dry soils, seeds will remain dormant and seed treatments will remain unaffected; however, once plants germinate, they are vulnerable to drought stress. Wherever possible, growers are irrigating before or after putting out transplants and direct seeded crops.

# DRY SOILS AND WEED MANAGEMENT

Rainfall has been sparse and soils are quite dry. Herbicide performance under these conditions is often less than satisfactory. Following are some options for improving herbicide performance. If the herbicide you are using can be incorporated, this may be desirable. Incorporating a herbicide puts it in the zone where it is most effective and the need for rain or irrigation for activation is eliminated. For herbicides which cannot be incorporated, rainfall or irrigation is required within a few days to achieve activation. Be aware, that surface-applied herbicides will not work unless they are activated. If the soil is VERY dry, I suggest that the soil be irrigated prior to AND after the herbicide application. In other words, it helps if the soil is moist prior to herbicide application and activation. Lastly, sweet corn growers using atrazine plus Dual or atrazine plus Lasso can apply these herbicides at

anytime from planting until the corn is 5" tall. If these herbicides are not incorporated and if irrigation is not available, it may be beneficial to wait until rainfall is anticipated before the application is made. Just be careful not to wait too long. Some emerged broadleaf weeds will be controlled but emerged grasses are difficult to control. Always check the herbicide label for advice on herbicide application and activation

*--Rich Bonanno, UMass Extension*

## PLANT DAMAGE FROM GREENHOUSE FURNACE GASES

If greenhouse furnaces are not properly tuned or are not adequately vented, they can release ethylene gas into the greenhouse. This can happen with gas or oil heating equipment. Many plants are very sensitive to this gas. Symptoms can include necrotic areas, which can easily be mistaken for herbicide injury or root problems. Growth may also appear distorted, including "epinasty", or curling under of leaves or petioles. On some flowering crops such as tomatoes, the blossom stem can turn yellow and the flower doesn't open and is easily dislodged from the plant.

We recently visited a greenhouse with ethylene problems. The grower said the gas furnace had been shutting off on cold nights. Apparently a safety device was sensing fumes and shut the unit down. The service technician removed the safety device, saying that it was not necessary because no one was sleeping there. He apparently was not aware of plant sensitivity to ethylene fumes. Every year there are serious losses due to ethylene from faulty furnaces. To avoid this, have your units serviced before each season by a qualified technician who understands the needs of greenhouse operators. Be sure the stove pipes and any chimney connections are tight and that there is a proper draft to carry exhaust gasses out of the house.

Tomatoes are particularly sensitive to ethylene damage. If necessary, they can be used as a bioassay for ethelyne gas. If you see symptoms on other plants that you suspect may be from ethelyne, put a flat of tomatoes in the house at several locations and, after a night when the furnace was on, look for symptoms.

*--John Howell and Ruth Hazzard, UMass Extension*

## PLANT GROWING MIXES

Many growers use a soil-less growing mix containing slow release fertilizer. The like the convenience of not having to add fertilizer. Recently, several growers purchased such a material they had been using for a few years and were happy with the results. This year, they noticed that the material looked different from bag to bag and sent samples to the UMass Soil Testing Lab. The results showed variability in nutrient levels and excessive levels of ammonium nitrogen which would be toxic to seedlings. It appears that the product was not mixed consistently, but there is another potential problem. Products with slow release fertilizers should be used soon after mixing because the nutrients can build up over time as they are released. To avoid such problems, some growers prefer to use mixes containing little or no nutrients and adding a known amount as they water. This is almost as convenient as using mixes with slow release fertilizer and allows you to control nutrient levels.

