UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

This week brought a few sunny days before returning to cool wet weather for much of the state. Some of the very first sweet corn is starting to come in now, along with the first corn earworm moths. This week there will be new potatoes, along with peas, cauliflower, broccoli, cabbage, early carrots, scallions, lettuce, beans, greens, zucchini and summer squash, and cucumbers are coming along now. We've been lucky so far in terms of late blight – it's hit tomatoes and potatoes in New York and other place in the Northeast, but so far we haven't had reports of it showing up in commercial fields in Massachusetts. Some of the preventative sprays many growers are applying may be helping to delay the spread of this disease.

DOES SPRAYING FOR APHIDS CONTROL VIRUS? WHEN SHOULD I SPRAY FOR APHIDS?

At this point in the season, aphids have shown up in many crops, and growers are concerned about whether and when to spray. Many growers feel they must have a rigorous spraying program for aphids to protect their crops from virus diseases. All too often this practice is not effective in preventing the occurrence of virus diseases, but it is expensive and time consuming.

This article will briefly review some of the basics of how viruses are spread. Virus diseases require a living host, and when the host plant dies, any virus within the host plant cannot survive. (An exception is tomato/tobacco mosaic, which can survive in dead host tissue.) For the most part, viruses survive the winter in certain perennial weeds. During the growing season, viruses can be transmitted from perennials to a susceptible vegetable crop.

Most vegetable virus diseases that are important in New England are spread by insects. Cucumber beetles, thrips, leafhoppers, and nematodes can spread certain viruses, but aphids are the most important vectors (carriers). Viruses can be classified as persistent and nonpersistent. This is related to the manner in which they are spread by insects and is important in choosing an appropriate management strategy.

An insect must feed for a minimum of ten minutes to an hour to pick up a persistent virus from an infected host. The virus must then undergo a dormant period of at least 12 hours within the insect before it can be transmitted to another plant. Aphids will remain infective (able to vector a virus) for at least a week and maybe throughout their life. A good insect management program including pesticides can be very helpful in dealing with persistent virus diseases.

Aphids pick up nonpersistent viruses by merely probing (exploring) an infected leaf. This happens rapidly--within seconds or minutes. A dormant period is not required and the aphid can immediately transmit the virus by probing another plant. Aphids remain infective with nonpersistent viruses for a short time (minutes).

Winged aphid stop on many types of plants and probe to determine if the plant is the 'right one' for them – if it is their host plant. If it does not 'taste right', they will fly away. During the few seconds it tastes the plant, any viruses that it is carrying can be transferred. No insecticide works fast enough to prevent this transmission. Insecticides do not prevent virus transmission in most vegetables and any application of insecticides to prevent viruses does more harm than good by killing natural enemies.

Systemic materials are generally the most effective insecticides available for aphid control. Systemic insecticides are

taken into the plant and become present in the plant juices. Aphids feed by sucking juices from the plant, and when they do so they also ingest some of the insecticide. However, when probing a leaf an aphid is not feeding and does not ingest plant juices or insecticide. In fact, the presence of an insecticide may actually stimulate probing and cause aphids to move from plant to plant in an effort to fine a suitable feeding site. This can increase the spread of nonpersistent viruses.

Nonpersistent viruses are very difficult to manage. We have no pesticide that kills viruses and, as we have seen, insecticides may actually make matters worse. Eradication of perennial weeds around fields can reduce the source of the virus. The green peach aphid is not the only aphid that transmits viruses, but it is important because it is a universal vector. Prunus species (peaches, cherries etc) are attractive to green peach aphids. Removal of wild prunus such as wild cherry trees from around fields can make the area less attractive to green peach aphids.

Reflective mulches such as aluminum foil on paper have been used successfully to repel aphids and can be effective in reducing virus problems. However this material is expensive and tears easily when laying. Some of the light colored plastic mulches may be worth a try. Row covers such as Remay can keep aphids off a crop, but they are generally used during the cool days of spring whereas aphids are most active during warm weather.

Resistant varieties. The most effective way to reduce the incidence of viruses is to plant virus resistant varieties, wherever possible. Managing weeds in and around vegetable fields will also help reduce aphid populations.

