UMASS EXTENSION

VEGETABLE IPM MESSAGE

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CROP CONDITIONS

Frost-sensitive transplants have been going out as fast as growers can get them in, ever since the cold spell ended in the middle of last week. Warmer soils and air temperatures are speeding germination and growth. Weeds, likewise, are emerging rapidly, including crabgrass, galinsoga, and many broadleaf weeds. Some plants (such as corn and some vine crops) that were injured by frost are recovering, but will be delayed. Strawberries are putting out new blossoms and setting new fruit after significant losses from frost. Strawberry growers, likewise, are doing their best to recover from four to five sleepless nights last week. European corn borer and Colorado potato beetle are beginning to emerge.

LET'S BE PREPARED FOR PHYTOPHTHORA BLIGHT

Phytophthora blight the most destructive disease of cucurbits and peppers in the Northeast. The pathogen, *Phytophthora capsici* is soil-borne and will remain in the soil for years, perhaps indefinitely. It is important to keep track of sites that are contaminated with *Phytophthora*. Do not rent land for susceptible crops without investigating the history of disease problems (there are other important soil-borne pathogens as well). Phytophthora blight is particularly important during wet weather or after long irrigations. *Phytophthora* can move through the air during windy storms and hurricanes but it would be difficult to estimate how far it can move. It is better suited to moving in water than air. It can also move on clods of soil on tractors.

Phytophthora capsici does not appear spontaneously, and since it is not efficiently wind disseminated it tends to be "locally important" on specific fields or farms. Once a site becomes contaminated it will remain so but the fields across the way may remain free of the pathogen as long as farm machinery does not bring it in. If contaminated fields drain into an irrigation pond then irrigation can easily disperse it throughout the crop.

The pathogen is very dependent on water to initiate disease and to move it from plant to plant. It produces spores that can swim to susceptible hosts (very short distances) and splashing rain and irrigation water can easily move spores from plant to plant. Its dependence on soil moisture is obvious in fields that have low spots or areas that do not drain readily. The disease will always begin in these areas first.

Recommendations for Management. Avoid planting susceptible crops in contaminated soil. This disease cannot be effectively controlled when conditions favor infection.

For sites that have a history of *Phytophthora:* Practice long rotations. Do not grow cucurbits, peppers, eggplant or tomato for at least five years. Use a chisel plow to break up any hard pans and to improve drainage. After preparing the land, remove any earthen dams at the end of rows so that water can drain off of the field. Avoid planting in low areas or areas with poor drainage. Subsoil between rows after planting. Keep irrigation to a minimum, and avoid leaks in the irrigation system that result in puddles. Avoid moving soil from contaminated land to and area of land that does not have the problem.

If disease occurs in the field: disc the plants under. This will not eliminate the pathogen but will help reduce movement to

new plants. Fungicides have not been very effective against this disease. Aliette has activity against *Phytophthora* but cannot be expected to provide control once the disease becomes established.

Additional considerations for peppers: Form domed shaped raised beds at least 9 inches high and cover with black plastic. Consider the resistant cultivar Paladin. If planting on bare ground, apply Ridomil Gold 4E at 1 pt/A. in a 12" band. See label for specific instructions. If planting on plastic, apply Ridomil Gold 4E through drip lines. Repeat applications according to the label.

--Rob Wick, Dept. of Microbiology, UMass

STRATEGY HERBICIDE FOR VINE CROPS RECEIVES MASS REGISTRATION

The herbicide Strategy (ethalfluralin + clomazone) has received approval for sale and use in Massachusetts. Strategy is a premix of Curbit (ethalfluralin) and Command (clomazone). It is intended for pre-emergence control of annual grasses and many broadleaf weeds in cucumber, melon, pumpkin, summer squash, winter squash, and watermelon. Broadleaf weeds that are controlled include common lambsquarters, pigweed, common purslane, velvetleaf, common ragweed, and Pennsylvania smartweed. This product may be applied to the soil surface after direct seeding on bare ground. It may also be banded between plastic for both direct-seeded and transplanted crops. The formulation of Command contained in this product is the ME (micro-encapsulated) formulation which does not need to be incorporated. There are many precautions on the label including some replant precautions. For squash and pumpkin, this product will be the treatment of choice since it controls so many weed species. In cucumber and melon however, Curbit tank-mixed with Alanap (naptalam) may still be a good option since most of the same weeds are controlled but the carry-over concerns with clomazone are not present.

