



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

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VERRILL FARM TWILIGHT MEETING REMINDER

Tuesday, August 19, 4-7 pm.

Sponsored by UMass Extension, the New England Vegetable and Berry Growers Association, and by Crop Production Services and Fieldworks.

Highlights: how to identify cucurbit diseases and what to do about them; weed management including white clover between plastic; heirloom tomato varieties (25 named varieties in the stand every day!); farmstand marketing highlights such as multicolored and heirloom varieties, email newsletter, and special festivals. Two PAT contact hours. (978) 835-5227. See attached flyer for details & directions.

CUCURBIT DISEASE UPDATE

We are beginning to see some ripening winter squash and pumpkins where growers were able to plant early this season. If you have anything ready to harvest, get it out of the field as soon as possible. Between disease risks, hail, insects, and deer, fields are not a particularly safe place for vine crops this year!

Maybe we should grow these crop inside?? Visit Verrill Farm at the Twilight meeting next week to see some late cucumbers growing in the hoop house.

Downy Mildew:

We've actually been at fairly low risk recently, though Downy is creeping closer every week. It's been reported in NJ, PA, and NY. The good news is that this disease has not been confirmed yet in Massachusetts. At this point in the season it's a good idea to be applying a protectant fungicide, not just as insurance against downy mildew but to protect against Plectosporium and black rot, and to help with resistance management in your powdery mildew spray program. It is still CRITICAL to scout your fields to catch the disease as soon as it appears. It is most likely to show up on cucumbers or winter squash. The most effective way to control this disease is to apply your most effective material immediately after the disease appears in your field and then follow a recommended spray schedule (consult the NE Vegetable Management guide or see June 26 2008 VegNotes at: http://www.umassvegetable.org/newsletters/documents/June262008_000.pdf for spray recommendations).

Powdery Mildew:

Powdery mildew is present and widespread in most vine crops at this point. Many of the fungicides recommended for powdery mildew will also be effective against Plectosporium and black rot, consult the NE Vegetable Management Guide for details. It is important to mix systemic materials with a protectant and to rotate between classes of systemic fungicides. Ideally, you should use a systemic material from any particular FRAC group no more than once per season. Powdery mildew has been rapidly evolving resistance to many of the materials that we rely on to control the disease, so it is vital that we practice good resistance management when deciding on a spray program.

Phytophthora:

This disease has been absolutely devastating in many fields this summer. The excessive rainfall that most parts of the

state have experienced this summer has led to drastic crop losses from this disease. Soils have been saturated for days and weeks at a time. It's common to see standing water between raised beds or crop rows, and in lower parts of the field. Often the disease gets going in a low spot in the field, then spreads like wildfire through the whole field. Since *P. capsici* zoospores can swim through soil water, they can move from infected plants to healthy plants through the wet soil. This is the primary mode of dispersal in the field. There may also be limited aerial dispersal of spores from infected fruit or plants within a field. It has been virtually impossible to prevent soil saturation and standing water in the field over the past few weeks.

Growers' efforts to till under the infected section and a surrounding area of healthy-looking plants have not succeeded under these conditions. Wherever possible, cultivate or encourage drainage to reduce ponding and pooling of rain. It is still critical to avoid moving soil from infected fields to healthy fields on boots or equipment.

It is also possible that irrigation water can become contaminated by runoff from infected fields. This is likely to be a problem this year, when we're seeing a heavy load of Phytophthora in the fields, soils are saturated, and runoff from fields into streams is heavy. If you would like information about getting your irrigation water tested for Phytophthora contamination, please contact Andy Cavanagh at 413-577-3976 or by email at acavanagh@psis.umass.edu.

Plectosporium:

This disease has been made an appearance in summer squash, zucchini, and pumpkins over the past few weeks. This disease takes down the foliage and stems, and makes fruit unmarketable. Many of the materials used for powdery mildew control will also control this disease. See the NE Vegetable Management Guide for details – available online at www.nevegetable.org.

Angular and Bacterial Leaf Spot:

The hot and wet weather in some parts of the state through most of July have led to an outbreak of these diseases in some areas. While they are generally not major problems in cucurbit crops, bacterial leaf spot can affect the fruit. Applications of copper compounds during early fruit set can reduce the risk to fruit in some vine crops.

As always, make sure you check the label before mixing fungicides. These recommendations are intended as guidelines only. No company or product endorsement is implied or intended. Disregard any information in this newsletter if it is in conflict with the label.