Direct damage from aphids. Besides spreading virus diseases, aphids in high numbers can cause economic damage by their feeding activities. Leaf curling and yellowing or deposits of honeydew on leaves or fruit can affect crop quality or yield. For this reason it is important to manage aphids even if virus is not a concern. However, beneficial insects such as ladybeetles, lacewings, and parasitic wasps often keep numbers low enough to prevent direct damage. Beneficials move in shortly after aphids arrive, and bring the population down. Early sprays targeting aphids may actually result in further aphid outbreaks, because the natural enemies that keep them in check have been killed. Where possible, use selective insecticides that have minimal impact on beneficials.

Scouting across the field gives you an estimate of current numbers. If aphids are present, check back in a few days to see if the numbers are increasing or decreasing. Note which natural enemies are present. Check undersides of leaves, including lower and mid level leaves. The following thresholds can be used to determine if insecticides are needed (sampling routine in parenthesis):

Pumpkin and winter squash: 20% of leaves have more than 10 aphids (based on 50 leaves).

Pepper: 10 per leaf (based on 4 leaves per plant, 25 plants).

Tomato: 6 per leaf (based on 2 leaves per plant, 25 plants).

Potato: 4 to 10 per leaf (based on 25-50 compound leaves; higher threshold near harvest).

Sweet corn: 50% of plants with >50 aphids at emerging tassel (based on 100 plants).

- Ruth Hazzard, John Howell, and Rob Wick, University of Mass., with excerpt from Beth Bishop, Michigan State

DOWNY MILDEW UPDATE

Downy mildew has recently been found in Southern Ontario and has made it's way up the coast as far north as Maryland. It will hopefully take it's time in getting to Massachusetts, but it's not too early to be prepared and make sure that you have effective materials on hand.

Downy mildew caused by Pseudoperonospora cubensis is one of the most important foliar diseases of cucurbits. It occurs worldwide where conditions of temperature and humidity allow its establishment and can result in major losses to cucumber, melon, squash, pumpkin, watermelon, and other cucurbits. Symptoms of Downy mildew are confined to the leaves and their appearance varies widely among cucurbit species. On most species, lesions are first visible on the upper leaf surface as small, irregular to angular, slightly chlorotic areas. Symptoms appear first on older leaves and progress to younger leaves as they expand. When conditions (leaf wetness and humidity) favor sporulation, the production of fruiting

bodies (sporangia) on the lower leaf surface gives the undersides of the lesions a downy appearance, varying in color from light gray to deep purple. Lesions can coalesce and result in large areas of dead tissue which exposes the fruit to sunscald.

Pseudoperonospora cubensis infects only members of the cucurbit family and is an obligate parasite. Its survival depends on the presence of cucurbit hosts, either in climates which permit their growth year round or in greenhouse culture (Ontario in recent years. The source of primary inoculum in cold climates is windblown sporangia from areas where plants survive the cold season. Generally, Downy mildew of cucurbits does not arrive in southern New England until September. However, in some seasons it can move up the eastern seaboard early and arrive in July. The progress of Downy mildew is tracked by the North American Plant Disease Forecast Center and warnings issued based on disease progression and weather (www.ces.ncsu.edu/depts/pp/cucurbit/). The UMass Vegetable Newsletter also reports on the progress of Downy Mildew allowing better timing of scouting and spraying. A contact protectant fungicide can be used alone when the forecasted risk of downy mildew is moderate and before downy mildew has been found in the area. An EBDC fungicide (e.g. maneb or mancozeb) is a good choice when powdery mildew is not also a concern; otherwise a chlorothalonil fungicide (such as Bravo) is a better choice. By the time downy mildew is a threat in our area you may already be applying one of these materials to control other diseases. Fungicides specific for downy mildew should be reserved for when risk is high or when the disease has been reported in your area or found in your field.

Downy Mildew (Pseudoperonospora cubensis) is not a true fungus so most conventional fungicides have little or no value for control. In addition, the sprays that are most effective for downy mildew have little to no effect on cucurbit diseases caused by true fungi. This underlines the case for making sure that you have correctly identified the disease before you apply chemicals.

