UMASS EXTENSION

VEGETABLE IPM MESSAGE

June 28, 2001 **Volume 12, Number 7**

CROP CONDITIONS

This week, growers are harvesting lettuce, greens, broccoli, cabbage, zucchini, summer squash, herbs, garlic scapes, peas. Heavy picks of summer squash began this week. Earliest corn in the warmest areas will be ready for the 4th, and more will be coming in by next weekend. Most corn is in the ground. Some growers report losses in early pea plantings from early floods or frosts, resulting in poor yields now. Tomatoes, eggplant and peppers are growing very well. It was another hot, humid week with rain at intervals – excellent growing conditions.

Some growers are reporting "best year ever" while others say "toughest year yet" – it seems to depend on when certain weather events hit, and which crops were affected.

John Howell has visited several fields where growers were concerned about poor crop growth. In some cases, when the soil was tested, it turned out that the pH was 5.0. It is easy to overlook this "basic" factor of pH management -- but critical to successful crops. In other instances the cause of poor growth appeared to be over fertilization.

--R Hazzard, J Howell

INSECT PESTS IN LETTUCE

Aster leafhoppers were observed in lettuce crops over the past several weeks. Direct damage from this pest is not a major concern, but the transmission of the mycoplasm which causes **aster yellows** can be. Symptoms appear in the center leaves first. They appear yellow and fail to grow normally, being stunted or curled. Light borwn latex depostis on the undersid of the midribs are characteristic. This disease can also occur in carrot and celery. In carrot, symptoms are excessive red or yellow-coloured, frond-like shoots with hariry, bitter roots. Sympoms are usually more severe later in the season.

The risk of transmission of aster yellows – and the need for controls -- is determined by the number of leafhoppers and the proportion of the population infected with the virus. In Ohio, for example, a recent collection of aster leafhoppers were tested for presence of the virus and had an estimated infectivity of 2.6% According to the Minnesota "Aster Yellows Index", it would take 10 leafhoppers per 100 sweeps of a sweep net to require insecticide applications in a lettuce field at this relatively low level of infectivity.

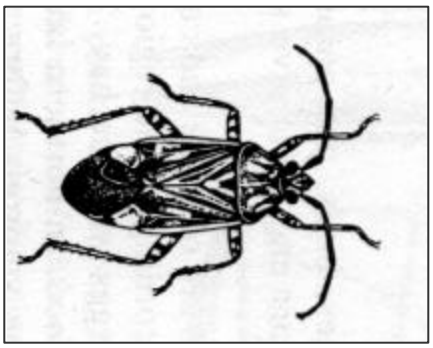
Adult leafhoppers can easily be sampled with a sweep net, lightly brushing the top of the foliage as the net is passed back and forth above the crop. The aster leafhopper has six black spots on the front of the head. The body color is more olive green compared with the bright green of the potato leafhopper, which can also be found in lettuce fields. Nymphs, which do not have wings, are pale yellow or beige.

Past research conducted at Ohio State has identified two key times for applying insecticides to control the leafhopper vectors of aster yellows: approximately 10-14 days after transplanting and approximately 14 days before harvest. The first application would protect the treated lettuce field from infection by incoming adults, so the insecticide used should have a long period of residual activity. The second application would protect neighboring younger lettuce fields by killing any infected leafhoppers that could otherwise carry the disease out of the treated field, so the insecticide used should be fast-acting and effective but needn't have long residual activity.

Last summer's research on aster leafhopper dispersal demonstrated that planting lettuce at least 60 yards from any earlier infected lettuce plantings also could greatly slow the spread of the disease.

-- adapted from information from Casey Hoy and Sally Miller, Ohio State University

Tarnished plant bug (TPB), which feeds on many different plant hosts, is being observed in several crops including lettuce. Adults are about 3/16 inch long with a shiny yellow to brown-black appearance and a distinctive triangular pattern on their backs. They move quickly when disturbed.



This pest feeds by sucking plant juices, and its saliva contains a toxin which kills cells near the feeding site. This can cause distortion of the growth surrounding their "sting marks", yellow or brown spots, wilting of new growth, or abortion of flowers and fruit in fruiting crops. In strawberries, TPB cause distortion of fruit called 'catfacing'. Injury may occur in celery, beans, lettuce, Chinese cabbage, broccoli, cauliflower, asparagus ferns, eggplant, pepper, potatoes, squash, and tomato fruit, as well as various cut flowers. In lettuce, feeding causes scars to the rib of the leaf. We are also seeing wilting and abortion of leaves in the growing tip of water spinach, which may be caused by TPB. TPB is found in corn, but does not cause significant damage.