-A. Cavanagh & R. Hazzard

SUMMER MEETING DATES – MARK YOUR CALENDAR!

Bonanno Farm (Pleasant Valley Gardens) Twilight Meeting, 255 Merrimack St., Methuen, MA, Wednesday, September 24, 4-7 pm. Sponsored by UMass Extension and New England Vegetable and Berry Growers Association and by Crop Production Services and Fieldworks. Highlights: cultural practices for growing susceptible crops in a Phytophthora-infected field; identifying and controlling cucurbit diseases; irrigating 6 acres with trickle irrigation using a sand filter for river water; growing lettuce all season through heat and cold; marketing packaged romaine hearts and baby lettuce.

Directions: From I-495, take exit 46 toward Pleasant Valley. Turn left off the ramp at Merrimack St/RT-110. After three-quarters of a mile, turn into the farm driveway after Messina Ave., park near greenhouses. If questions, call 978-361-5650.

Other State's Meetings:

New Hampshire: Vegetable Twilight Meeting. Tues Aug 19. Tassej's Farm, Shelburne, NH. 5:30-8PM. Steve and Kay Tassej will host an educational tour of their mixed vegetable farm in Shelburne NH with UNHCE extension educator Steve Turaj and UNHCE sustainable horticulture specialist Becky Grube. Topics will weed control strategies, trials with seeding pumpkins into strip-tilled rye, and high tunnel tomato culture and pest management. For info, contact Steve Turaj at steven.turaj@unh.edu or 603-788-4961. PAT credits available.

New Hampshire: Vegetable and Fruit Growers' Twilight Meeting. Wed Aug 27. Woodman Horticultural Farm, Durham NH. 4:30-7:30pm. See and hear about the latest UNH research on vegetable crops, ornamental horticulture, fruit crops, and more, and enjoy local refreshments! Contact: Suzanne Hebert, 603-862-3200. PAT credits available.

SWEET CORN UPDATE

Corn has been a reliable crop this season – free of disease and relatively tolerant of wet feet. Some has been lost to wind, but overall the crop quality has been excellent and demand remains steady. For mid August, corn earworm pressure is low to moderate. In the Southeast, a spike in flight last week has subsided down to levels that require a 4 day schedule. In western and central MA, flights are hovering just around the threshold for sprays, and even with some ECB flight still going on, sprays can be extended to 6 days. European corn borer is generally declining, though new spikes of flight were reported at a couple of locations. We sometimes see a second peak in late August, which may reflect a partial third generation.

The biggest challenge for pest control has been getting into wet fields with equipment, and wondering how often to re-apply sprays that were washed off by heavy rain. When possible, it's important to get 3-5 hours of drying time after the spray to make it more rain-fast. However, when foliage is wet from late afternoon through mid morning there are not many hours left for spraying the crop before the next rainstorm. For a table of rainfast times for common materials, see <http://www.vdsc.com/ReferenceMaterials/Rainfast%20Times%203-7-08.pdf>

MANAGING CUCURBIT POWDERY MILDEW ORGANICALLY

Powdery mildew is the most common disease of cucurbit crops occurring every year throughout the US. The characteristic white, powdery fungal growth is readily recognizable on leaves and vines. This growth is mostly spores that are easily dispersed by wind. Symptoms can be difficult to see on watermelon, however, as spores are produced less abundantly than on other cucurbits.

Uncontrolled powdery mildew indirectly affects yield because infected leaves usually wither and die. Premature loss of leaves can result in reduced market quality because fruit become sunburnt, have poor color, or have low sugar content due to ripening prematurely or incompletely. Fruit with low sugars have poor flavor and poor storability. Handles on pumpkin fruit may be shriveled or rotten in addition to fruit being paler orange. Size and/or number of fruit can be reduced in summer squash and in other crops when powdery mildew is severe. Severe disease can also lead to imperfections on fruit rind such as speckling and oedema. In addition, powdery mildew infection predisposes plants to other diseases, in particular, gummy stem blight (aka black rot).

Powdery mildew can be managed with resistant varieties and regular foliar applications of disease control products and fungicides*. It is not possible to escape infection because the pathogen produces many wind-dispersed spores, cucurbit crops are grown widely, and conditions often are favorable for this disease. The powdery mildew fungus tolerates a wide range of temperatures below about 100 F and it does not need a period of free moisture on leaves to infect, in contrast with other foliar fungal pathogens. Rain is actually unfavorable.

