



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 15, Number 12

July 15, 2004

CROP CONDITIONS

Warm weather crops would appreciate some heat. Some field tomatoes are starting to trickle in, but major harvests are yet to come. Green beans are coming in. Sweet corn quality is excellent – as long as early borer was controlled. Phytophthora showed up in one cucurbit field this week. Disease management is on everyone's mind. Long periods of leaf wetness have taken place this past week – cool, cloudy days with intermittent mist and rain. These are good conditions for foliar fungal diseases such as early blight and late blight of tomato and potato, as well as for bacterial diseases such as bacterial leaf spot in pepper or tomato, and bacterial canker of tomato. Scout fields frequently, and use protectant sprays to prevent disease. Two hours of drying time (before that impending thunderstorm) is needed – and is sufficient -- to obtain rain fastness in most materials.

Earlier damage from cutworms has made itself evident in some tomatoes and peppers. Now that fruit load is weighting down the plants, and demands for water are high, plants have toppled or wilted. Examination of the base of the stem shows old feeding damage, swelling at the base of the stem just above the chewing damage, and rotting that entered the stem tissue. Cutworms have pupated (and possibly emerged as moths) by now, so no cutworm can be found in the soil nearby.

Oriental beetles have emerged from the soil and are feeding. These can be troublesome. Though not often serious pests of vegetables, they do feed in sweet potato and leaves of other vegetable crops, such as tender brassica greens
Correction: The phone number for the UMass Disease Diagnostic Lab is 413-545-1045. Rob Wick suggests that growers call to determine the best way to take and send a sample for diagnosis.

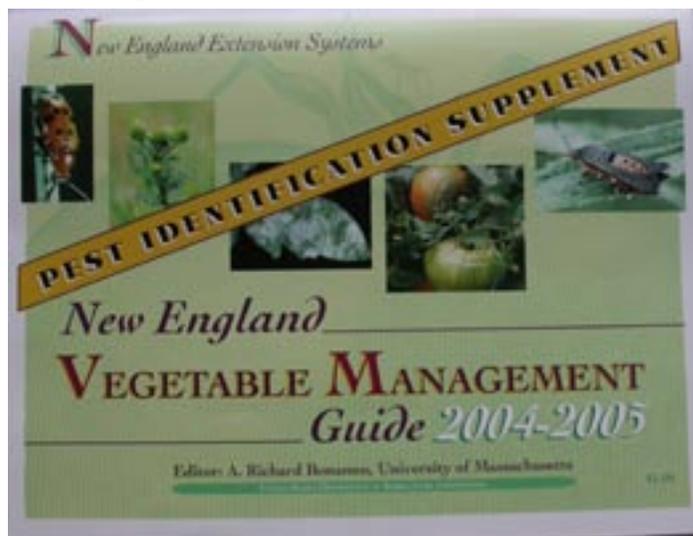
ANNOUNCING THE PEST IDENTIFICATION SUPPLEMENT

Many growers in New England are aware of the *New England Vegetable Management Guide* and its effectiveness in providing up-to-date resources and information necessary for healthy vegetable production. (The updated edition for 2004-2005 is still available at the UMass Extension

Bookstore if you don't have a copy yet). However, we realize that it is often difficult to identify the exact problem affecting your crops without a visual guide to refer to. For this reason we have created a ***Pest Identification Supplement*** that contains over 200 beautiful color pictures of all of the weeds, insects, diseases & physiological disorders that are mentioned in the Guide. Production of this supplement was made possible by a grant from EPA to the New England Vegetable and Berry Growers Association. Every member of the NEV&BGA, and everyone who purchased a Guide through the UMass Extension Bookstore, is receiving a copy in the mail. Anyone who orders a Guide will also receive the Pest ID Supplement, for a total cost of \$15 plus shipping and handling. The price for the Pest ID Supplement by itself is \$5.00. Contact the UMass Extension Bookstore at 413-545-2716 or visit the website at <http://www.umassextension.org/Merchant2/merchant.mv>

In each New England state, the Extension office that distributes Guides has received the Pest ID Supplements to distribute in their state. Contact your state Extension office for more information.

