



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 17, Number 12

July 20, 2006

CROP CONDITIONS

Most of our vegetable crops have enjoyed the hot weather, possibly more than the farmers who are growing them. The losses from flooded fields and days of rain are being replaced by good harvests, even if it's the *second* planting of summer squash or corn that's coming in. More cornfields are ripe, including fields that were started without plastic. Crops such as cucumbers, summer squash, cabbage, basil and green beans are producing well, and the first field tomatoes are ripening. An occasional pepper and eggplant have reached maturity, but mostly we are looking at good fruit set (that seems not to have been hurt by the hot weather) and waiting for fruit to grow and mature. Lettuce and peas have not taken the heat as well as some other crops. Early potato harvest has started. It's time for garlic harvest. Fall vine crops are setting fruit in earnest. Many crops still need additional nitrogen, although warmer soils encourage microbes to turn organic matter into available N. Summer cover crops can be seeded after early crops, or a second crop fit into the late-season window.

The first UMass vegetable twilight meeting, at Twin Oaks Farm, gave farmers from near and far a chance to witness a well-run operation, see some new equipment,



Farmers Check Out a Baby Cabbage, Grown By Edwin Matuszko (Center, Facing Camera) at Twin Oaks Farm Twilight Meeting
Photo by Julie Callahan

learn to tell a diamondback moth from an imported cabbageworm, taste baby cabbage, notice how well leeks grow as a rotation crop in Phytophthora-infested land, and look across a 14-acre butternut field that achieved cucumber beetle control for \$1.21 per acre by using PTC. Many thanks to our hosts and to the businesses that helped to sponsor the meeting.

Twilight Meeting Reminder: Tuesday July 26, 4-7 pm, Riverland Farm, Sunderland, MA. Using Solar Energy to power your farmstand, cooler, fencing, irrigation, and water pumping. Rte 47, one mile south of Sunderland Center. For more information call 413-545-5306 or visit www.umass.edu/umext.floriculture. Preregistration is requested, but not required.

•Weekly European Corn Borer, Corn Earworm and Fall Armyworm Trap Counts:

Location	Z I	E II	Total ECB	CEW	FAW
Pittsfield	0	0	0	0	0
S. Deerfield (UMass)	0	0	0	0	4 (6 nights)
Deerfield	0	4	4	10	28
N. Hadley	0	3	3	1	0
Whately	1	2	3	0	-
Hadley (1)	4	14	18	1	10
Hadley (2)	0	0	0	0	3
East-hampton	0	9	9	3	0
Feeding Hills	0	12	12	4	0
Sunderland	0	18	18	0	0
Rehobeth	3	12	15	0	-
Still River	2	1	3	6	-
Dighton	1	2	3	0	-
Concord	0	0	0	0	0
Leicester/Spencer	0	2	2	2	0

North-bridge	1	0	1	1	0
Tyngs-boro	0	0	0	0	0
Seekonk	-	-	-	12 (3 nights)	-
Rehobeth	3	12	15	0	-
Hollis, NH	0	3	3	1	1
Litchfield, NH	2	2	4	1	0

•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 one day if daily temperatures are below 80 degrees F.

--Thanks to our scouting network: R.Hazzard, A.Duphily, K.Reidel, J.Mussoni, D.Dumaresq, D.Rose, J.Otto, T.Gallagher, J.Golonka, W.Kingsley, P.Willard, G.Hamilton

SWEET CORN UPDATE

Sweet corn has grown rapidly since last week. With all of the sunshine and humidity, it seems like some growers are catching up from the first week of sluggish sales. More people are cooking outdoors and enjoying their favorite summer time treat! Side dressing has actually been possible this week with the dry conditions, making fields green up and grow like crazy!

