Vegetable IPM Message
August 17, 2000
Volume 11, Number 14

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Crop Conditions

Late summer crops are coming in, though more slowly than normal . Unseasonably cool temperatures returned this week. Market demand outstrips supply in many farmstands and other outlets. Growers report running out of sweet corn on many days -- unheard of for mid August!

Rainfall totals for the past four weeks (reported by New England Agricultural Statistics Service) range from about 3.5 inches in eastern and southeastern locations to more than eight inches in the Connecticut Valley. The Connecticut Valley and Berkshire County have been inundated with another 4-5 inches of rain in the past week. Central and eastern Mass had less rain, but many fields are soaked nonetheless. This week brought more long periods with continuous leaf wetness. As a result, foliar and fruit diseases are blossoming. Whole fields are going down to disease. Rotated fields and lighter soils are showing a significant benefit. Some growers are faced with deciding whether, or when, to cut their losses and disk under crops that are too heavily infected to be likely to produce marketable crops. Getting infected crops underground can speed decomposition and reduce aerial movement of spores to surrounding areas. Looking hard for some good news! Everyone is hoping for a turnaround to warmer, drier weather.

TOBACCO

Brown spot, caused by an *Alternaria* fungus, has caused nearly a complete loss in tobacco this year. This fungus is indigenous to this area and is always present. It normally infects lower (sand) leaves as they age. However, wet weather this year has been ideal for the disease. Although mancozeb fungicides are effective against Alternaria, it is not possible to achieve adequate control under conditions such as we have experienced this year.

There are many species of Alternaria fungi which cause disease of various crops. Early blight of tomato is caused by an Alternaria fungus, but not the one that causes brown spot in tobacco. These fungi over-winter on infected plant debris. However, they do not survive well in the soil. Therefore, an effective way to reduce the amount of inoculum

that can carry over to infect next year's crop is to thoroughly incorporate all crop residue into the soil. This can be done by deep harrowing or plowing. Small amounts of crop debris left on the soil can provide a source of the disease next year. It is not possible to eliminate all of the fungus, but careful incorporation on crop residue this year may reduce the problem next year.

--*John Howell*

Scarab Beetles in vegetable crops

White grubs, the larvae of scarab beetles, are a common and destructive pest on turfgrass. While the grub stage is most damaging in settings such as turfgrass, the adult beetles often move into vegetable fields where they feed on foliage and can occasionally reach pest status. Currently, we are seeing Japanese beetles causing damage in several vegetable crops. They are feeding on silks in sweet corn (which may cause poor pollination and ear fill). In collards and cabbage Japanese beetles are causing feeding holes in leaves. Three species of these scarab beetles 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. (Sometimes an individual will be almost all black or almost all gray.)

Asiatic garden beetles (AGB) are about half as long as a Japanese beetle adult, and somewhat more "plump" in appearance. They are reddish-brown or copper-colored. AGB is a night feeder, spending the day in the soil around plants. Beetles 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).

Life cycle. 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 of Japanese beetle 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 ago, 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 European chafer has become a major problem in coastal Massachusetts, especially in the Bridgewater and Plymouth areas as well as western Middlesex county and eastern Worcester county. (The current "front" in the expansion of this species appears to be just west of Route 495.) We have received numerous calls describing total devastation of hay fields. The life cycle of the European chafer is about two weeks earlier than the Japanese beetle. Of all the scarab species we encounter in New England, it is least vulnerable to insecticides.

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.

Controls. 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 the other scarab 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.

If there is concern about grub populations in cropped fields, it may be possible to reduce grub survival through starvation (ie no crop roots to feed on in late summer, where that is possible). The tillage used to incorporate crop residues after harvest will bring grubs to the surface and expose them to predators. This needs to be done before November, when grubs move down deep for overwintering. Another possibility is predatory nematodes. The best option would be *Heterorhabditis bacteriophora*, which can be purchased from insectaries and applied through a backpack or low-pressure boom sprayer as a soil drench. (Do not use *Steinernema spp*, which are ineffective against grubs.) The rate used on turf is 1 billion per acre but it could be less on bare soil because they are not lost in the thatch as in turf. They have to be watered in to get them down into the moist areas of the soil. Research studies conducted at UMass and elsewhere, using this species, showed quite consistent results (60-70% mortality) against grubs in turf.

Traps baited with attractant may be another option for reducing Japanese beetle numbers, but care should be taken to place traps a distance away from any crop that could be damaged (preferably upwind). Studies out of Kentucky indicate that trapping of Japanese beetles results in **increased** grub activity within 10 meters of the trap. So placement would be crucial. As heavy as our beetle populations tend to be, trapping may not make a big dent but in the absence of other options it may be worth trying.