A note for organic farmers: organic growers are often cautious about using the Guide because it presents information on many conventional pesticides and fertilizers that are prohibited for organic growers. However, there is a wealth of information that is useful to organic farmers, including the nutrient value of organic sources of nutrients and cover crops, crop production recommendations, biorational pest



management, irrigation, vegetable bedding plant production –and, the new Pest ID Supplement! Because of frequent change certification standards, and the new federal standards we did not earmark specific products as ‘organic’; you must depend on your certifier for that information. However, many certified/approved products are included in the recommendations – and it makes clear which products are labeled for which crops.

TOMATO AND EGGPLANT UPDATE

Early blight is showing up in susceptible varieties. The most common diseases of tomato in Massachusetts in recent years have been early blight, Septoria leaf spot, and bacterial canker. Late blight has occurred sporadically in wet years, and there are several other fungal and bacterial diseases that are not uncommon. See the new Photo ID Supplement for excellent photos of disease symptoms of fruit and leaves of tomato!

Growers should be scouting their fields regularly for disease. By this time, growers should be on a regular fungicide schedule ranging from 7-14 days, depending on weather conditions. Conditions that favor disease are long leaf wetness periods and warm temperatures. Tighten spray schedules when conditions are favorable. Use copper products when bacterial disease is present.

Following are descriptions of the three most common: Bacterial Canker -- Secondary infections are the most common and typically show up in midseason, July or August. This foliar blight phase results from bacteria that entered the plant from the leaf surface. The latent period from infection of tissue to evidence of symptoms is 3-6 weeks.

Identification: Leaflet margins are dry and brown, with a border of yellow between the necrotic and healthy tissue. This “marginal scorch” often begins on lower leaves, spreading upward, but may begin anywhere on the plant. Infected fruit show “bird’s-eye” spot, small spots with brown centers surrounded by a white halo. Primary infections may also occur.

Recommended Action: Applications of copper, copper-maneb mix, or copper-maneb-chlorothalonil mix are recommended when the disease first appears, and at 7-10 day intervals thereafter. Work in field only when dry, if possible; work in non-infected area first. Bury debris with deep disking after harvest; rotate tomato fields. Do not use airblast sprayers, which spread the disease across the rows.

Early Blight

Early blight (*Alternaria solani*) is the most common and widespread foliar disease in field grown tomatoes in New England. Contrary to what the name suggests, this fungal disease normally appears in mid to late July, as plants develop a full load of ripening fruit, and it is not until mid to late August that we see rapid expansion of the

disease throughout the foliage. Uncontrolled, early blight can completely defoliate tomato plants and shorten the harvest period. In four years of field trials at University of Massachusetts, yield was reduced by 9% to 52% in unsprayed plots as a result of defoliation from early blight. However, unsprayed staked tomatoes developed less blight than ground tomatoes – a result that has also been found in NJ and VT.

Identification: Lesions occur on the older foliage first, and work their way up the plant. Infection results in characteristic brown, circular lesions with dark concentric rings like a target board. As disease progresses, whole leaves turn yellow, then brown.

Recommended action: Applications of strobilurin fungicides (Quadris, Cabrio), chlorothalonil, maneb, or copper should begin the first week of July should be made at 7-14 day intervals depending on weather conditions; or at intervals of 15 DSV’s if the disease forecasting from TOM-CAST is available.

Septoria Leaf Spot

Septoria leaf spot (*Septoria lycopersici*) is less common than early blight but can be very fast moving and destructive when present, resulting in significant yield losses. The timing and development of the disease is similar to that of early blight.

Identification: Infection begins on the lower leaves with small circular spots that have tan to gray centers and dark brown margins. At the center of the lesions, black pinhead-sized pycnidia can be seen (visible with the naked eye, and even more apparent with a hand lens), which distinguish this disease from early blight. Also, lesions tend to remain small, up to 1/8 inch in diameter. Infection, and subsequent defoliation of the plant, spreads from the oldest leaves toward new growth, and can progress even more rapidly than with early blight.

Recommended Action: Same as for early blight, except that manzate and mancozeb do not give adequate control of Septoria blight.