European Corn borer: Trap captures remained low this week showing that the second flight has not begun yet. Many sites were still at zero for the Z traps while E traps had a few here and there. It is still worthwhile to scout any pretassel corn for ECB infestation, especially because some FAW is showing up. Most blocks scouted in the Connecticut Valley showed infestation levels of ECB below 15% so sprays were not necessary. Any new blocks were tassels are emerging should be scouted and treated when infestation levels are above 15%. Scout blocks 3-4 days after spraying to ensure your coverage was adequate. If ECB total is > 5 moths per week, spray silk weekly. If ECB is > 5 moths per week, we can expect counts to go up next week, followed by new eggs and, about a week after flight begins, new borers.

Corn earworm: CEW is still at low levels around the state and around New England and New York. The majority of trap counts in the Connecticut Valley and in the central and northeastern sites were at zero or one, below threshold

for sprays. However several locations had numbers high enough to require sprays on silk: ten moths were caught in Deerfield (four day schedule recommended on silk), six in Fall River and four were caught in Hadley, in Leominster, and in Feeding Hills (five day schedule recommended). This variability within a single county or river valley shows the value of having a trap on your own farm. If you don't have CEW traps up yet, get them up! It's a worthwhile investment at less than \$80 for one trap and the lures to make it work! That's a lot less than the cost of culls or the cost of a few unnecessary sprays!

Fall armyworm: Time to scout whorl stage corn as well as pretassel! Fall armyworm is showing its typically spotty habit, and caterpillars have been making some ragged leaves in whorl stage corn at a few fields in the CT Valley. Clean up done last week has worked well in fields treated with Avaunt (indoxacarb). Pressure in one field went from over 15 % to zero after one spray. FAW infestation has shown to be very concentrated in some fields. Sending an applicator in with a backpack sprayer for spot treatments might be a better use of time and money in such fields.



Fall Armyworm Feeding Damage and Frass

Overhead sprays with high pressure directed into the whorl of infested plants should take care of any problems. Again, scout 3-4 days after spraying to ensure your treatment was successful!

Update on NEV&BGA Sweet corn project: Informal reports from growers who tried Avaunt or Spintor in early corn are positive. Several have also had FAW infestations in whorl stage corn and these were effectively cleaned up by Avaunt. Several growers are trying the IPM system – basing their sprays on trapping, field scouting, thresholds - for the first time and so far a pleased with fewer sprays and good results at harvest. If you'd like suggestions on how to try any of these, please call the Vegetable Program office

at 413-545-3696.

Some growers are also planning to release *Trichogramma ostrinae* wasps in Indian corn. In this crop, for the past two years one grower has seen significant reductions in the number of culls, without any sprays. Provide advance notice of 2-3 weeks to IPM Labs (315) 497- 2063 if you want to use this biocontrol in corn or peppers. For peppers, we suggest rates of 60,000 wasps per acre over four weeks starting the first week of August. For Indian corn, release of 30,000 to 60,000 for three weeks should be adequate.

-- written by Amanda Duphily and Ruth Hazzard

SCARAB BEETLES IN VEGETABLE CROPS

Japanese Beetles are active now in various crops and non-crop habitats. Oriental Beetles are also active and, though less damaging, may show up in vegetable fields as well. Oriental beetles emerge a bit earlier and showed up in the last week of June, while Japanese beetles began emerging about July 4 (right 'on schedule' relative to past years). Both species are starting to lay eggs now. Possibly because of the mild winter, numbers of both beetles are high this year.

There are four species of scarab beetles that are common in New England turf, fruit and vegetable crops. These were all introduced to the US. 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. Oriental and Asiatic Garden beetles are relatively new "imports" and their range is expanding. Below are brief descriptions.

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. The adults are active in daylight and feed on many different kinds of trees, fruit and flower crops. In vegetables, adults can cause silk clipping in corn, and leaf damage in sweet basil, collards, other greens, green beans, eggplant, asparagus, rhubarb, and peppers.

Oriental Beetles fly at night, but are very active during the day as well. The beetles are just a little smaller than Japanese beetles, and usually are a rather mottled gray with black splotches. The pattern and color varies. Occasionally an individual will be almost all black or almost all gray. The antennae are branched and are quite striking if you take a close look. There are more beetles flying this year than usual, which will probably translate into a more significant year for grub activity in turf. Grubs are not known to be active in vegetable fields and crops, though this is not well studied. Adults feed less on foliage than Japanese beetles so are not generally a concern in crops.