To control downy mildew treat with a systemic fungicide from the table below. Systemics should be mixed with either Bravo, copper fungicides, or Maneb. Never make consecutive applications of a systemic fungicide from this table; alternate with a fungicide with a different mode of action (FRAC group). Gavel cannot be used in pumpkins or winter squash because it contains mancozeb.

Recommended Systemic Materials for Downy Mildew Control.

Name	**Active Ingredient**	**FRAC Group**
Presidio	fluopicolide	43
Revus	mandipropamid	40
Tanos	famoxadone and cymoxanil	11 & 27
Gavel	zoxamide plus mancozeb	M3 & 22
Ranman	cyazofamid	21
Aliette, ProPhyt, Agri-Phos	phosphoric acid	33
Forum	dimethomorph	15
PrevicurFlex	propamocarb hydrochloride	28

Ridomil Gold/Bravo is very effective against downy mildew but many strains have become resistant due to many years of this product in the southern U.S. Some control may be obtained with strobilurins like Pristine, though resistance against strobilurin fungicides (Group 11) like Reason and Quadris has been reported.

Presidio, Revus, Gavel, Ranman, Forum, Ridomil Gold and phosphorous acid fungicides may help to manage Phytophthora blight in conjunction with cultural practices to manage soil water. No fungicide has been shown to be sufficiently effective to be the sole management strategy for Phytophthora capsici diseases, but when used in conjunction with cultural practices they may be a valuable tool.

- M.B. Dicklow, adapted by A. Cavanagh

Sap beetles

Dusky Sap Beetle

Sap beetles are usually secondary pests of sweet corn usually associated with damage caused by other pests. Sap beetles overwinter as adults or pupae in crop refuse, decomposing corn ears, or decaying fruit on the ground. Eggs are laid in spring. There are several generations per year. They are more likely to be a problem on farms producing a variety of vegetable and fruit crops. They can also be pests of strawberry.

Dusky sap beetle is black and plain (3.5-4.5mm long), while four-spotted sap beetle (also known as picnic beetle) is black with four irregular yellow spots (5-6mm long). Adults are first noticed about the time that tassels appear. They may invade corn borer tunnels or areas with other insect or bird damage, feed on pollen or silks, and may lay eggs in these sites or in silks at the tip of ears. Eggs are milky white and resemble tiny grains of rice. The larvae are small, pinkish white or creamy colored grubs about ¼ inch long. They may hollow out kernels of the upper half of the ear.

Monitoring. Sample for sap beetles when silks begin to wilt. Inspect the silk area at the tip of 20 ears at each of five sites and determine the percent of ears infested with adults, eggs, or larvae. Sprays for other ear pests usually control sap beetles, but if other pests are absent and more than 10% of ears are infested with sap beetles, treat for sap beetles. Insecticides used to control ECB and CEW, including synthetic pyrethroids, may reduce sap beetle. Insecticides will not completely control heavy infestations.

Cultural practices. Ears with exposed tips, especially super sweet and Bt varieties are susceptible to infestation. To prevent or reduce damage, select varieties that have good tip cover, use clean cultivation, control ear-infesting caterpillars and remove or bury decomposing fruit on a regular basis. Sanitation is important to prevent successful overwintering and reproduction during the season. Bury corn residue especially decomposing ears; remove or bury of alternate hosts such as rotting tree fruit or discarded vegetables. Burial should be deeper than 10 cm.

Squash vine borer and squash bugs

Squash bugs have been seen in cucurbit crops, and squash vine borer (SVB) have been showing up in traps in New Hampshire. Squash vine borer moths are day-flying moths with a 1.0 to 1.5 inch wingspan. In flight, they look like wasps. There is one generation each year and adults emerge in late June/early July. They lay eggs at the base of squash plants, and upon hatching, larvae bore into stems (where they are protected from insecticides). Unless you use traps or scout fields for evidence of eggs or larvae, the first sign of squash vine borer infestation can be wilting vines in July and August. By that time, it is too late to do anything.