TWO SPOTTED SPIDER MITES IN TOMATO AND EGGPLANT

Watch for infestations of **two-spotted spider mites** in tomatoes and eggplants. In tomato, leaves turn yellowish and chlorotic, and mites are found in high numbers on the leaf undersides. Damage from mites often goes unnoticed until too late, when plants are severely injured and yields are reduced. Damage increases rapidly with the arrival of hot weather (we might still get some – July is only half over!). Once webbing begins, it is difficult to control spider mites. If the plants look off-color, look closely on the leaf undersides to determine if mites are the reason., No thresholds established but, treat if there is significant

plant injury or if numbers are increasing. In tomato, apply either Kelthane or AgriMek for control. (Note these are not labeled for use in Eggplant) Neem (Trilogy) is also labeled for mites in both tomato and eggplant. Insecticides labeled in eggplant include Capture, Warrior, Vydate, and Metasystox-R. (see New England Vegetable Management Guide). Unfortunately some of these are hard on natural enemies and could induce aphid outbreaks. Use at least two sprays 5-7 days apart. Target sprays for adequate coverage of the foliage to the leaf undersides – use drop nozzles, or high pressure sprayer.

-Adopted from Gerald M. Ghidui, Ph.D., Specialist in Vegetable Entomology, Rutgers Cooperative Extension, 7/14/04

CUCURBITS UPDATE

Scout for **powdery mildew** and **downy mildew** in squash crops by examining leaves on plants throughout the field. This gets harder as vines run, but once spray rows are established, use the spray rows to get around. Powdery mildew will show up first on older leaves, and often on the underside. The threshold for initiating sprays for powdery mildew is one symptomatic leaf per 50 sampled leaves. Basically, if you see it, you initiate sprays for it. See accompanying article for organic options vs this disease.

Angular leaf spot has been observed in squash. Initial symptoms are water-soaked spots on leaves, bounded by veins (hence, angular). These may be brown and surrounded by a yellow halo (on squash), lesions gradually shrink and dry; as they dry, the tissue tears leaving irregular holes. While this often shows up only on older leaves and does not threaten yield, it is similar to bacterial leaf spot of cucurbits which can cause fruit problems. Copper applications may be warranted if disease is expanding into younger leaves.

Squash bugs can be found ovipositing on cucurbits (squash, cukes and pumpkins) at this time, and populations of squash bugs may be higher in no-till. If more than 1 egg mass is found per plant, control methods should be initiated for this pest (eggs appear as clusters of bronze, oval, small hard objects on the leaves). Management of this pest is best obtained by targeting the small, whitish/grayish nymphal stages, usually found on the leaf undersides. Ambush, Capture, Asana and Sevin are labeled for squash bug control on cucurbits. Gerry Ghidui of Rutgers reports that neem-based insecticides (azadirachtin product such as Azatin, Ecozin, Neemix, etc) may be less harmful to the beneficials, and will still effectively control squash bug nymphs. This is excellent news for organic growers who are struggling with this pest. For any pesticide applications against squash bug, aim for coverage of undersides of leaves as well as upper surfaces, since squash bugs tend to hide and feed under the leaves.

Squash vine borer may also be active at this time. This is not normally a significant pest in vine crops in Massachusetts; however, some growers report problems, and I hear about it more from farmers with small plantings than I do from those with large fields. Injury to a few stems may not warrant a pesticide application. Inspect stems for frass and signs of damage. Control newly hatched squash vine borer larvae by making 2-4 applications at one-week intervals beginning now. Thoroughly treat stems. Spray late in the day. In small plantings, burying stems to encourage re-rooting beyond the damaged section may be helpful.

--Adapted from Gerald M. Ghidui, Ph.D., Specialist in Vegetable Entomology, Rutgers Cooperative Extension

FOR ORGANIC GROWERS: DISEASE MANAGEMENT IN CUCURBITS AND TOMATO

The following recommendations are excerpted from Vegetable Crop Health: Helping Nature Control Diseases and Pests Organically by Brian Caldwell, which is now available (see below).

Cucurbit diseases: If striped cucumber beetles are well-controlled, bacterial wilt will be minimal to none. There are many leaf spots which affect cucurbits, but with good rotation and culture you should not see them often. Phytophthora blight is a major problem for pumpkins and squashes in some warmer areas of the Northeast. Be sure to grow them on well-drained soils, and rotate well. Peppers are another common host of this disease, strangely enough.

