UMASS EXTENSION

VEGETABLE IPM MESSAGE

JULY 12 , 2001 VOLUME 12, NUMBER 9

CROP CONDITIONS

Regular rains, good sun and frequent drying winds have made for excellent crop growth. The same is true of weeds. More sweet corn crops are coming in, and the earliest field tomatoes are beginning to ripen. We have had enough rain that some leaching of nitrogen may have occurred; use the PSNT to determine need for further nitrogen applications.

PHYTOPHTHORA WATCH

We have had enough rain in the past month that low-lying areas in some fields may have had standing water for periods of time after heavy rains. In fields with crops that are susceptible to Phytophthora capsicii –which includes all the vine crops, pepper, tomato, and eggplant – these low spots are sites where a Phytophthora outbreak could begin. We know that many soils around the state are infected with Phytophthora spores from outbreaks in past years. These resting spores (oospores) are most likely to germinate when there are alternating periods of dry soil followed by saturation. Standing water (or fully saturated soil) and warm temperatures are ideal conditions for spores (both oospores and sporangia) to germinate and release the swimming zoospores. These mobile spores will travel through the soil water, in surface water, in splashing water, or aerially in windblown rain to infect leaves, roots, crowns, or fruit. Once established, the fungus produces a yeast-like growth that contains many sporangia. Sporangia are lemon-shaped structures that cause new infections as they disperse into the rest of the field.

The best control for this disease is to **never allow that initial infection to start**. Take measures to reduce standing water by subsoiling between beds or rows, and removing soil barriers that might keep water from draining out of the field. Scout low-lying pockets for signs of infection. In pepper, look for black lesions on the stem or circular, grayish brown lesions on leaves. In cucurbits, look for seedling damping-off, crown rot which causes the whole plant to collapse and die in a short period of time; or dieback on the growing tip. The initial symptoms of fruit rot are a water-soaked or depressed spot, often on the underside of the fruit or near the stem. If you suspect you may have this disease, call the UMass Disease Diagnostic lab (413-545-1045) to arrange for sending a sample. Samples can be sent by overnight mail from anywhere in the state, so don't let distance hold you back! Small pockets of vine crops or peppers which have sat in standing water can be tilled under *before* an infection starts. The destruction of a few plants is better than the possible loss of a whole field!

Where there is a high risk of pepper crown rot (ie growing peppers in a field with a known history of the disease, or where sypmptoms occur), mefanoxam (Ridomil Gold 4E at 1 pt/Aor Ultra Flourish 2E at 1 qt/A, with rates adjusted for banded application) can be applied through trickle irrigation under plastic or as a directed spray in a 6-10 inch band on either side of the row in bare ground culture. If foliar symptoms are found in pepper, copper applications may slow the development of the disease.

This summer, the Plant Disease Diagnostic Lab has a special project to study *Phytophthora capsicii*. This includes testing irrigation pond water for possible infection, and sampling fields

where infection occurs. If you would like more information about testing pond water, contact the Disease Diagnostic Lab.

UPCOMING TWILIGHT MEETINGS

Monday, July 23, 2:00 - 5:00 p.m.
Kestrel Farm, Westminster, VT
Contact: Vern Grubinger, (802) 257-7967

Tom Harlow grows 12 to 15 acres of organic sweet corn for wholesale and retail markets. For many years he has practiced IPM, scouting his crop and monitoring moth flights using traps for European corn borer, fall armyworm and corn earworm. To control weeds, he relies on timely cultivation with a tine weeder and rolling cultivators. He sprays Bt for control of caterpillar pests. Recently, he has been applying a mixture of corn oil and Bt to corn silks to manage corn earworm, using a hand-held applicator called the Zea-Later, developed by Ruth Hazzard of UMass Extension. Ruth will join us to explain the technique and the results of her on-farm trials.

Directions: Take Exit 5 off I-91; go east about a half mile to Route 5. Turn right, and go south on Route 5 for about 2 ½ miles. Immediately after the village of Westminster, turn left onto Greenwood Rd, which leads to the farm.

Tuesday, July 31, 5:30 - 8:00 p.m.
Ward's Berry Farm, 614 South Main St., Sharon, MA
Contact: Sonia Schloemann, (413) 545-4347

More details next week.

PEPPER

Plants are gaining stature, putting out new blossoms, and beginning to develop fruit. Scout fields now for **aphids** and **bacterial leaf spot**. Aphids fly into peppers in June and July. The most common species is green peach aphid, which is light green, yellow green, or pink, with no distinctive marks. Wingless females feed on the underside of leaves, and give birth to tiny nymphs which look just like them.