Squash vine borer larvae in stem

Growers should scout their pumpkin and squash fields weekly for squash vine borer from late June through early August. Examine the base of vines for evidence of larval feeding (sawdust-like frass near entrance holes) and then split open the stem to confirm the presence of larvae, which suggests more eggs are being laid. Two insecticide sprays, ideally applied to the base of the plants, and timed five to seven days apart, will control newly hatching larvae before they are able to bore into the stem. Alternatively, you can monitor with a Scentry Heliothis pheromone trap from early June through early August. Make 2 to 4 weekly applications if more than 5 moths per week are captured. Timing is very important. Treat base of stems thoroughly to target hatching larvae. Some selective materials, such as spinosad (SpinTor or Entrust), provide excellent control of hatching SVB larvae.

Squash bugs are serious pests of pumpkins and squash. Both adults and nymphs feed by inserting their beak and sucking juices from plant tissue. Large populations can cause partial wilting, and later in the season, squash bugs may feed on the fruit, causing them to collapse or become unmarketable. Adults are 0.5 to 0.75 of an inch long, flattened and grayish-brown. Wingless nymphs are similar in appearance to adults, and are whitish when small, with a brown head, and grayish white when larger. Eggs are laid in clusters usually on the underside of leaves and are orange when first laid, but turn bronze-colored before they hatch.

Squash bug nymphs on pumpkin. Small nymphs are most vulnerable to chemical controls

Squash bugs are virtually impossible to control later in the season when nymphs are large and the canopy is dense. Squash bugs are generally controlled by clean cultivation, crop rotation and sprays for cucumber beetle, but are often resistant to all but a few insecticides (i.e. bifenthrin). If possible, rotate cucurbit crops between fields as far apart as possible. Scout undersides of leaves for squash bug adults and eggs and treat if the copper-colored egg masses exceed one per plant. Time squash bug sprays to kill young nymphs which are easiest to control. Thorough coverage is necessary. Treat late in the day when the flowers are closed to reduce risk to bees. Keep headlands mowed and free of trash to reduce overwintering sites. Clean cultivation helps reduce populations, while use of mulches and reduced tillage favors squash bug survival. Certain winter squash (Hubbard or marrow) are favored by bugs over other cucurbits. Adults colonizing the field in the spring can be controlled by planting a perimeter trap crop (Hubbard or marrow) 1 or 2 weeks before the main crop, and treating the trap crop just prior to main crop emergence or prior to transplanting, and 5 to 10 days later.

- Source material from Beth Bishop, MI state university. Adapted by Andy Cavanagh, UMass extension.

THREE LINED POTATO BEETLE

Potato, tomato, and sometimes eggplant are attacked by the three-lined potato beetle, Lema trilinea. Adults and larvae chew irregularly shaped holes in the leaves, feeding along the margin of the leaf or in the central area, and occasionally may devour all leaf tissue except the mid-vein. Larvae generally feed on the lower surface, but may feed anywhere on the plant.

Overwintered beetles emerge in early spring and feed on solanaceous weeds, migrating to eggplant, potato, and tomato plants when they are available. Females deposit eggs in clusters of 6–10 on the undersides of leaves. Eggs hatch in about two weeks and young larvae feed at first in a row side by side, beginning at the edge of the leaf and moving backward as they devour the tissue. Older larvae separate, migrate throughout the plant, and feed individually. Larvae become full grown in about two weeks. There are two generations each year.

The adult is 1/4 inch long with a reddish-yellow head and thorax. The thorax is constricted at the middle and marked with two black spots. The wing covers are reddish-yellow and marked with three black longitudinal stripes, one along each outer margin and one in the center. The eyes and antennae are black, the legs are reddish-yellow, and the feet are black. Adults are extremely active, flying readily when approached or feigning death by tumbling off the plant to the ground if threatened. Eggs are about 1/25 inch long, smooth, oval, and yellow in color, turning dark just before hatching. Mature larvae are 1/3 inch long with a black head, thorax and legs, and a pale yellowish or grayish body. The body of the larva is kept moist and sticky by a secretion and its back is usually covered with a coating of its own excrement.