Thresholds and control options vary depending on the crop -- and in many cases, no thresholds exist since this in not normally a significant pest. Often tarnished plant bugs have moved on by the time the damage is observed. Low numbers are not necessarily a problem. However, it may be worth keeping an eye out for this pest, especially in lettuce.

Loopers have also been observed in lettuce. They do not appear to be cabbage looper, but possibly another similar large, green 'looping' species such as alfalfa looper. This may be a migratory pest not commonly found in lettuce crops in New England. Feeding damage is dramatic. Keep an eye out for ragged feeding damage and frass. Products that control cabbage looper and other caterpillars should be effective.

CAUTIONS FOR USE OF PERMIT HERBICIDE IN SWEET CORN

Permit (halosulfuron) 75% WSG. 2/3 to 1.33 ounce per acre (0.032 to 0.063 lb a.i./acre) is now labeled for sweet corn but should be used with caution. Burning has been observed in some fields. This herbicide provides postemergence control of many weed species which are not under drought stress. It is rainfast in 4 hours. Use a non-ionic surfactant at a rate of 1-2 qt/100 gal spray or a crop oil concentrate at 1 gal/100 gal spray. Control varies with type and size of weed. Species listed on the label include redroot pigweed, pokeweed, common ragweed, Pennsylvania smartweed, common sunflower, velvetleaf, wild mustard, yellow nutsedge, and wild radish. Do not cultivate for 7 days after application. Most vegetables can be planted within 12 months of application except crucifers, carrot, leeks, onions, lettuce, beets, and spinach. Some sweet corn varieties may be injured by Permit and no reliable list of susceptible varieties has yet been developed. Regular sugary varieties do not appear to be more tolerant than se (sugar enhanced) types or sh2 (supersweet) types.Initially, this herbicide should be used on a small scale to control problem weeds such as yellow nutsedge, ragweed, velvetleaf, and triazine-resistant lambsquarters.

Other postemergence options continue to exist. These include AAtrex (atrazine), Basagran (bentazon), Formula 40 (2,4-D), Lorox (linuron), and Evik (ametryn). Atrazine, Basagran, and 2,4-D have been the most commonly used.

--Rich Bonanno

TOMATO

Tomatoes are growing well with plenty of heat and water. No further reports of late blight have occurred in the Northeast region. Preventative fungicide applications for early blight are

recommended by the first week of July if they have not been applied earlier.

From 1993-1999 this newsletter published weekly updates for **TOM-CAST,** the tomato disease forecasting system. These indicate recommended fungicide application intervals based on accumulated disease severity values, which depend on temperature and leaf wetness periods. In 2000 we did not have the resources to provide this information, but in a survey of our readership conducted last fall we received a strong vote for re-instating TOM-CAST information. We are in the process of getting the hardware, and the people to manage it, in place again. TOM-CAST updates should be included in this year's newsletter by the July 12 issue – not as soon as we'd hoped, but soon enough to serve as a guide for the mid to late season sprays. We appreciate the support of individual growers and of the UMass IPM Program which enables us to restore this service.

TWO-SPOTTED SPIDER MITE

Two-spotted spider mite was observed in vine crops at two farms this week. Growers should look in tomato crops as well. Hot weather favors outbreaks of this pest. At low levels these can be controlled with releases of commercially available biocontrol agents. See the New England Vegetable Management Guide for recommended chemical control in tomato.

Below is an article by Cathy Thomas, IPM Program, Bureau of Plant Industry, Pennsylvania Department of Agriculture. This is focused on greenhouses, but much applies to field crops as well.

Bug vs. Bug--Biological Control of Two-Spotted Spider Mite

A population of two-spotted spider mite *(Tetranycus urticae)* can increase rapidly especially during hot, dry periods. Whether you are using chemical or biological control, treatment must start at low densities for effective control. Two-spotted spider mite, the most economic spider mite in greenhouse crops, can infest many crops including tomatoes, peppers, eggplants and ornamental plants. Most of the difficulty in controlling this pest is initial detection. Since there is no winged stage, sticky traps are ineffective, hence, **plant inspection is the only method to assess if mites are present.** Damage is caused by larvae, nymphs and adults piercing the plant cells and sucking out the contents. The damaged cells appear as yellowish white spots (chlorophyll is destroyed) on the upper surface of the leaf. As populations increase, the whole leaf will eventually turn yellow. Crop losses may occur when about 30% of the leaf surface is damaged.