Most of the time, predators such as ladybeetles and lacewings, and aphid parasites, keep aphid numbers under control in peppers. Avoiding unnecessary sprays will help reduce aphid problems. Aphids may build up after broad-spectrum insecticides are used, especially synthetic pyrethroids.

Monitoring: examine the underside of four leaves per plant on 25 plants. Count aphids found. Calculate the average aphids per leaf (divide total by 100).

Threshold: 10 aphids per leaf. At lower numbers, recheck to determine if populations are increasing. This threshold has been used successful in IPM fields in MA and CT for many years. See *New England Vegetable Management Guide* for recommended materials.

TORTOISE BEETLES IN SWEET POTATO

Sweet potato (*Ipomoaea batatas*) is being grown by famers who are pursuing new crops for diverse markets. Sweet potato is in the Convolvulaceae family. A closely related crop is water spinach (*Ipomoea aquatica*), which is grown for its stems and leaves and is popular in Asian cuisine. In both these crops we have observed a beetle pest which causes feeding damage to the leaves. If farmers could make money on an insect petting zoo, they might get a lot of mileage out of this beetle! Known as the Golden Tortoise Beetle, this adult beetle is turtle-like, oval or nearly circular, about 1/3 inch long, with a remarkable ability to change colors. It usually is a brilliant, shiny, metallic gold but may change almost instantly to a dull red. The edge of its shell expands into a flat, clear plate, as if it has been dipped in plastic. Adults and larvae cause chewing damage to leaves, leaving regular or ragged holes. Larvae are dull in color, flat, spiny and have a forked appendage at the tip of the abdomen to which are attached cast skins, debris, and excrement. This is held over the body like an umbrella. When disturbed, the larva raises up this dried clump and uses it to fend off attackers.

Adult beetles were active during June, and larvae were found this week feeding in sweet potato. Control would be warranted in sweet potato only if damage is severe enough to reduce yield. In water spinach, damage to harvested leaves

reduces marketability. Sevin XLR Plus is labeled for control of tortoise beetles in sweet potato (7 days to harvest).

--*Matt Verson and Ruth Hazzard*

CUCURBITS

Conditions have been good for crop growth. Vines are starting to run in transplanted pumpkin and butternut and fruit set is just beginning.

Watch for **angular leaf spot** and **bacterial leaf spot**, which have been observed in some fields. These two bacterial diseases can be difficult to distinguish in the field. **Angular leaf spot** first appears as small water-soaked spots on the leaves. These spots expand until they reach a leaf vein and are limited by the surrounding veins. This results in the spots having a squared-off or angular shape. The spots become more obvious after they dry and turn tan. They may also drop out leaving holes in the leaf. The disease is spread by splashing rain, people or insects. Spread is enhanced when leaves are moist from rain or dew. Often we see plants outgrow this disease without serious damage, especially if conditions are not favorable to the disease. Recent drying winds and cool temperatures reduce the likelihood of spread. Some cucumber varieties are resistant, but nonresistant varieties and other vine crops should be treated with copper if the disease is present in the field, especially if symptoms are increasing.

Bacterial leaf spot of cucurbits has been found in one cucumber field. On cucumber, spots begin as small water-soaked lesions on the undersides of leaves, then become visible as indefinite yellow areas on the upper sides. These become round or angular with a translucent center and a yellow hallow. On pumpkin and winter squash, leaf spots typically are small and angular, similar to ALS but smaller. This disease is seed-borne and may be introduced into the field on infected seed. Infections can spread from one cultivar to other parts of the field, especially with overhead irrigation. Unlike ALS, this disease can cause serious fruit damage, especially in pumpkin.

Because these two diseases are difficult to distinguish from leaf symptoms, and only one tends to cause serious fruit damage, it is worthwhile getting an accurate diagnosis from the Disease Lab. By the time symptoms occur on fruit, there is little that can be done to prevent damage. It should be noted that the type of *Xanthomonas campestris* that attacks cucurbits is not the same pathovar that attacks peppers or tomato.

Copper spray materials such as Kocide or Basicop offer some protection and can help limit the spread of the disease. The activity of these materials can be enhanced by tank mixing them with mancozeb fungicides.

SCARAB BEETLES IN VEGETABLE CROPS

Japanese beetles are emerging now and congregating in various crops and non-crop habitats. These are one of three species of these scarab beetles which have been observed this season in vegetables:

JAPANESE BEETLE adults are about half an inch long, with a metallic green head. The wings are shiny copper or bronze color, and there are a few tufts of white "fur" along the side of each wing when it is folded back over the body.