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. Adults tend to cause more damage to vegetable crops than Oriental Beetle, but less than Japanese beetles. Their numbers don't seem to be especially high this year. Larvae feed on beet, carrot, corn, lettuce, onion, Swiss chard and strawberry. Adults feed on carrot, beet, parsnip, pepper and turnip.

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). Adults are not foliage feeders and grubs are mostly a turf problem. Feed through October or November.

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 from the soil in early July in most of Massachusetts (later farther north) to feed and mate. The females burrow into the soil (often in or near wide expanses of sod or turf grass) to 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 (including 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.

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 (or necessary) since the grubs are most likely feeding elsewhere. However, vegetable growers could run into problems with grub damage if turf or sod is plowed under in fall or spring and followed by a spring vegetable crop. Insecticides may be needed to control adult beetles if numbers are high and damage is significant. The *2006-2007 New England Vegetable Management Guide* lists products for Japanese and/or Oriental Beetles in basil and sweet corn. For controls in a crop where these beetles are rarely a pest

and therefore not mentioned in the Guide, check the label of commonly used broad spectrum synthetic pyrethroids, carbamates, or pyrethrin.

--Update from Pat Vitum, Turf Entomologist, and Ruth Hazzard

POTATO UPDATE

Harvest has begun in early potatoes. No new reports of **late blight** have occurred in the past two weeks throughout the Northeast. Late blight reports in the northeastern states to date:

- Pennsylvania, June 16: on tomatoes in Lancaster Co.
- Long Island, July 5: on potatoes. This was ID'd as the US-8 strain of the pathogen, which is very aggressive on potato but not on tomato, on which it rarely causes symptoms on leaves but it can affect fruit) On Long Island, where late blight has been found in one field, growers are using a 7-day spray schedule with protectant fungicide mancozeb or Bravo.

- Maine (date not known): Late blight has been found in northern and central Maine.

Moderate conditions for late blight development occurred this past week and protectant sprays are needed since late blight has not been found in Massachusetts, CT or eastern NY, an intensive program of systemic fungicides for late blight is probably not necessary at this time. If weather conditions again favor this disease (cool, long leaf wetness periods, heavy and frequent rains) then this may change. Recent research has indicated the fungicide Forum (formerly labeled as Acrobat) has provided remarkably better control when applied with a crop oil such as Penetrator Plus.

The University of Maine maintains an excellent website with information about potatoes. Though the season in northern Maine is very different (Colorado potato beetles are just arriving!) the information is relevant. For example, there is a pesticide list for Worker Protection Standard that includes the chemical name added as a column to go along with brand name, REI and EPA numbers as required for WPS compliance. Go to the home page, <http://www.umaine.edu/umext/potatoprogram/>, follow the fact sheets link, scroll to the bottom (Pesticide list with REI and EPA numbers).

Emergence of summer **Colorado potato beetle** adults continues. On Long Island, egg laying by these adults has been observed with some egg hatch just beginning in many fields. Adults that emerge before August 1 will lay eggs. Thus, the next two weeks will be critical for second generation larva control. With hot sunny conditions predicted, applications of Cryolite may be the best material to apply. Due to resistance potential and resistance noted in some fields, SpinTor should only be used if weather conditions don't allow for the use of Cryolite. Provado should NOT

be used if another neo-nicotinoid (Platinum, Admire) was used at planting or if Provado was used on the first generation.

Watch for **potato leafhoppers**; control from early season Admire applications may drop off. Hopperburn can develop if numbers of adults or nymphs are greater than 1 per 10 leaves.