The fungus causing powdery mildew fortunately is sensitive to many types of chemicals that are approved for organic production. These include oil (mineral and botanical types), sulfur, copper, potassium bicarbonate, and biofungicides (Table 1). Efficacy and cost vary widely. Few products are labeled for other diseases. For effective control, applications need to

Location	Z1	EII	Total	CEW	FAW
CT Valley					
South Deerfield	0	3	3	-	-
Sunderland (1)	2	1	3	0	0
Sunderland (2)	--	--	--	0.5	--
Whatley	1	3	4	2	--
Hadley (1)	5	11	16	2	0
Hadley (2)	0	14	14	1	0
Amherst (1)	0	4	4	3	0
Amherst (2)	0	2	2	0	0
Easthampton	0	0	0	3	0
Central & Eastern MA					
Rehobeth	0	25	25	12	-
Still River	2	1	3	2.5	--
Concord	4	0	4	3	0
Leicester/Spencer	0	11	11	0	0
Northbridge	7	0	7	16	6
Tyngsboro	6	0	6	4	3
Lancaster	0	0	0	1	0
NH					
Litchfield, NH	4	0	4	13	0
Hollis, NH	49	1	50	2	0
Mason, NH	8	1	9	1	0

be started very early in disease development and repeated every 7 to 10 days (14 days with resistant varieties). Established powdery mildew cannot be controlled, not even with systemic conventional fungicides.

Routine scouting is needed to ensure applications are started very early in powdery mildew development. Plants are susceptible to powdery mildew when in their reproductive phase and at any age when grown under greenhouse conditions. Sometimes symptoms begin to develop on field-grown plants before they begin producing fruit, especially when severely stressed due to delayed transplanting or surrounded by tall weeds; removing these stresses can halt powdery mildew development thereby avoiding the need to start applications early. Inspect plants weekly. When first fruit start to enlarge is an especially important time. The scouting protocol entails weekly examining both leaf surfaces of 5 old, crown leaves in at least 10 locations through out a field. Symptoms develop first on older leaves, often on the underside. It is time to start applications when powdery mildew is found at a very low level on at least 1 of the 50 leaves. Once symptoms are easily seen without hunting, potential to effectively manage powdery mildew with rescue treatments is greatly diminished.

The pathogen develops best on the lower surface (underside) of leaves, thus a successful management program necessitates controlling the pathogen on the lower as well as the upper surface to avoid premature death of leaves. Unfortunately there are no products with systemic activity approved for organic production and it is difficult to directly deliver fungicide to the lower leaf surface, even with new nozzle types and air assist sprayers. Foliar applications of sulfur have been more effective than most other organic products for powdery mildew on lower surfaces when compared in fungicide efficacy experiments, apparently because when deposited on the upper leaf surface, sulfur can volatilize and be redistributed to the lower surface. Sulfur is also less expensive than other materials. Like copper, sulfur is an element and thus cannot be degraded and removed from the environment as can materials such as oils. Sulfur is a micronutrient for plants. Note that sulfur can be phytotoxic on melons, especially if applied when temperatures are hot.

All products listed below, except MilStop, have been evaluated in replicated experiments conducted since 1997 in Riverhead, NY, and found to be effective for powdery mildew. All are considered protectants since they do not move into plant tissue. Product efficacy for providing full-season control ranged from poor to at least as good as the popular conventional protectant fungicide chlorothalonil formulated as Bravo. The most effective products were Microthiol Dispers and Eco E-Rase. GC-3 organic fungicide, Organocide, JMS Stylet-oil (organic formulation), and Champion were also highly effective. No experiment included all products thus they cannot be ranked. Tables of these experiment results will be posted on line at <http://vegetablemendonline.ppath.cornell.edu/>.

In summary, to ensure good yield of high quality fruit of cucurbit crops, manage powdery mildew by selecting varieties with resistance, examining foliage weekly to detect when this disease begins to develop, and applying control products to foliage beginning very early in disease development.

Please Note: Organic growers should ask their certifier about product acceptability for their operation before purchasing. 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.

* note that in the US products for which the manufacturer claims disease control must be registered as fungicides with EPA unless the ingredients are 'generally recognized as safe' (GRAS) by EPA.