ORIENTAL BEETLES normally fly at night but may occasionally be seen at dusk or in the soil when weeding. The beetles are just a little smaller than Japanese beetles, and usually are a rather mottled gray with black splotches. (Occasionally an individual will be almost all black or almost all gray.)

ASIATIC GARDEN BEETLES are about half as long as a Japanese beetle adult, and somewhat more "plump" in appearance. They are reddish-brown or copper-colored. They often are found near roots of plants when one is weeding.

A fourth species may also be found: **EUROPEAN CHAFERS,** which are slightly larger than Japanese beetles and are a fairly dull brown or tan in color. They are night fliers but can be seen in large numbers just at sunset, when they congregate in large numbers in favorite trees (such as locust or willow).

The **life cycle** of the Japanese beetle fits most of the species of grubs we encounter in New England, with minor variations depending on the species and the location. They have a one year life cycle, with adults emerging in early July in most of Massachusetts (slightly earlier further south and slightly later further north). The adults are active in daylight and begin feeding on many different kinds of plants, including roses, grapes, lindens, purple-leafed plums, and crabapples. In vegetables, they can be found in many crops including corn, peppers, green beans, collards, basil, and other herbs and greens.

The females return to the soil (often in or near wide expanses of turfgrass) and lay eggs, usually beginning in late July. Eggs hatch into tiny grubs (cream-colored larvae, C-shaped, with brown heads). The first grubs usually appear around late July or early August and begin feeding on roots of grasses and other plants (especially corn). After about two weeks of feeding, the grubs molt to a second "instar", and feed for another three weeks. The grubs molt once more, to the "third instar" (or large grub) around the middle of September, and continue feeding until the soils begin to cool down.

In late fall the grubs begin to migrate downward through the soil profile, staying below the frost line throughout the winter. In the spring as the soils warm up, the grubs move back into the root zone and resume feeding for about six weeks. By the middle of June, most grubs have completed their feeding requirements and pupate (still in the soil) for about a week before emerging as new young adults.

Japanese beetles are the most common and widely distributed scarab species in New England and until about 10 years, they were the primary grub species in most of New England. Recently, we are also finding some relatively new "imports" into the region. The Oriental beetle is found throughout Connecticut and Rhode Island, as well as Long Island. More recently we have found several populations in the Connecticut River Valley. The biology of this insect is very similar to that of the Japanese beetle. However, the oriental beetle tends to be less sensitive to several of the insecticides that are commonly used in turf.

The Asiatic garden beetle (AGB) is gradually becoming a nuisance in many areas throughout New England. While we are not sure what is going on, we suspect that it is not particularly vulnerable to insecticides, so when other grubs are killed, the AGB moves into the vacated niche.

On turf, insecticide controls normally target young grubs just as they begin to emerge from eggs. In vegetables, managing the grub stage may not be feasible since the grubs are most likely feeding elsewhere. Adult beetles normally do not cause economic damage but they may need to be controlled if numbers are high and damage is significant. Insecticide options include carbaryl (Sevin) which has a broad vegetable label, and is labeled for Japanese beetle on some vegetable crops; however, it is not labeled for these beetle species on most crops. On organic farms, rotenone is an option for controlling adults. Insecticide should be applied in the evening for night-feeding beetles, or in the morning for day-feeders.

--Pat Vittum and Ruth Hazzard

ARMYWORM UPDATE

The Midwest is reeling from an armyworm invasion of historic proportions. In Massachusetts the invasion is more patchy, but barren hayfields and lawns can be found from Bristol to Berkshire County. While hayfields, lawns, turfgrass, and field corn across the state are suffering, vegetable growers need to be especially concerned about their sweet corn. Like fall armyworm, the true or common armyworm will attack corn in the whorl stage (as well as later stages) so corn should be scouted early. Corn under 8 in. in height that is attacked by armyworms may have the leaves eaten off entirely. Peppers should also be watched closely.

Look for ragged feeding damage on leaves and in the whorl – similar to fall armyworm -- and for one or multiple caterpillars hidden in the whorl. The dark-green worms up to 2 in. in length, with white stripes on the sides and down the middle of

the back, will be found hiding under clods and stones or in the center of leaves of the plant during the day. Frass, or droppings, are dark green when fresh and sawdust-like when dry. The damage usually starts at the sides of the field, where the worms have moved in from some other crop. However, infestations may be patchy, may have originated in the corn, and are not necessarily limited to the edges of the field. Use the 15% threshold for armyworm or ECB + armyworm.