One of the interesting (in a disgusting sort of way) thing about these beetles is that they defend themselves against predators by covering their backs in their own excrement. Potatoes are in the nightshade family (along with tomatoes and other solanaceous crops). Many plants in this family have toxic compounds in their foliage that deter most animals from feeding on their leaves. When the beetle larvae eat nightshade leaves they absorb the useful nutrients and excrete the toxins, which are concentrated in their excrement, or frass. The larva forms a fecal shield by excreting waste through its

anus, located in the middle of its back. Muscular contractions continually move the frass higher onto the larva's back until it's fully covered. This fecal shield contains the chemicals that the plant was using to defend itself from being eaten, and now these chemicals serve to deter predators from eating the beetle larvae - as if being covered in your own poop wasn't enough of a deterrent.

- source material from Gerald M. Ghidiu, Ph.D., Extension Specialist in Vegetable Entomology, Rutgers University, NJ Agricultural Experiment Station. Adapted and expanded by Andy Cavanagh, UMass Extension

CORN REPORT

Growers are finally harvesting! Some early corn is ready to be harvested this week, but many fields will still need some sun and higher temperatures in order to fill in the ears. The first generation of European corn borer flight is over in most locations with trap counts at zero or slightly above. We are between ECB flights, expecting the second flight to begin within the next 7-14 days. Scouting of tasseling corn continued this week with many fields below threshold, but "clean up" from the first generation may be needed. Look for feeding damage, frass or ECB larvae, making sure to check the entire stalk of plants to see if borers are starting to move down towards the developing ears. Drop nozzles can be used to hit silks directly to control borers before they enter the ears.

Location	Z1	EII	Total	AVG	FAW
CT Valley					
South Deerfield	0	0	0	-	-
Deerfield	1	0	0	-	-
Sunderland	0	0	0	-	-
Hadley (1)	0	0	0	0.75	-
Hadley (2)	0	0	0	-	-
Granby	1	1	2	-	-
Easthampton	0	1	1	0	-
Central & Eastern MA					
Lancaster	0	0	0	1	-
Tyngsboro	0	0	0	0	-
Concord	0	0	0	0	-
Northbridge	1	1	2	0	-
Leicester	0	0	0	0	-
Dracut	3	1	4	3	0

This is the time of year when sweet corn pest management switches from European corn borer to corn earworm. We can expect trap counts to rise as the weeks continue and more storms arrive from the southern states. Know what you are looking for: Adult moths are light tan with a distinctive dark spot on each forewing. Live moths have bright green eyes. CEW larvae may be brown, tan, green or pink with light and dark longitudinal stripes. The head capsule is always plain golden brown, and the body is rough with small bumps and hairs.

Keep in mind that trap capture thresholds are much lower for CEW than ECB. See table below for thresholds. At 2 or more moths per week, growers need to be on a 6 day schedule on silking corn. Flight monitoring is the best way to protect your fields from an earworm infestation. Place two traps per field in areas where fresh silk is present. Move traps weekly to ensure that they remain in fresh silk in order to attract adult moths as soon as they arrive. Remember to changes lures every two weeks. Want to know what the numbers are on YOUR farm? For less than $100 you can have a trap (Scentry Heliothis net trap) and lures (Hercon luretape for Helicoverpa zea) for the season. Sources: Great Lakes IPM, Gemplers.

- C. Huffman

Corn Earworm Threshold		
Moths/Night	Moths/Week	Spray Interval
0-0.2	0-1.4	no spray
0.3-0.5	1.5-3.5	every 6 days
0.6-1	3.6-7	every 5 days
1.1-13.0	7.1-91	every 4 days
Over 13	Over 91	every 3 days

NEW CASH CROPS: FOOD, FEED AND FUEL

Field Day at the UMass Crops Research and Education Farm

89-91 River Rd, South Deerfield, MA

Thursday July 16, 2009

Join us for tours of the latest research on vegetable, grain and energy crops, demonstrations of Deep Zone Tillage equipment, and a local foods supper. If you haven't been to the Research Farm recently, you'll see plenty that's new: new facility, new fields in use, new research directions, and new vision!