*--John Howell, UMass Extension*

## TOMATO: TEMPERATURE CONDITIONS FOR CATFACING

Catfacing is brought about by exposure of the tomato plant to cool temperatures at the time the embryonic flowers are just beginning to form. The most effective temperatures are 60–65°F during the day and 50°F at night for at least one week's duration. Colder night temperatures such as 40–45°F are less effective in causing this disorder. Plants are susceptible to the disorder about four weeks after sowing for the first cluster of an early variety, and susceptibility continues for about one month, during which the later clusters reach the same susceptible stage. Thus a tomato plant that has been grown for five weeks in a 70/60°F greenhouse should show no catfacing on its first two clusters, because these were formed under

warmer temperatures. If those plants are transplanted into cool weather outdoors, however, later clusters could be catfaced.

*--H. C. Wien, Cornell University*

## CRUCIFERS: CABBAGE ROOT MAGGOT AND FLEA BEETLE

**Flea beetles** are active. In visiting several early brassica fields in the Connecticut Valley this week, it was evident that crop rotation gives a significant benefit. Putting spring crucifers close to last fall's later-season crucifers provides a ready food source for overwintered beetles. Populations were much lower in rotated fields.

The all-black crucifer flea beetle, *Phyllotreta cruciferae*, and the striped flea beetle, *Phyllotreta striolata*, which is black with two light tan stripes on its back, are the primary flea beetles that attack brassicas in the Northeast. The adult beetles overwinter primarily in field edges, in leaf litter or in soil and move out of these sites after temperatures exceed 55 $^{o}$F in the spring. Beetles rapidly colonize new plantings of brassicas and feed on cotyledons and leaves, causing shot-hole damage which can delay growth, reduce yield, or kill whole plants. Eggs are laid in the soil and larvae develop underground, feeding on roots. Beetles are long-lived, and may be present until the summer generation of beetles has completed its development in the soil and emerges as new adults.

Flea beetles show differences in preference among the brassica species, tending to prefer the other species of Brassica (*B. juncea, B. rapa, B. napus*) to *Brassica oleracea*. Generally, the standard European vegetable crops (cabbage, broccoli, cauliflower, Brussels sprouts, collards, kale, kohlrabi) belong to B. oleracea, while the leafy greens and Asian crops belong to other species of Brassica. The Brassica oleracae can generally tolerate and outgrow more feeding damage than Chinese cabbage, bok choi, mustards, mizuna, or other leafy greens.

However, feeding can kill seedlings, delay growth or reduce yield on any brassicas. Scout crops to assess beetle numbers, damage and plant stress. Beetles can be counted if leaves are not disturbed. Threshold studies conducted by M. A. Al-Doghairi at Colorado State tested thresholds of 0.2, 5, and 10 beetles per plant in broccoli and cabbage, where sprays were applied when the average number of flea beetles per plant reached the desired threshold. This study concluded that a threshold of 2 to 5 beetles per plant would provide control without yield loss. When controls were applied at 10 beetles per plant or no controls were applied, significant yield reductions and reduced head diameter occurred.

Pyrethroids and carbamates are generally effective; see the *New England Vegetable Management Guide* for foliar insecticides that can be used against this pest in brassicas. For non-chemical control, floating row covers provide a barrier that prevents beetles from reaching the crop. Covers must be put in place at seeding and sealed around the edges with soil. For weeding or harvesting, remove and replace the cover as quickly as possible Pyrethrin products, where available, are an effective option for organic growers.

Watch for **cabbage root maggot eggs**, especially on transplants. Flies spend the winter as small brown pupae in the soil. Adults emerge in spring and seek out crucifer plants to lay eggs at the base of the stem. Adults can travel considerable distance in search of host plants (1/2 to 1 mile). Onion growers should also watch for root maggot activity at this time.

Our current conditions -- hot dry soils -- are not a favorable environment for maggot egg survival. Eggs are killed when temperatures exceed 100 oF, and are also subject to dessication under dry conditions -- both of which are occurring in many fields at present. While this reduces the risk of crop loss from this pest, it also places plants under water stress which means they are more susceptible to loss of water uptake capacity caused by any maggot feeding that might occur.