--*Pat Vittum & Ruth Hazzard*

Cucurbits

More new fields are showing outbreaks of fruit infections from **black rot** (**gummy stem blight**) or **Phytophthora**. Infections blossomed in the past week during the long period of leaf wetness from Friday to Monday. Maintain weekly fungicide schedules with the rotations described in previous issues. Remember that three systemic fungicides are available: Nova, Quadris and Benlate.

Crucifers

Watch for **cabbage aphid** in late crucifers (especially Brussels sprouts). For fall root crops, watch for eggs of the third generation of **cabbage root maggot**. Typically the third flight begins the latter half of August. Continue to scout for **cabbage looper** and other caterpillars. With all the rain, soil temperatures are cooler than usual, which is more favorable to maggot egg survival and may result in heavier infestations in fall crucifer crops.

Onions

Downy mildew is being reported in New York State on onion. Mancozeb is the material of choice for controlling this disease. Chlorothalonil (Bravo) will <u>not</u> control downy mildew on onions and also has been shown to reduce onion yields. Mancozeb also

controls botrytis leaf blight. There is little additional value from adding Ridomil. Downy mildew on onions looks somewhat similar to powdery mildew on other crops. Look for a violet fuzz of sporulation (most visible on dewy mornings) on recently infected leaf tissue.

Disease Diagnostic Update

Greetings from the UMass Plant Disease Diagnostic Lab. In the last issue, we mentioned that several vascular wilt diseases were found in cucurbit and eggplant samples recently submitted to the lab. We have since confirmed that the eggplants had **Verticillium wilt**, caused by a fungus of the same name. Although Verticillium can infect a large number of vegetables, it is most prevalent and destructive on eggplants. Symptoms include wilting and yellowing of foliage, stunting of plants, and misshapen fruit. Although many eggplants can survive this condition, a significant portion may die. There are no effective chemical treatments against this or other vascular wilt diseases (such as Fusarium wilt and bacterial wilt, mentioned in previous issues), so the use of resistant varieties is usually the best defense against these diseases. However, there are no Verticillium-resistant eggplant varieties available. Cultural practices include rotation out of all solanaceous crops (e.g., eggplants, tomatoes, green peppers, potatoes), as well as strawberries and brambles, for four years, since Verticillium produces sclerotia, hard reproductive structures which can last in the soil for many years. Growing eggplants in black plastic appears to reduce disease severity. Infected plant material should be removed from the field and destroyed after harvest. Fumigation of field soil with Vapam in the fall is an option, but only if the wilt was widespread or if any of the susceptible crops listed above are going to be grown over the next few growing seasons.

Cucurbit fruit throughout the state continues to be plagued by **black rot** (caused by the fungus Didymella) and **Phytophthora fruit rot** (caused by P. capsici). Although there are fungicide treatments available for black rot (see previous issues), there are none for Phytophthora. We are recommending that infected plants, if caught early enough, be removed (in plastic bags), tilled under, or covered with plastic tarps to prevent the aerial dissemination of the spores. However, care must be taken to prevent the spread of infected tissue or soil to other parts of the field. If you need more information, or see any diseased plants in your fields, call us here at the lab (414 545-1045 or 577-1827), and send samples to the Plant Disease Diagnostic Lab, Fernald Hall, UMass, Amherst, MA 01003.

SWEET CORN

Environmental conditions are affecting sweet corn, too. In addition to harvest gaps caused by planting difficulties earlier in the season, the ongoing cool temperatures, rainfall and wet soils are playing a role in uneveness in maturity, slow ripening and poor ear fill. Blocks of one variety, planted at the same time, vary in maturity by 7-10 days and have to be picked over a long period to get a full harvest. This complicates pest management actions as well. Growers are reporting problems with tip fill and ear size in some plantings. We are also seeing uneven kernel fill, not just at the tips but throughout

the ear. This may be from environmental causes, but may also be associated with silk clipping cause by **Japanese beetle,** or **corn rootworm beetles**. Clipped silks can result in uneven pollination. These beetles include northern, southern, and Western corn rootworm. Female **western corn rootworms** look very similar to striped cucumber beetle, except that the black stripes are less distinct and do not extend all the way to the tip of the abdomen. Male western corn rootworms are mostly black except for the posterior end, which is yellow-green. **Northern corn rootworm** is pale green without markings. **Southern corn rootworm** is the same as **spotted cucumber beetle**, and is yellow green with twelve black spots and a yellow abdomen, and feeds also in cucurbits. Corn rootworms have one generation per year, with adults normally emerging in July, feeding on pollen, and laying eggs in the soil late in the summer. They cause injury to sweet corn because they clip and destroy silks while feeding before pollination. Larvae feed on roots and may cause injury to corn crops the following year in non-rotated corn fields. Rotation effectively prevents damage.