---R Hazzard, thanks to sources from Long Island Vegetable and Fruit Update (M McGrath and D. Moyer) and University of Maine Potato Pest Alert (Steven B. Johnson)

UPDATE ON MANAGING DOWNY MILDEW OF CUCURBITS

Downy mildew is a potentially devastating disease of cucurbits. Fortunately it has occurred sporadically in this region, usually appearing late enough in the growing season that yield is not impacted. In 2004, this disease appeared here much earlier than usual causing extensive defoliation. Downy mildew was also a major problem in 2005. This year, the disease was reported in NC and Maryland in early July, and in MI, OH and Ontario during June. Downy mildew is likely to be a concern this year in the Northeast although it has not been reported north of Maryland as of July 20, 2006.

Try to learn to recognize the symptoms and be aware of which products to use if downy mildew does occur. Only leaves are affected. Spots are angular being delineated by leaf veins. Often several spots occur together in a coalesced group. Initially spots are pale green, then yellow before the tissue dies. Affected tissue in pumpkin can be more orange than yellow. On the leaf underside spots appear water-soaked at first. Extensive defoliation can occur when conditions are favorable. Leaf petioles often remain green and upright after the leaf blade has died and drooped. In



Downy Mildew on Top of Leaf

contrast with powdery mildew, spores of the downy mildew fungus are darker (purplish gray) and develop only on the underside of leaves. Photographs are posted at <http://vegetablemdonline.ppath.cornell.edu>. There is an article at this site on 'Identifying initial downy mildew symptoms in cucurbits is critical for successful management'.

The downy mildew fungus exists as pathotypes varying in ability to infect the various cucurbit types. Some can infect all types while others are able to infect cucumber and cantaloupe but not watermelon, squash or pumpkin. Major change evidently occurred recently in the downy mildew fungal population in the US, based on detection in 2004 of resistance to the QoI fungicides and observations of downy mildew developing on resistant cucumber varieties.



Downy Mildew on Underside of Leaf

Manage downy mildew by planting resistant varieties, monitoring disease occurrence and weather forecasts, inspecting crops for symptoms weekly, and applying broad-spectrum protective fungicides before detection and systemic narrow-spectrum fungicides when downy mildew occurs early in crop production.

Most cucumber varieties and a few melons have resistance to downy mildew. See variety tables posted at <http://vegetablemdonline.ppath.cornell.edu>. Resistant cantaloupes include Allstar, an Eastern type that is also resistant to Fusarium wilt and powdery mildew. Although with the new race cucumber varieties do not exhibit the very high level of resistance that they did to previous races, resistant varieties are still a valuable component of downy mildew management. Cucumber variety evaluations each year in NC now include downy mildew ratings. Best pickle type varieties based on horticultural type as well as downy mildew resistance in 2005 were LB 1 (Baker Seeds), Pershing (Nunhems), and Bejo-2759. See Table 21 at <http://cuke.hort.ncsu.edu/cucurbit/cuke/cktrials/ckrpt05pk4.html> for

ratings of all entries. Best Slicer types were BCS-003 (Harris Moran), Dasher II, and NUN-2002 (Nunhems). See Table 36 at <http://cuke.hort.ncsu.edu/cucurbit/cuke/cktrials/ckrpt05sl4.html>.

Choose planting sites with good air movement and without shading. Avoid overhead irrigation in early morning when leaves are wet from dew or late in the day when leaves will not have an opportunity to dry before dew forms. Maintain ample but not excessive nitrogen fertility.

This fungal pathogen does not survive winter in the Northeast, thus it only occurs there when conditions favor spore production, release, and movement by wind from where the disease is occurring plus favorable conditions for disease development where the spores land. These factors have been used to forecast where downy mildew will occur in the eastern USA. Forecasts are posted at a North Carolina State University web site (www.ces.ncsu.edu/depts/pp/cucurbit/). Click on 'Current Forecasts' on the left side of the home page. The calendar on the right side can be used to look at past year's forecasts. Considering the potential for spores to be dispersed to the northeastern US at any time during the cucurbit growing season, the destructive potential of this disease, and the fact these crops are susceptible from the cotyledon stage, regularly checking the forecast is a critical component of downy mildew management. This web site also has fungicide evaluation results and photographs of symptoms.