Recent research by Tony Shelton at Cornell University produced a degree day model for cabbage maggot emergence in New York State. According to the model, the first emergence of cabbage maggot occurs at 160 degree days +/- 8 degree days (DD). 25% emergence occurs at 203 DD +/- 3 DD, 50%

emergence occurs at 251 DD +/- 8 DD, 75% emergence occurs at 304 DD +/- 37 DD and 95 % emergence occurs at 387 DD +/- 8 DD. We do not know if this model fits for New England maggot flies, as there can be regional variations, but it gives an estimate. As of May 6, GDD accumulation in Massachusetts (base 50 oF) ranged from a low of 118 GDD on Cape Cod to a high of 203 GDD in Boston and Westover (NASS New England Report). Growing Degree Days are calculated by taking the average of the maximum and minimum temperatures for the day (Max + Min /2) and subtracting the base temperature (either 50 or 55 oF for most plants and insects). Below the base temperature, growth and development are minimal.

Cabbage root maggot flies are smaller and more delicate than a housefly, and can often be seen moving from plant to plant in early crucifers. To monitor for adult flies, use a flat water-pan trap painted bright yellow (Federal Safety Yellow), placed on the ground in the field. These can be made from any sturdy plastic dish, or purchased. Add a drop of soap to break the surface tension. Flies are attracted to the yellow color and to the moisture. Yellow sticky traps can also be used – these are placed vertically on stakes, near the soil. Check traps twice weekly. This will tell you when the flight peaks, and when it declines. Typically, flight declines after mid-May and many late May plantings do not need a soil drench.

Monitoring for eggs is the most critical. To check your field for eggs, look for the 1/8-inch long, torpedo-shaped white eggs that are laid along the stem, or on the soil next to the stem of young transplants. Often eggs are laid in neat rows, or inserted into the soil. They may be under a small clod of dirt near the stem. A pencil point helps stir the soil to look for them. Check 20-40 plants in the field, in groups of 2-4 plants. If you find more than an average of 1 egg/stem, it is likely to be a damaging population and a banded soil drench is recommended. Eggs may be more abundant in wetter areas of the field. Target the base of the plants and use at least 200 gallons of water per acre to help the insecticide penetrate to the root zone. Diazinontm and chlorpyrifos (Lorsbantm) do not move readily in soil after the application is made, so it is important to provide adequate water so that the material penetrates several inches into the soil when it is applied. With the current dry soil conditions, additional water may be needed to penetrate the soil.

Re-scout the field five to 7 days after application to note whether eggs have hatched; if there are few maggots active, then the application was effective. Because the materials are quite persistent in the soil, a second application is usually not needed.

Why bother to take the time to put your nose to the ground and scout for eggs? By scouting each planting (which takes about 15 minutes) you can achieve the best timing for a soil drench. You'll be able to apply it when it is needed, and you can save the cost of application when it is not needed. By not applying too early, you avoid the need for a second drench later.

Floating row covers provide an effective barrier against this pest. Use in a rotated field only, as flies overwinter in fields of late season crucifers. Replace after weeding operations. If covers are not a practical option, and eggs are found, cultivation that brings soil up around the stem may help encourage formation of adventitious roots from the stem., which can help compensate for root loss. This assumes some soil moisture is present.

*--Ruth Hazzard*

## SWEET CORN: FROST DAMAGE

Some early crops that were cut out of plastic in the heat wave suffered frost damage shortly afterward. Here are some notes on frosted sweet corn from Liz Maynard of Purdue University:

The growing point of sweet corn remains below the ground until plants reach the 6-leaf stage (6 leaf collars visible). While underground, the growing point is protected from light frosts. A frost on small sweet corn will injure or kill leaves that are above ground, but the growing point will typically survive and continue to produce new leaves. What affect will frost have on maturity and yield of sweet corn? Sweet corn maturity

depends on the cultivar and growing temperatures. While the growing point is below the ground, the soil temperature plays a bigger role in determining the developmental rate than air temperature. Cool soil temperatures will slow development whether or not a frost occurs. The damage that frost causes to leaves above ground robs those leaves of the capacity to make sugars, the primary source of energy and building materials for plant growth. Frost that occurs before the 3- leaf stage generally does not reduce yield.