It is possible that you may find old damage, dried up droppings, and no larvae. We are approaching the end of the first generation. Where outbreaks were first noticed two weeks ago, many larvae may have already pupated. When full grown, caterpillars reach 1 ½ to 2 inches long, and burrow into the soil to pupate. After two to three weeks, they emerge as new adults. These new adults will mate and lay eggs. It is this next generation that we need to watch for in the next few weeks. The UMass Vegetable program will be putting out pheromone trapsat several locations, to assess new flight.

Armyworm is reported to cause more damage in the first generation than the second. Second generations may be suppressed by insect pathogens that infect dense populations, and buildup of several natural enemies that attack this pest. However, we can't predict at this time what the second generation will be like. Stay tuned, and keep scouting.

See last week's message for suggestions on insecticides for corn and for peppers. At the UMass Research Farm, spinosad gave good control of armyworm in our biointensive sweet corn plots. Organic growers using Bt products may find that *Bt aizawi* is more effective than *Bt kurstaki.*

Photos of armyworm can be found on the web at http://www.ces.purdue.edu/hotnews/index.html

http://www.ag.ohio-state.edu/~ohioline/icm-fact/images/105.html

SWEET CORN

European corn borer flights are continuing to decline. Flights are lower enough that silking corn no longer needs to be sprayed on a regular basis. The exception is far western Mass, on the border of New York State, where the one-generation Z-strain moth may be present appears to be on the increase. For most of Massachusetts, this is the lull between the two flights of ECB. There may still be larval infestations in pretassel stage that needs to be cleaned up but these are spotty and should be based on scouting. **Corn earworm** flights remain low and are below threshold throughout most of the state. The exception was near the coast in the Southeast, where captures were at 2 or 3 moths per week. This is the time when careful use of IPM monitoring methods saves you sprays! However, watch for coastal storm fronts that could bring new migratory flights into the region. At this time of year, having your own trap is well worth the time and trouble. As more and more corn approaches silking, more acreage is vulnerable to the sudden arrival of migratory corn earworm flights. We have about 3-5 days (depending on temperature) from arrival of new moths (ready to lay eggs) till hatch of eggs laid on corn silks and invasion of ears by young caterpillars. Join us at twilight meetings on July 23 (southern VT) or July 31 (Sharon MA) for a review of trapping and scouting methods!

Watch for common armyworm migrating from small grain or grass hay fields into corn and other vegetable crops. If they are a problem in sweet corn, the 15% infested plants threshold applies for pre-tassel corn. Scout fields starting in the whorl stage, especially if small grain or grass cover crop or hay fields are nearby. This year with the heavy common armyworm populations, keep an eye on whorl stage fields for invasions from adjacent fields.

SWEET CORN TRAP CAPTURES AND SCOUTING DATA JULY 5-12

Town	Date	ECB Z1	ECB E2	TOTAL ECB	CEW	% PT
Berkshire Region						
N. Bennington,VT	July 5	5	1	6	0	--
Stephentown,MA	July 9	17	0	17	0	--
Conn. River Valley North to South						
Plainfield, NH	July 12	5	0	5	1	8%
Westminster VT	July 12	4	5	9	0	--
Hatfield	July 9	0	2	2	0	8%
South Deerfield	July 11	2	0	2	--	--
Hadley	July 10	1	0	1	0	--
Amherst	July 10	17	0	17	0	--
Southwick	July 10	2	0	2	1	--
Feeding Hills	July 9	0	0	0	0	18%
East/Central MA, North to South						
Ipswich	July 10	0	0	0	0	12%
Dracut	July 12	3	1	4	1	--
Stow	July 9	14	2	16	0	--
Sutton	July 12	3	1	4	0	--
Monson	July 11	0	0	0	0	3%
Still River	July 12	--	--	--	0	0%
Leicester	July 11	0	0	0	0	6%
Millis	July 9	0	2	2	0	28%
Hopkinton	July 9	2	1	3	0	35%
Seekonk	July 11	1	3	4	1	--
Swansea	July 11	0	0	0	1	18%
Rochester	July 11	0	1	1	3	--
Rehobeth	July 10	0	3	3	2	8%

-- Information not available.

CORN EARWORM THRESHOLDS

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	No spray
0.2 -0.5	1.4 - 3.5	6 days
0.5 - 1	3.5 - 7	5 days
1.0 - 13.0	7 - 91	4 days
over 13	Over 91	3 days

Note: spray intervals can be lengthened by one day if daily maximum temperatures were below 80 ^{o}F for the previous 2-3 days.

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.

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