--Rich Bonnano, Plant and Soil Science Dept., UMass.

CUTWORMS ON SEEDLINGS

We have had reports of cutworm damage in direct-seeded and transplanted corn and brassicas. These can also cause damage in peppers, tomatoes, and eggplants.

Monitoring. Scout weed borders before plantings go in. Check newly transplanted crops to look for damage: clipped stems or leaf feeding (some cutworms climb up into foliage). If you find clipped transplants, you can usually find the larva in the soil near the plant. Estimate % stand loss to determine need for a spray.

In sweet corn, Rutgers suggests inspecting 20 plants at 5 sites (total 100 plants). Threshold is 3% (3 or more plants damaged). Damage may be more concentrated around field edges.

Life cycle and identification. There are many species of cutworms that attack vegetables including black cutworm, variegated cutworm, dingy, spotted, dark-sided, or glassy cutworm. Spotted and variegated cutworms climb and feed above-ground, and black cutworms climb when they are young (less than half an inch long). Cutworms can be difficult to identify. Variegated cutworm has some pale yellow markings on its back, while black cutworm is nearly uniform gray to black with a greasy, rough appearance.

Adults of all cutworms are moths with dark gray forewings, often with various lighter or darker markings, and lighter hindwings. They are in the same group of moths (noctuids) as the corn earworm, fall armyworm, and cabbage looper, but with very different life cycles and habits. They are capable of migrating long distances but it is very likely our own resident populations which are causing problems. Black, spotted and variegated cutworm have at least two generations per year in this region.

Black and variegated cutworms spend the winter in the larval or the pupal stage as deep as 5 inches (12 cm) down in the soil. Spotted and dingy cutworms overwinter only as larvae. It is these larvae that are present in the soil at planting time, ready to feed on early spring transplants and seedlings. They may be

of varying sizes. Young black cutworm larvae are more likely to feed on plant foliage. Older larvae feed on stems near the soil line during the night and descend into the soil during the day. They clip stems of young seedlings and are reported to feed on the wilted plant material. Larval development takes about a month (28-34 days).

Adults emerge from overwintered pupae in May or June, and from pupae of spring-feeding larvae later in the season. At one site in Easthampton, a pheromone trap has been catching 10-20 black cutworm moths per week for the past two weeks. Females lay eggs on grass leaves, weeds, or the soil surface. Attractive habitats include weedy or grassy areas, and alfalfa; corn and soybeans are among the least attractive hosts. Black cutworm moths are reported to select low spots in the field, that has been waterlogged or flooded for egg laying. Egg are also concentrated on low-lying vegetable such as chickweed, curly dock, shepherd's purse, peppergrass, mustards such as yellow rocket, or plant residue from the previous year's crop. Note that the above list includes lots of winter annual weeds that grow in the fall – weeds that we often overlook.

Cultural Management. Weedy land harbors the most cutworms, as the adult moths seem to prefer dense plant cover for egg laying. Crop residues may also attract higher populations. Therefore, crops that follow weedy crops, alfalfa, or no-till crops are more likely to be damaged by cutworms. Plant early transplants into fields that had low weed pressure the previous year, especially in the fall, or where crop residue was tilled under in the fall. There seems to be little information about specific relationships between what cover crops are planting in the fall, and cutworm infestations in the following year.

Plow fields in spring and keep weed free for at least two weeks before planting to starve young larvae and reduce egg-laying. Avoid planting susceptible crops close to sod, alfalfa or fallow areas. Summer plowing disturbs eggs and larvae and raises them to the soil surface where they are more vulnerable to predation and dessication. Fall plowing will do the same. Plan rotations to avoid planting vulnerable crops after a grassy sod, and plow sod fields in later summer or early fall. Cultivate frequently to injure and expose hiding cutworms to predators. Daily search and destroy missions -- by hand -- are a time-honored "biological" management for small plantings!