*--Vegetable Crops Hotline, Purdue, May 3, 2001.*

# POTATO

As noted in the most recent UMass *Vegetable Notes* significant levels of resistance to imidacloprid (Admire) are developing in Colorado potato beetle populations in the Connecticut River Valley region, especially where this material has been used in the same fields over several years. To avoid losing this product, use alternative strategies such as crop rotation, perimeter treatments, and other products. See the April 2001 issue, posted on the UMass Vegetable website, for more details on imidacloprid resistance and border treatments.

*--R. Hazzard*

**Late Blight and Cull Piles:** Cull potatoes are a well-known source of late blight inoculum. Because late blight is more difficult to control now than in recent memory, eliminating late blight inoculum sources is critically important. Cull tubers can be buried. This method is effective if they are placed deep enough so that the sprouts will not each the surface. Generally this requires at least two feet of soil on top of the tubers. There are safety issues to consider. Deep piles can create sinkholes after the tubers degrade. Another technique is to completely cover the cull piles with black plastic or an opaque tarp. It is important that no light reaches the tubers, as this will allow the volunteers to survive and encourage sprouts to push through or around the covering.

*--Rosemary Loria, Cornell & D.Moyer- Cornell Cooperative Extension, Suffolk Co.*

# SPRAYER CALIBRATION STEPS FOR BOOM SPRAYERS

(1) On an area that best represents the average topography for the area to be sprayed, measure and mark off the Calibration Distance that coincides with your band width or nozzle spacing. See Table 1.

(2) Select a safe speed which can be maintained while spraying. Note and record the engine RPM's and the gear selection so the same speed is used during calibration and application.

(3) With the tractor traveling at this selected speed, time and record the seconds needed to travel the Calibration Distance.

(4) Fill the sprayer, engage the pump and adjust the pressure regulator to the desired boom pressure (between 15 and 50 PSI for herbicides). Collect all the water from one nozzle for the same number of seconds needed to travel the Calibration Distance. Example: with 20" nozzle spacing, if it took 35 seconds to travel 204', collect the discharge of one nozzle for 35 seconds. The number of fluid ounces collected equals the gallons per acre (GPA) of output of that nozzle. Example: 20 ounces collected equals 20 GPA.

(5) Repeat Step 4 two more times, collecting water from a different nozzle each time. The average number of ounces collected from each of the three nozzles is equal to the gallons of water applied per acre for that boom. Remember to maintain the same pressure and travel speed when spraying.

| Table 1. Select the Calibration Distance to be used based on nozzle spacing if broadcast applying, or on band width if band applying. | |
|---|---|
| Band Width or Nozzle Spacing | Calibration Distance |
| 10 inches | 408 feet |
| 12 inches | 340 feet |
| 16 inches | 255 feet |
| 18 inches | 227 feet |
| 20 inches | 204 feet |
| 24 inches | 170 feet |
| 28 inches | 146 feet |
| 32 inches | 127 feet |
| 36 inches | 113 feet |
| 40 inches | 102 feet |
| *Source: PA State University Cooperative Extension, Agricultural Engineering Fact Sheet, PM - 8, via Ontario, Wayne, Yates, & Steuben Muck Weekly Vegetable Update - 5/09/01, C.R. MacNeil & Julie Kikkert* | |

*Vegetable IPM Message*, Ruth Hazzard, Editor. The Vegetable IPM Message is published weekly from May to September and includes contributions from the UMass Extension Vegetable Program faculty and staff, growers, and private IPM consultants. Authors of articles are noted; author is R. Hazzard if none is cited. Send comments or questions to rhazzard@umext.umass.edu, 413-545-3696

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