A **stalk rot** is evident in some fields, causing soft brown lesions on the stalk up into the ear zone. Some stalks have rusty-red patches. This may be associated with a brown rot seen inside ears, which begins in the shank and sometimes moves upward onto kernels and silks. In areas of heavy rains, developing ears are actually sitting in a "lake" formed by the sheath that holds the ear, which means that the tissues are in water for extended periods. The exact identity of these diseases is being determined. **Corn rust** continues to be present, though in most cases appears not to be causing significant injury or crop loss.

Corn earworm numbers are lower in the Connecticut River Valley, but remain high in eastern Massachusetts from the north shore all the way southward. Berkshire captures are also high. Spray schedules should be maintained at intervals matched to the capture rate (see thresholds below). Cool temperatures (highs below 80 ^{o}F) produce slower egg hatch, which makes it possible to extend intervals for a day.

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.

European corn borer flight remains high. If corn earworm were not driving the spray schedules, we would be recommending a weekly spray to control ECB in silking corn. As it is, we are not seeing the levels of pretassel infestation one might expect given the trap counts. Environmental factors such as rain and cool temperatures may account for this. Pretassel fields should still be scouted, especially because **fall armyworm** captures are high. Watch whorl-stage blocks for ragged damage, and treat at >15% infestation.

For organic growers, caterpillar control can be achieved using foliar Bt applications to control European corn borer from pretassel into silking stages. Use a *Bt kurstaki* product labeled for use in sweet corn (Dipel ES, DF; Condor XL). Use higher rates for heavy infestations, and include an approved sticker. Where fall armyworm is present, *Bt aizawi* (Xentari) is likely to provide better control. Corn earworm can be controlled with direct silk applications of a mixture of Bt and vegetable oil (corn or soy). For details on this method, contact the Vegetable IPM office (413-545-3696) for a fact sheet.

SWEET CORN TRAP CAPTURES FOR WEEK ENDING AUGUST 17, 2000

Town	Date	ECB Z1	ECB E2	TOTAL ECB	CEW	FAW	% ECB/FAW PT*
Berkshire Region							
N. Bennington,VT	14-Aug	12	0	12	9		
Stephentown,NY	15-Aug	25	12	37	17		
Sheffield	15-Aug				4		
Pittsfield, MA	15-Aug	23	24	47	14		
Conn. River Valley North to South							
Walpole, NH	15-Aug	1	17	18	3	0	2%
Plainfield, NH	15-Aug	7	7	14	1	0	
Westminster,VT	16-Aug	59	280	339	1	9	2%
Putney,VT	17-Aug	33	28	61	4	4	8%
Whately	14-Aug	52	140	192	2	0	0%

South Deerfield	14-Aug	13	29	42	13		
Sunderland**	12-Aug	5	3	8	17**	12	0%
Hadley**	12-Aug	21	17	38	6**	40	0%
Amherst	15-Aug	17	22	39	6	3	12%
Feeding Hills**	12-Aug	0	8	8	12**	14	10%
East/Central MA North to South							
Ipswich	14-Aug	2	0	2	59	1	1%
Dracut	16-Aug	8	80	88	42	1	
Concord**	11-Aug	0	13	13	14**	0	2%
Stow	15-Aug	41	64	105	49	5	20%
Northbridge	16-Aug	30	50	80	23	12	19%
Still River	17-Aug				30		
Leicester	16-Aug	3	0	3	11	0	4%
Millis	17-Aug	9	16	25	60	12	
Hopkinton	17-Aug	21	27	48	85	18	
Seekonk	17-Aug	6	25	31	NA		
Swansea	17-Aug	19	33	52	117	27	
Rehobeth	17-Aug	17	107	124	67	19	

****NOTE**: Sites marked with ** were scouted on August 11 or 12 and do not reflect changes in earworm activity in the past 6 days. Check nearby locations for more recent

data.

*% infestation with European corn borer or fall armyworm in unsprayed, pretassel corn.

Blanks indicate no data is available.

-- *Thanks to J. Mussoni, M. Yates, R. Pestle, D. Riggs, P. Willard, R. Cook, P. Westgate, & R. Parker for sweet corn data.*

NEXT VEGETABLE IPM NEWSLETTER WILL BE MONDAY AUGUST 28.

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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