Powdery mildew (PM) will make an appearance each year on almost every farm. It comes in late July or early August, when plants are loaded with fruit. Unlike many fungal diseases, it does not need free moisture to get going.

PM lowers yield and quality by reducing functioning leaf area. I believe that keeping soil quality very high, for a good, healthy root zone, will make plants more tolerant of PM. Choose spreading over bush varieties.

Bush varieties have fewer overall leaves, so PM may affect them more. If PM starts late and spreads slowly through the crop, its effect on yield and quality is minimal. Intercropping cucurbits with strips of other species can help with this. Try non-GMO PM-resistant varieties. There are several approved pesticides that are effective against PM, but spray coverage must be very good, on tops and bottoms of the leaves. It is also difficult to get into the field when sprays need to be applied. Mineral oils, plant-derived oils, bicarbonate products (Armcarb 100), sulfur, and others will reduce this sensitive pathogen.

Virus diseases, including cucumber mosaic virus and others, can be a problem, especially in late plantings. The reservoir for these is perennial broadleaf weeds near the field. Aphids transmit the viruses to the crop. Either destroy the

reservoir plants or keep cucurbits away from areas where virus is prevalent.

Tomatoes

The single most important thing you can do to increase the marketable yield of tomatoes is-get them off the ground. Use whatever form of support you like, Florida weave trellis, caging, or staking, but do it.

Diseases: Early blight is a yearly visitor on most farms. Indeterminate varieties that are well-fed, mulched with plastic and staked (cages do the same thing) are often able to tolerate this fungus reasonably well, producing good crops without sprays, until cool weather in mid-September finishes the plants. They continually make new leaves to replace those that go down to the disease, which may get off to a slower start if both rows and aisles are mulched. This keeps spores from splashing from the soil up to the foliage. The aisles between plastic need to be mulched with straw or hay for best effect. This is great for the soil, and prevents weeds.

If a spray is needed, copper products are effective. They must be applied on a 7-day cycle during periods of wet weather, or with an interval of up to 15 days in dry weather. Predictive models such as Tomcast can be used to time copper sprays. They require close weather monitoring. Check with your Cooperative Extension Educator for detailed information.

Work is being done with compost teas on this disease, but so far there are no clear guidelines for effective control that I'm aware of. Also, the status of compost teas under the NOP is unclear. Abby Seaman of Cornell has found that drenching the plants at transplanting time with PlantShield has reduced early blight in the field.

I might also add that university trials with Serenade, an approved *Bacillus subtilis* product, have not been promising against early blight, septoria, or bacterial spot on tomatoes; or powdery mildew on cucurbits.

Also, for butternut squash growers having trouble with black rot, the variety Nicklow's Delight does not show resistance to that disease in the field. Good sanitation and rotation are the only viable options at this time for black rot.

In the near future, another manual called the *Resource Guide to Organic Insect and Disease Management* will be available, written by Emily Brown-Rosen, Eric Sideman, Tony Shelton, Christine Smart, and myself. It will review organically-approved pest control products in considerable detail, covering environmental impacts and efficacy.

-Brian Caldwell, Farm Education Coordinator for NOFA-NY.

FARMER FRIENDLY ORGANIC PEST CONTROL MANUAL

Vegetable Crop Health: Helping Nature Control Diseases and Pests Organically is a new manual for organic vegetable growers in the Northeast. It is part of a series of handbooks on Organic Principles and Practices published by the Northeast Organic Farming Association (NOFA). *Vegetable Crop Health* includes farmer-friendly chapters on the basic concepts of organic pest management with heavy emphasis on proven no-spray cultural techniques that reduce pest numbers and damage. There is a full chapter on farm design and crop rotation toward this end. Finally, there is a crop-by-crop discussion of specific pest management practices, including spray-based "rescue" treatments. Scientific research and farmer experience back up the discussions.

This manual covers all aspects of holistic pest management, including everything from host plant resistance to soil health, trap cropping, cover crops, field layout, row covers, manipulating the overall farm environment, and much more. The author, Brian Caldwell, has been a commercial organic vegetable grower for over 20 years, a Cornell Cooperative Extension Educator, and is now Farm Education Coordinator for NOFA-NY.