12:30 Energy Crops Tour # 1 (see topics, below)

1:30 Deep Zone tillage demonstration # 1. Deep vertical tillage directly below the planting zone breaks the compaction layer, shallow tillage prepares a seedbed in the row. Reduces trips through the field, improves drainage and soil structure, using same planter with reduced tillage. Demo in mature rye, green oats. Chuck Borndt, Cornell Extension and Brooks Finnegan, Unverferth Mftg.

1 contact hour PAT credit will be offered.

2:00 Understanding and Using Combines: Setup, costs, how they work. Small and large combines for soybean, grain corn, sunflower, wheat, rape. Kyle Bostrom, UMass and Arnie Voehringer, NESFI

3:00 Heritage Wheat – Evaluating varieties drawn from gene banks and farmers of the Old and New Worlds for production in New England. Eli Rugosa & R. Hazzard

4:00 Deep Zone tillage demonstration # 2 (see above)

5:00 Supper: burgers, bread and veggies from local sources and unique Brazilian dishes.

6:00 Choose your tour:

1. Energy Crops Tour # 2: cultural management practices including weed management and crops nutrient requirement will be discussed. Stephen Herbert, Masoud Hashemi, Randy Prostak.

1 contact hour PAT credit will be offered.

- Oilseed Rape: Growth and N accumulation pattern, yield, and nitrogen use efficiency of 2 cultivars at 2 population densities.
- Sunflower: Evaluation of yield and growth of 7 sunflower cultivars.
- Crambe: Nitrogen effect on yield performance on differing soil types.
- Soybean: Narrower planting rows and higher densities for maximizing seed yield.
- Grain corn: Yield performance of 15 shorterseason and fullseason hybrids.
- Switch Grass: Effect of nitrogen application and time of harvest and affect on regrowth.

2. Vegetable Crops Tour:

- Ethnic crops: okra, maxixe (spiny cucumber), chipilin (leguminous herb) and taioba (tropical leafy green). Production and cultural practices, pest management, postharvest strategies, use of high tunnels, and marketing. Frank Mangan & Maria Moreira
- Ecology of cucumber yield: effect of cucumber beetle feeding above and below ground on pollinators, mycorhyzal fungi, and yield. Nick Barber & Lynn Adler
- Organic beetle controls in eggplant and cucurbits for cucumber, flea and Colorado potato beetles. Andrew Cavanagh, R Hazzard
- Brussels Sprouts variety trial for yield and disease resistance. R. Hazzard, Touria Eaton & Michael Rozyne, Red Tomato
- UMass Student Farming Enterprise. Amanda Brown, R. Hazzard & students.
- Rollercrimper timing to kill cover crops. K. Bostrom & R. Hazzard
- Edamame variety trials. S. Herbert, M. Hashemi
- Pilot study of Chinese medicinal herbs: feasibility and nutrient needs. Zoe Gardner

1 contact hour PAT credit will be offered

For more information contact 4135453696, umassvegetable@umext.umass.edu.

Directions to the Field Day at the UMass Crops Research and Education Farm

89-91 River Rd, South Deerfield, MA

Coming north on I91:

Take exit 24, turn right at the end of the ramp, then right again at the light onto Rt. 116. Go about 1.5 miles, through one light. Before crossing the bridge over the CT River, turn left onto River Rd. Pass the Turf Farm and a subdivision. The Crops Research Farm is on the left.

Coming south on I91:

Take exit 25, turn left at the end of the ramp, right at the light onto Rt. 5&10. Go about 1 mile, past one light and turn left at the next light onto Rt. 116. Continue on Rt. 116 through another set of lights. Take a left onto River Rd (before you cross the bridge). End at 61 River Rd. Farm is on the left.

Coming from south of Sunderland on 116:

Take 116 into Sunderland center and across the bridge. Turn right on River Rd. End at 61 River Rd. Farm is on the left.

If you would like to become a Vegetable notes sponsor, please contact Jessica Dizek at jdizek@outreach.umass.edu or 413 545 1445

Vegetable Notes. Ruth Hazzard, editor and Amanda Brown and Andrew Cavanagh, assistant editors. Vegetable Notes is published weekly from May to September and at intervals during the off-season, 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 and photographer is R. Hazzard if none is cited.