Broad-spectrum contact protectant fungicides (Bravo, Maneb, Dithane, copper) provide some downy mildew control. Researchers in NC regularly conducting fungicide efficacy trials for downy mildew rated chlorothalonil (4 rating) better than mancozeb and maneb (3) and also copper (1).

Mobile (systemic, translaminar) fungicides with an active ingredient that specifically targets oomycete fungi are recommended beginning when downy mildew is forecast to occur in the area or symptoms have just started to develop. Apply every 5-7 days depending on disease severity. Fungicide resistance is a concern with this pathogen and with these fungicides due to their specific mode of action; therefore, alternate among systemic fungicides in different chemical classes and tank-mix with protectant fungicides when the systemic is not formulated with a protectant. Fortunately several systemic fungicides are now available. Their efficacy was similar when compared in recent fungicide efficacy experiments

Curzate (cymoxanil, FRAC Group 27 fungicide) is labeled for use at 3.2 oz/A on a 10-14 day schedule for a maximum of 9 applications. It has a 12 hr REI and 3 day PHI. Since this product reportedly has good curative activity (about 3 day kickback), it is a good product to use first after downy mildew is detected. However, it has poor residual activity (only 1-2 days), thus it is critical to tank-

mix it with a protectant fungicide and to follow-up with another systemic fungicide when disease pressure is high. Curzate should be used as soon as possible after rain if not applied before (2 hr rainfastness). Cost of product per application is about \$8.50/A. Tanos is another fungicide with cymoxanil.

Forum (dimethomorph, Group 15), a new formulation replacing Acrobat, is labeled for use at 6 oz/A tank-mixed with protectant fungicide on a 5-10 day schedule for a maximum of 5 times with no more than 2 sequential applications. PHI is 0 days. REI is 12 hours. Tank-mix with protectant fungicide. Cost of product per application is about \$8.91/A.

Gavel (mancozeb and zoxamide, Group 22) can be used on cucumber, melon, summer squash, and watermelon but not currently on pumpkin and winter squash because it contains mancozeb. Gavel is labeled for use at 1.5–2.0 lb/A, which will cost about \$7.73-10.30/A, every 7 to 10 days or when conditions are favorable for disease for a maximum of 8 applications.

New phosphorus acid fungicides (Phostrol, ProPhyt, and Fosphite, Group 33) are more effective than Aliette. They have a 12 hr REI and can be applied to all cucurbits at 2.5-5 pt/A, which will cost about \$12.50-25.00/A, on a 7-14 day interval up to 6-7 times/crop. Phosphite ion, the active ingredient for these fungicides, effects fungal pathogens directly and promotes the plant's defense system.

Tanos (cymoxanil, Group 27, plus famoxadone, Group 11) is labeled for use at 8 oz/A, tank-mixed with protectant fungicide, on a 5-7 day schedule for a maximum of 4 applications of Group 11 fungicides including Tanos. It has a 12 hr REI and 3 day PHI. Cost of product per application is about \$10.31/A. Curzate is another fungicide with cymoxanil.

Reason 500 SC (fenamidone, Group 11) is labeled for use on tomatoes and cucurbit crops at 5.5 fl oz/A on a 5-10 day schedule. It has a 12 hour REI and 7 day PHI. Rotate Reason with another fungicide with a different mode of action (non-Group 11).

Forum, Gavel, Tanos and phosphorus acid fungicides are also labeled for Phytophthora blight, which is caused by a pathogen related to the downy mildew fungus.

Fungicides with mefenoxam (Ridomil Gold Bravo, Ridomil Gold Copper, Group 4) are highly effective but more resistant strains have been detected in the US. Ridomil Gold Bravo applied at 2 lb/A will cost \$34/A. PHI is 5 days. REI is 48 hours.