Life Cycle. Two-spotted spider mite has five life stages, egg, larva, first nymphal stage (protonymph), second nymphal stage (deutonymph), and the adult mite. The female deposits round eggs on the underside of the leaf. These eggs hatch into larva with six legs that begin feeding immediately. After they have eaten, their color changes and two dark spots appear in the middle of the body. The larvae take in enough food before they settle on the leaf with their legs drawn in until they develop into the protonymph. After a period of feeding the protonymph develops into the deutonymph. The two body spots are very visible on these two stages compared to the larvae. The total development time varies with temperature, humidity and the host plant. Approximate development time (egg to adult) at 86°F is 7 days. Nymphs and adults produce webs and if populations are high the plant can be completely covered with webs. At this point, obtaining control is difficult and biological control is not effective.

Monitoring. Mites usually develop on the undersides of leaves and are often found at certain spots in the greenhouse. These areas have a more favorable climate for development (dry, warm). Inspect plants for mite development near heaters, doors and vents. It is important to have at a 16x hand lens to monitor for this pest. If you have difficulty-detecting mites on leaves, tap the leaves over a sheet of white paper. This technique dislodges mites (and other pests) and provides for easier identification.

Remember to maintain broadleaf weed control inside the greenhouse and at least 20-ft around the outside. In many cases, spider mite infestations develop from weeds left in the

greenhouse from the previous crop season. Remove the weeds and destroy!

Biological Control

The spider mite was the first greenhouse pest to be controlled by a commercial application of natural enemies. Several predators are commercially available.

Phytoseiulus persimilis – predatory mite

Phytoseiulus – the mainstay in spider mite control, can be used on many crops including tomato, pepper, cucumber, squash, beans, flowers and strawberries. It can also be an effective predator in field crops such as strawberries and other small fruits.

Amblyseius californicus – predatory mite

This predatory mite is used in crops where high temperatures and/or relative humidity variations occur. Amblyseius can survive for a long period of time without eating and can be used on a preventative basis when it is very hard to detect mites.

Feltiella acarisuga – predatory midge

Feltiella is a gall midge that is used especially when spider mites occur in colonies. It should be used in conjunction with a predatory mite. The gall midge larva feeds on spider mite eggs.

CRUCIFERS

Cabbage, broccoli, collard and kale harvest are underway. Caterpillars of all stripes are very active and regular scouting is recommended. IPM consultants report finding **diamondback moth, small cabbage looper and imported cabbageworm.** See last week's newsletter for recommended controls.

Club root has been observed in some fields of crucifers. This is a very destructive root disease caused by the fungus *Plasmodiophora brassicae*, which can persist for long periods in the soil. It attacks all species of brassicas. Plants are more likely to be adversely affected in low pH soils with adequate or high moisture. Long crop rotations help reduce the populations of the pathogen; however, once it is present it is difficult to eradicate. Raising pH to 7.2 is the most cost-effective way to manage the disease, if infected fields continue to be used for crucifer production.

Plants can be infected for some time before showing symptoms. The first aboveground symptoms are usually wilting during midday heat. Roots of infected plants become enlarged into various shapes, and uptake of water and nutrients is reduced. Both transplants and direct-seeded crops can be infected. If you suspect club root, contact the disease diagnostic lab at 413-545-1045.

CUCURBITS

Striped cucumber beetle is variable – not a problem in some fields, and serious in others. In hot weather, beetles may not be obvious -- look under leaves and in soil, or check for damage on the underside of cotyledons or holes in older leaves. After the 5 leaf stage, plants are less susceptible to transmission of bacterial wilt and control of cucumber beetle is less critical. After flowering, insecticide applications should be limited, to avoid killing pollinators. If treatments are needed, make applications in the evening.

POTATO AND EGGPLANT

Colorado potato beetle larvae are actively feeding and growing. Eggs hatch in 4 - 6 days at temperatures of 68-75 F, so the hot temperatures mean that as long as adults are laying eggs, there will be a rapid influx of new larvae into the field. Since the fourth instar larvae do 80% of the feeding damage, controlling larvae at earlier stages will prevent a large part of the potential damage. Feeding toxins (eg Bt, spinosad) will be effective in these temperatures. An addition to previous information on products: Spintor 2SC controls both larval and adult stages and provides excellent control at the 4.5oz/acre rate.