Chemical Management. Postplanting treatments for corn include Asana, Baythroid, Lorsban, Ambush/Pounce or Warrior. For cole crops, Ammo, Asana, Lannate, Lorsban and Warrior are labeled on certain crops. A new material, Confirm, is labeled for cutworms on cole crops. Check labels for restrictions. For best results apply in the evening just prior to active feeding. Consult the *New England Vegetable Management Guide* for more details.

Biological management. Several predators and parasites have been identified, however none have been commercialized for release against these pests. At Iowa State University, a new baculovirus has been isolated from black cutworm, which is highly active and has potential as an alternative to chemical control. Soil applications of nematodes (*Steinernema carpocapsae*) can reduce cutworms and last for anywhere from 8 days to several weeks, according to various research trials. Good soil moisture favors survival. Repeat applications may be needed.

Other organic options. This is a tough pest for organic growers as no effective insecticides when outbreaks occur. Strategies such as cardboard or tinfoil collars are impractical on a commercial scale. Eric Sideman, technical advisor for Maine Organic Farming and Gardening Association (MOFGA) reports that insecticidal baits have been effective. He recommends a recipe using a very concentrated solution of Bt, mixed with bran and a bit of molasses. It can be sprinkled on the ground near the crops or made into patties that are placed along the rows. Bt sprays (ie, *Bt aizawi or kurstak*i directed at plant stems and foliage) are reported to work sometimes, but not consistently, possibly because large cutworms do not ingest a big enough dose of BT to stop feeding and die before they have caused damage.

--Ruth Hazzard (resources: Vern Grubinger (UVM), Brian Caldwel (NYS-NOFA) ,Eric Sideman(MOFGA), Rex Dufour (ATTRA))

GOOD AGRICULTURAL PRACTICES: SANITATION ISSUES FOR "PICK YOUR OWN" OPERATIONS

U-pick operations have their own challenges, perhaps most of them involving how to manage customers. Here's another challenge: humans and pets can be the source of disease-causing bacteria and viruses, and can contaminate the produce they handle at your farm. Pets, including the customers' pets and those in petting zoos, can harbor harmful microorganisms that can cause foodborne illness. Humans can be the source of foodborne disease causing bacteria and viruses and can contaminate the fresh fruits and vegetables they handle at a "pick your own" farm. ***E.coli*** 0157.H7, ***Salmonella spp.***, ***Shigella spp.***, ***Staphylococcus aureus***, ***Giardia lamblia***, ***Cryptosporidium parvum*** and **hepatitis A** can often be traced back to human or animal sources.

It is important to tell your customers that the safety of their food is a priority on your farm. Think about how you would like your customers to handle the produce in your field or orchard. Provide printed guidelines that describe safe food handling practices. Post signs that remind customers to wash their hands.

Do these food safety hazards exist in your "pick your own" fields and orchards?: Household pets in the fields and orchards; Children in the fields and orchards when not being supervised by adults; No bathroom or hand washing facilities for customers and their children; Bathroom and hand washing facilities poorly serviced (no paper towels, soap, toilet paper or water?); Dirty "pick your own" containers; Produce that has been harvested by customers offered for sale; and Petting zoo without hand washing facilities.

What can you do?:

- If possible, do not allow pets in the field or orchard. If pets must accompany customers, encourage them to pick up and properly dispose of any pet waste.
- Establish guidelines for customers with children in the field and orchard. Discourage diaper changing in the field.
- Provide trash cans for any customer trash.
- Provide toilet facilities and handwashing facilities that are accessible, clean, and regularly supplied with toilet paper, paper towels, soap, water, and trash can. If portable toilets are used, they must be maintained to prevent wastewater from contaminating the fields.
- Encourage customers to wash their hands after petting animals and using toilet facilities.
- Use signs and fact sheets to promote handwashing and safe food handling.
- Clean and sanitize the pick your own containers that you provide to customers.
- Do not sell produce that has been picked by customers.

Adapted from the New England Extension Food Safety Consortium

Here's a suggestion for a farm sign:

WELCOME U-PICK CUSTOMERS
WE WORK HARD TO ENSURE THE SAFETY OF THE
PRODUCE ON THIS FARM BY FOLLOWING GOOD AGRICULTURAL PRACTICES.

CRUCIFERS

Flea beetles are still very active in early greens and seedlings of heading crops. Where you are using row cover for protection, be sure to seal the edges immediately after sowing

seeds or setting out transplants. For weeding, uncover as soon as the cover is dry in the morning, and replace the cover after the weeding is done.