QoI (aka strobilurin) fungicides (Group 11) are no longer recommended for downy mildew because resistant strains of the pathogen have been detected in the US. Although impact of resistance on efficacy is not known, there are several other effective, mobile fungicides. Tanos is one Group 11 fungicide that is still recommended because it

contains an additional active ingredient, cymoxanil. Other Group 11 fungicides include Amistar, Cabrio, Flint, and Pristine. When compared for managing pathogen strains without resistance to this group, Cabrio has been more effective than Amistar. Generally, although symptoms were severe in early August when downy mildew was first observed on Long Island in 2004, growers were able to avoid excessive loss of leaves by applying these fungicides that have systemic activity for this pathogen. This was clearly demonstrated in a field where there were edge areas that the spray boom did not reach. Powdery mildew was more severe than downy mildew in early September. Although the canopy looked adequate in September, apparently in some fields there had been enough loss of foliage to downy mildew that the older portions of vines had died resulting in rotten handles on fruit.

Note: Ranman fungicide is not registered for use in Massachusetts.

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

-- written by Margaret Tuttle McGrath, Dept. of Plant Pathology, Cornell University, Long Island Horticultural Research and Extension Center, mtm3@cornell.edu. Edited for Massachusetts by M. Bess Dicklow, Plant Disease Lab, Dept of Plant Soil and Insect Science, UMass, and Ruth Hazzard..

CUCURBIT UPDATE

Summer squash and zucchini are pumping out fruit at a rapid rate, given hot weather. Irrigation has been needed on light land, or will be needed if rain does not come in a few days. Wet weather last week caused fruit rot on summer squash in northeastern Mass and New Hampshire, but drier weather this week reduced the problem. Butternut and pumpkin crops have a big range in stage of growth; the earliest have up to 4 inch fruit, while the latest have not yet started flowering. Certainly we are in the stage where flowering and fruit set is gearing up.

It is time to take scouting seriously! Scouting at this point involves checking both older and fully grown young leaves – including upper and lower surface, throughout the field canopy (50 leaves, in groups of 5 at 10 locations in the field). Also observe stems, blossoms and fruit development. Your goal is protect fruit from disease, and keep foliage in good health long enough to bring the fruit to maturity.

Watch for arrival of powdery mildew, which has been observed on summer squash in eastern NY and on Brazilian squash in the Connecticut Valley. This is the first of the vine crops to develop this disease so it is a good crop to scout as an indicator of whether or not powdery mildew

is in your area. This week in western Massachusetts, field scouts in butternut fields (of all crop ages) did not find powdery mildew. This crop typically shows symptoms later than summer squash and zucchini.

Scout for powdery mildew on the undersides of older leaves, and look in areas where dew lasts longer. PM usually shows up the last week of July or early August. The



Powdery Mildew on Top of Leaf

first signs are pale yellow spots on leaves, vines or petioles. These spots enlarge and become covered with white spores that appear powdery. Make the first application of a PM fungicide when powdery mildew is detected in the field by scouting (one lesion on the underside of 50 older leaves).

Another concern in scouting for disease in summer squash and pumpkin at this time is *Plectosporium* blight, which has become a problem on more farms in New England over the past three seasons. Look for spindle-shaped lesions on the stems or spots on the fruit. Start spraying a protectant fungicides (eg chlorothalonil) when fruit is formed (melon size for pumpkins, 4-6 inches for winter squash). This will also protect against black rot.

Everyone worries about the risk of downy mildew, since we remember the damage caused by this disease in 2004. As of this writing, the reports from the North Carolina Downy Mildew Forecasting Center state that no downy mildew of cucurbits has been reported north of Maryland or east of Indiana and Michigan. This, combined with the current weather patterns, means that the risk in New England is low. These forecasts are updated regularly at: <http://www.ces.ncsu.edu/depts/pp/cucurbit/forecasts/c050712.php> based on weather patterns and any new confirmed reports of downy mildew.

Symptoms of powdery and downy mildew are described in the accompanying article by Meg McGrath and also are shown in the adjacent photographs.

So far, we have had little indication of *Phytophthora*

blight in cucurbits in Massachusetts. Initial symptoms will be the crown rot phase, in which plants wilt and the stems will decay at the soil line. Drier conditions as plants mature and produce fruit have been very welcome. It seems that growers are hyper alert to the need for subsoiling and good drainage to prevent puddling of water in the field or between aisles of plastic. If you use irrigation in cucurbit fields, watch for leaking pipes that might cause pooling of water in certain areas of the field. Also avoid pumping out of ponds or rivers that may be infected.