Watch fields for **potato leafhopper.** Field reports are variable – some fields show low levels, others are significant. Adults are about 1/4 inch long, light yellow-green, and fly up from foliage when it is disturbed or shaken. They can also be

monitored with sweep nets. Nymphs are found on the underside of leaves, light green, wedge-shaped and very fast-moving. Damage can be severe on early-season varieties of potato, as well as in green beans. Some late-season varieties such as Katahdin seem to have more tolerance.

Adults and nymphs feed by inserting a needle-like beak into the plant and sucking out sap. They also inject a toxin into the plant, which causes yellowing, browning, and curling of leaves. In potato, leaf margins turn brown and brittle first, followed by death of entire leaves. In beans, the leaf turns mottled brown as if infected with a disease before dying completely. Both adults and nymphs cause damage. Plant injury and yield loss can be significant.

Since most growers in New England scout by looking at leaves rather than using a sweep net, we use a threshold based on insects per leaf: one nymph or adult per 10 leaves. Check 25 compound leaves throughout the field to determine numbers per leaf. University of Connecticut has established a threshold of 1.5 leafhopper per leaf in eggplant. Beans are more susceptible when they are young than at later stages.

In potato, many materials registered for Colorado potato beetle adults will control leafhopper (See *New England Vegetable Management Guide*). Methomidophos (Monitor) may be the material of choice because it has the advantage of systemic activity, long residual period, and effectiveness against aphids as well as leafhoppers. Refer to the *New England Vegetable Management Guide* for recommended materials.

Organic potato growers are faced with a lack of effective, approved control materials for leafhopper. Prethrin products provide some control. The pyrethrin 'Premium Pyganic' has a national label and is approved by OMRI but is difficult to obtain and does not have state registration in Massachusetts.

SWEET CORN

Our trap capture data is expanding to more sites, with information coming in from several private consultants, growers, and researchers. We appreciate the data we receive from Mike Yates, Jim Mussoni, Dale Riggs and Ray Pestle who are scouting farms around the state and in nearby states. We will be collecting trap counts from additional locations as we set up traps at on-farm research sites. Nonetheless, we encourage growers to obtain trap counts on their own farm, either by checking their own traps or hiring a consultant. Onsite, timely trap information can't be beat!

European corn borer flight remains high, with some sites showing higher captures and some lower. Infestations in pretassel corn are variable, with many over threshold. Field should be scouted as tassels begin to appear, and treated as tassels emerge if infestations are >15%. Check again and retreat in 5-7 days if infestations remain over threshold. **Silking corn** should be sprayed weekly to prevent direct invasion of ears from ECB eggs laid on flag leaves near the silk. **Corn earworm** captures are zero at most locations. Weekly sprays should be adequate for captures at the 1-2 moths per week level, which were found at two or three sites.

Common armyworm has been reported in corn in other states, and in lawns in Massachusetts, where it is an unusual pest. It produces the same kind of ragged feeding damage in the whorl stage as fall armyworm. Use a combined threshold of 15% in whorl-stage plants.

-R Hazzard, R Cook, M Yates, D Riggs, J. Mussoni

Sweet Corn Trap Captures and Scouting Data June 21-28

Town	Date	ECB Z1	ECB E2	TOTAL ECB	CEW	% PT**
N. Bennington,VT	26-Jun	7	11	18	--	<1%
Stephentown,MA	26-Jun	3	1	4	--	<1%
Hatfield	25-Jun	0	2	2	1	25%
South Deerfield	27-Jun	9	--	9	--	--
Hadley	26-Jun	16	8	24	0	20%
Southwick	26-Jun	52	7	59	0	0-20%*
Feeding Hills	25-Jun	5	3	8	0	17%
Ipswich	26-Jun	0	1	1	0	9%
Munson	27-Jun	0	0	0	0	3%
Leicester	27-Jun	0	0	0	0	3%
Millis	25-Jun	19	22	41	0	--
Hopkinton	25-Jun	14	4	18	0	19%
Seekonk	26-Jun	15	12	27	2	16
Swansea	26-Jun	26	15	41	0	--
Rochester	26-Jun	0	23	23	2	--
Rehobeth	26-Jun	6	13	19	1	--

*Where row cover was used, 0% infestation.

** % infestation in unsprayed corn at the pretassel stage (tassel visible in the whorl)

-- Information not available.

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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