At the UMass research farm we are observing damage to early seedling greens from a small weevil which is a rare pest of crucifers. It is rare enough that we have not been able to find a common name, only a scientific name: *Ceutorhynchus erysimi*. It is about 2 mm long, blue-black with a slightly iridescent sheen. It could easily be mistaken for a flea beetle, except that it does not jump. When disturbed, it simply falls off the plant. It can also be found on bare ground, in sod, and on cruciferous weeds. The damage to seedlings includes browning of plant tissues, and death. We would be interested in hearing if other farms are noticing this pest.

Typically, the first cabbage maggot flight is winding down by late May. Given the roller coaster temperatures this spring, continue to scout for eggs on new plantings.

POTATO

All over the Connecticut Valley potatoes are breaking ground. Colorado potato beetles are also becoming active. Potatoes that had broken ground before the frost last week suffered some frost damage. Plants that were less than 4 inches should be able to grow out of it without loss in yield. Older plants (above eight inches) may suffer some yield loss. Early varieties are more susceptible to stress than later varieties.

TRICHOGRAMMA USE GUIDELINES FOR FRESH MARKET SWEET CORN

Trichogramma ostriniae, a small wasp that parasitizes and kills European corn borer (ECB) eggs, will be commercially available for the first time this season. In this article, we'll outline how to integrate Trichogramma releases into the existing fresh market sweet corn IPM practices.

T. ostriniae is affectionately known as "the Ghengis Khan of natural enemies" by those who know it best. In research conducted in sweet corn in New York State over the past 8 years, this wasp has produced remarkably high levels of parasitism (80-100% of ECB egg masses), shown an extraordinary ability to disperse throughout corn fields, and demonstrated that it is able to reproduce in the field and increase its numbers in response to increases in ECB numbers. Crop damage is typically reduced by half in fields receiving Trichogramma releases. Because of the wasp's excellent dispersal and reproductive abilities, we are able to use an inoculative release approach. Inoculative releases are inexpensive (around $15/A for the wasps) because just a single release of relatively low numbers of wasps (30,000/A) is needed in each field. This single inoculative release has the potential to halve the number of insecticide applications to early season sweet corn for ECB control.

T. ostriniae does not parasitize either fall armyworm or corn earworm, the other two worm pests of sweet corn. You'll get the most benefit and save the most sprays releasing Trichogramma in early season fields before the armyworm and earworm flights start.

Release timing

Using an inoculative release approach means that the wasps need to be released in fields just as the corn borers start to lay eggs. Experience to date indicates that releases are almost always successful except if made when there no egg masses are in the field. In these situations the wasps will die without reproducing. Timing can be a little tricky! Based on our experiences with research demonstrations, we're recommending that the wasps be released when the corn is in the 4-6 leaf stage. We're hesitant to recommend Trichogramma for early fields started under plastic at this point. Those fields are very attractive to egg-laying females because they're the plants are larger than those in bare-ground fields. There could be so many eggs laid immediately after the

plastic is removed that releases of 30,000 per acre would not be able to parasitize them all. We'll be looking at that in at least one of our demonstrations this season.

Ordering Trichogramma

There are two sources for the wasps. They are available through IPM Laboratories in Locke, NY, Small quantities can be ordered a week before delivery. They will need more advance notice for larger quantities. For planning purposes, IPM Labs would appreciate advance notice if you're thinking about using Trichogramma this season. IPM Labs can be reached at 315-497-2063. Wasps can also be ordered through Insecterra, Inc. in Montreal, Quebec. Follow the same guidelines for ordering as described above. Insecterra can be reached at 514-524-2433 (email ffournier@insecterra.com).

Handling Trichogramma

One major difference between Trichogramma and insecticides is that the Trichogramma are alive! Trichogramma arrive from the insectary inside the eggs of the grain moths that they are reared on. They look like coarse grains of pepper. You want to be sure that they are still alive and in good shape when you put them in the field. That means not letting them get too hot (not leaving them in the truck in the hot sun if you get sidetracked on the way to the field), not letting them get too cold (they should not be refrigerated), and not letting the wasps emerge from the grain moth eggs before you put them in the field. It's best to put them out in the field the same day as they arrive from the insectary.