Vegetable Crop Health may be purchased through state NOFA chapters throughout the Northeast. For contact information for all the NOFA state chapters, go to <http://www.nofa.org/chapters.php> You may also call NOFA-NY at

518-734-5495.

SCARAB BEETLES IN VEGETABLE CROPS

Japanese Beetles and Oriental Beetles. are active now and congregating in various crops and non-crop habitats. They can cause damage in greens and peppers. Below are descriptions of several scarab beetles found in New England.

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.) Eggs are laid in the soil. Small grubs will hatch from the eggs, and the grubs can cause severe damage to the sweet potato roots. There is only one generation per year, and the developing grubs remain in the soil until next June-July

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 turf grass) 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 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.

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 (including sweet potato). It is labeled for Japanese beetle on some vegetable crops; however, it is not labeled specifically for these beetle species on most crops. On organic farms, Pyganic may be an option for controlling adults. Insecticide should be applied in the evening for night-feeding beetles, or in the morning for day-feeders.

-Adapted from Pat Vittum, Turf Entomologist, UMass, Gerry Ghidui, Rutgers Coop. Extension.

SWEET CORN

We are still in the fortunate period of sweet corn production when pests are light. **European corn borer** moths are between generations and captures are still low. Scouting in pretassel blocks showed lower numbers of borers this week – often below threshold for sprays. “Mopping up” from the first generation is still needed in some. **Corn earworm** captures are low – 0 or 1 moths per week in many sites. Threshold for a 6-day schedule on silk is 2 moths per week or more (see below). Watch for coastal storms, which may bring greater numbers. A few sites captured a **fall armyworm** moth--nothing serious, but a suggestion to watch whorl stage corn for the ragged feeding damage that indicated fall armyworm is present (whorl stage threshold is 15% with damage). Aphids are showing up.

A good growing year for the whole Northeast means wholesale market prices drop fast. That seems to be happening in sweet corn.

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 days	3.5 - 7	5 days
1.0 - 13.0	7 - 91	4 days
Over 13	Over 91	3 days

Town	Date	ECB Z1	ECB E2	Total ECB	CEW	FAW	%PT
Berkshires/ Champlain Valley							
Sheffield	7/14	1	5	6	1	0	
Westminster, VT	7/13	1	1	2	0	1	
Pittsfield	7/14				1	2	
CT River Valley							
S. Deerfield	7/13	3	2	5	0	0	
N. Hadley	7/13	1		1	0	0	
Hatfield	7/13	3	2	5	6	0	8%
Hadley	7/13	1	1	2	1	0	
Feeding Hills	7/13	0	0	0	1	0	2%
C.&E. MA							
Dighton	7/13	2	1	3	3	0	
Dracut	7/12	1	0	1	0	0	
Still River	7/14	0	0	0	1	1	
N. Andover	7/9	0	0	0	0	0	28%
Concord	7/12	2	1	3	1	0	48%
Ipswich	7/10	0	0	0	2	0	8%
Leicester/ Spencer	7/14	0	0	0	0	0	4%
Northbridge	7/14	0	0	0	0	1	4%
Tyngsboro	7/12	0	0	0	1	0	48%
Seekonk	7/13	0	3	3	0	0	
Sharon	7/13	7	1	8	3	0	

Vegetable Notes, Ruth Hazzard, editor and Ben Hunsdorfer, Assistant Editor. *Vegetable Notes* is published weekly from May to September and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted; author is R. Hazzard if none are cited.

Where trade names or commercial products are used, no company or product endorsement is implied or intended. Always read the label before using any pesticide. The label is the legal document for product use. Disregard any information in this newsletter if it is in conflict with the label.

PEPPERS

Next week is a good time to set up European corn borer traps. We can expect the second flight to begin within the next two weeks. Use two net traps (baited with Z/Iowa and E/New York lures) set up in an open, grassy or weedy border of the field, with the base of the trap touching the top of the weeds.

Bacterial leaf spot has shown up in some pepper fields. Copper applications (weekly) suppress this disease. Combining with a maneb or mancozeb fungicide enhances the efficacy of the copper.