Use the Plant Diagnostic Lab to be sure what diseases you are dealing with! Call 413-545-3209 or mail samples to 108 Holdsworth Natural Resources Center, 160 Holdsworth Way, UMass, Amherst MA 01003.

Growers have been asking about how to determine a good, all-round spray program for cucurbits given the wide range of diseases. See accompanying article by Rob Wick which provides guidelines for your spray schedule.

Squash bug eggs are likely to be hatching into the gray, black-legged nymphs. **Cucumber beetles** are still active, though numbers are down and as vine crop flowers, you will see more in flowers than on leaves. **Honeybees, bumblebees and native squash bees** are busy pollinating – but you have to get out to the field by 5 am to see the wide open flowers and first bee visits. **Aphids** may be present, but rarely build up in vine crops. If you make a count of the % of leaves with > 10 aphids per leaf, the threshold



Powdery Mildew on Underside of Leaf

for treatment is when > 20% of leaves have more than 10 aphids. Beneficials generally keep aphids under control.

CUCURBIT DISEASES AND FUNGICIDES-- HOW TO CHOOSE A SPRAY SCHEDULE

We have 4 important diseases of cucurbits to manage: powdery mildew, downy mildew, Plectosporium and black rot. It is highly recommended that you scout for these diseases. If you cannot scout, apply Bravo (chlorothalonil) as a preventive.

When powdery mildew first occurs, apply Nova (myclobutanil) at the highest labeled rate, or Procur (triflumizole) at 6-8 oz/A. In either case, mix with a protectant. Rotate with Pristine (pyraclostrobin + boscalid) + a protectant or chlorothalonil alone. Nova, Procur and Pristine are systemic fungicides and can result in resistant strains of powdery mildew. Mixing these materials with a protectant will help prevent resistance from occurring. Bravo alone is only moderately effective against powdery mildew but will provide good protection against the other diseases. Since Nova and Procur are in the same fungicide group, do not rotate with each other. Use a 7-14 day spray interval depending on weather conditions, disease severity, and the level of crop resistance in the varieties you grow.

Strobilurin fungicides were very effective against powdery mildews but widespread resistance has been reported.

If Plectosporium occurs before powdery mildew apply Chlorothalonil, Flint (trifloxystrobin), Quadris (azoxystrobin) or Cabrio (pyraclostrobin). Use the strobilurins only once and rotate with chlorothalonil.

The new phosphorus acid fungicides Phostrol, ProPhyt and Fosphite, have shown very promising results in university trials for downy mildew. They are similar in chemistry to Aliette but more effective. See below for other materials that are effective against downy mildew.

Relative Effectiveness of Fungicides for Diseases of Cucurbits (a more complete table can be found at <http://ipm.ncsu.edu/agchem/chptr6/615.pdf>)

	Downy	Blackrot	Plecto	Powdery	Fungicide Group*
Quadris azoxystrobin	++	++++	++	++++	11
Bravo chlorothalonil	++++	++++	+++	++	M5
Curzate cy-moxanil	+++	--	--	--	27
Tanos famoxadone plus cy-moxanil	++++	--	--	--	11+27

Mancozeb mancozeb	+++	+++	+++	+	M3
Nova myclobutanil	--	--	--	+++++	3
Previcur Flex propamocarb	++++	--	--	--	28
Cabrio pyraclostrobin	++++	++++	++++	+++	11
Pristine pyraclostrobin plus boscalid	++++	++++	+++	+++	11+7
Flint trifloxystrobin	+	++++	++++	++++	11
Procur triflumizole	--	--	--	+++++	3
Gavel zoxamide plus mancozeb	++++	++	++	+	22 + M

*To prevent resistance development, rotate fungicides outside of the fungicide group.

-Robert Wick, Plant Pathologist, UMass.

Vegetable Notes, Ruth Hazzard, editor and Kate Reidel, Assistant Editor: 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.

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