Putting them in the field

The wasps will arrive from the insectary as pupae in grain moth eggs glued inside cardboard release packets, each containing 8000 pupae. They need to be in release packets because natural enemies like lady beetles and lacewing larvae will feast on them if they get the chance, and there can be a lot of natural enemies in a corn field. The adult wasps will emerge from the pupae and escape from the release packet along the open edges. Distribute the packets as evenly as possible throughout the field, starting about 50 feet in from the field edges. If you have a long narrow field less than 125' wide, distribute them evenly along the middle row. For wider or more square-shaped fields you'll need to use more than one row. Flat wooden stakes can be used to put the release containers on if the plants are too small to attach them to. Do not put them on the ground, and when hung from a plant, locate them in the shade, such as under a leaf or on the north side of the plant.

Scouting release fields

Throughout New England, growers make IPM spray decisions based on scouting for ECB caterpillars and feeding damage, starting at the pretassel stage. Where Trichogramma has been released, you can scout as usual (check 100 plants in groups of 10, determine % infested with caterpillars) and make your spray decision based on the 15% threshold. Eggs that were parasitized and did not hatch will never reach the larval stage, resulting in fewer caterpillars and less need to spray.

You can also determine whether wasps are doing their job by scouting fields for ECB egg masses. Search the underside of all leaves for the white, scale-like flat egg masses, which are about the size of a dime. Keep track of both the total number of egg masses and the number of parasitized ECB egg masses. Egg masses parasitized by Trichogramma turn evenly black, and are no longer really ECB egg masses. They're really Trichogramma, so they can be ignored when deciding if a field is over threshold. In the New York State IPM program, spray decisions are based on egg mass infestation (2 or more egg masses in the black head stage, or 15% infestation, out of 40 plants sampled).

Spraying release fields

Using the inoculative release approach, Trichogramma will suppress ECB, but cannot be expected to completely control all infestations, so insecticide applications may still be needed. Trichogramma that are inside host eggs are somewhat protected from the spray and many will survive, but adult wasps may be killed. Some of the insecticides labeled for sweet corn are less toxic to Trichogramma than the others. Currently, Spintor does the least harm to Trichogramma in the

field, and can help you get the most out of your investment in Trichogramma.

In a nutshell:

Release T. ostriniae at a rate of 30,000/A when the plants are in the 4-6 leaf stage.

Handle the wasps correctly so they will be in good shape when they are released.

Distribute the release containers evenly throughout the field. Do not count parasitized ECB egg masses when deciding if a field is over threshold. Use insecticides with lower toxicity to Trichogramma.

-Abby Seaman and Mike Hoffmann, New York State IPM Program; adapted for New England by R. Hazzard

SWEET CORN

Corn that stayed under plastic through the frosts last week has been cut out and is growing nicely. These plantings are likely to reach silking stage while ECB flight is high. The earliest bare corn that was frosted in April is recovering in some fields, and will be delayed but will still produce a crop. It has been a difficult spring for getting an regular succession of crop ages for an even harvest in July. New plantings are emerging and growing well.

European corn borer flight is beginning in the Connecticut River Valley. Our first trap reports are from Ray Pestle in southern Vermont who reported 51 ECB moths captured at Westminster (50 NY - E-strain and 1 IOWA-Z-strain moth). At the South Deerfield Research Farm we captured 62 ECB-E moths. The ECB season is starting out gangbusters.

If you want to monitor the first flight of ECB, now is the time to get ECB traps set up! Use two Heliothis Scentry™ traps, one baited with the lure for the Z (Iowa, I) strain and one for the E (New York, II) strain. Both strains are present throughout New England. Hang lures in the center of the lower trap opening. Place in weedy borders near early corn, with the base of the trap close to the top of the weed canopy. Place traps at least 50 feet apart to prevent cross-contamination of the pheromone plume that attracts the male moths.

Sources of traps and other IPM supplies include:

Great Lakes IPM (general supplier)
10220 Church Street, NE, Vestaburg, MI 48891
(517) 268-5693
Gempler's
P.O. Box 270, Mt. Horeb, WI 53572
(800) 382-8473
If you have questions on traps or placement, call Ruth Hazzard at 413-545-3696.

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