Biocompatible products evaluated for managing powdery mildew, active ingredient, whether exempt from tolerance and EPA registration as a fungicide, labeled diseases and insect pests, and company. Note that a few are not yet OMRI listed. Prices are from 2007 and should be used for relative comparisons only.

1. Bugitol. 0.42% capsaicin and related capsaicinoids, 3.7% allyl isothiocyanate. Kills and repels numerous insects, no diseases on label. Champon Millennium Chemicals. \$28.56 at 96 fl oz/A. Not OMRI approved yet. EPA Reg No. 61966-4.
2. Eco E-rase. 97.50% jojoba oil. Controls powdery mildew and white fly. Labeled presently for use on grape and ornamental crops. IJO Products. \$16.25 at 0.5% applied at 50 gpa. OMRI listed. Exempt from tolerance. EPA Reg No. 68186-1.
3. GC-3 Organic fungicide. 30% cottonseed oil, 30% corn oil, 23% garlic extract. Controls powdery mildew. JH Biotech, Inc. \$23.75 at 1% applied at 50 gpa. OMRI listed. Exempt from EPA registration.
4. Organocide. Active ingredient=5% sesame oil; inerts = 92% fish oil + 3% emulsifiers. Labeled for several dis-

- eases and insects. Organic Laboratories, Inc. \$47.50 at 2 oz/gal. OMRI listed. Exempt from EPA registration.
5. Sporan. 17.6% rosemary oil; Other ingredient = 82.4% wintergreen oil. Labeled for several fungal diseases. EcoSmart Technologies. \$29.25 at 1.5 qt/A. OMRI listed. Exempt from EPA registration.
 6. Trilogy. 70% clarified hydrophobic extract of neem oil. Labeled for several diseases and insects. OMRI listed. Certis USA L.L.C. \$12.00 at 1% applied at 50 gpa. EPA Reg No. 70051-2.
 7. Milsana. 5% ethanolic extract of Reynoutria sachalinensis (giant knotweed). Boosts plants' natural defense mechanisms; certain fungal and bacterial diseases. Label recently expanded from just ornamental greenhouse crops to include use in field on food crops. KHH BioSci, Inc. \$8.75 at 2 qt/100 gal applied at 50 gpa. EPA Reg No. 72179-2.
 8. Prev-Am. 0.99% sodium tetraborohydrate decahydrate. Labeled for several diseases and insect pests in addition to powdery and downy mildew in cucurbits. ORO Agri, Inc. \$11-27.50 at 0.4-1% applied at 50 gpa.
 9. AgriLife. 5% citric acid. Natural plant immune booster. Broadly labeled for fungi and insects. Biological Solutions, LLC. \$30-60 at 0.5-1% applied at 50 gpa. Exempt from EPA registration.
 10. JMS Stylet-oil, organic formulation (note that there is another formulation). 97.1% paraffinic oil. JMS Flower Farms, Inc. \$7.43 at 5 qt/100 gal applied at 50 gpa. OMRI listed formulation. EPA Reg No. 65564-1.
 11. Serenade. Bacillus subtilis. Labeled for several diseases. OMRI listed. AgraQuest. EPA Reg No. 69592-11.
 12. Sonata. Bacillus pumilus. Labeled for several diseases. OMRI listed. AgraQuest. EPA Reg No. 69592-13.
 13. OxiDate. 27% hydrogen dioxide. Labeled for several diseases. OMRI listed. BioSafe Systems. \$21.58 at 128 fl oz/100 gal. EPA Reg No. 70299-2.
 14. Armicarb. 85% potassium bicarbonate. Labeled for powdery mildew and other diseases. Helena Chemical Company. \$12.69-16.92 at 1.5-2 lb/A. EPA Reg No. 5905-541.
 15. Kaligreen. 82% potassium bicarbonate. Labeled for powdery mildew. \$21.41 at 4 lb/A. OMRI listed. AgBio, Inc. EPA Reg No. 70231-1.
 16. Milstop. 85% potassium bicarbonate. Labeled for several diseases. BioWorks, Inc. EPA Reg No. 70870-1-68539.
 17. Nutrol. potassium dihydrogen phosphate (0-50-32). Labeled for powdery mildew. \$11.36-17.04 at 8-12 lb/A. Not OMRI listed. LidoChem, Inc. EPA Reg No. 70644-1.
 18. Champion. 77% copper hydroxide. Labeled for several diseases. NOTE: OMRI listing of Champion WP was revoked in 2007; a new formulation is being developed for organic production, called Champ WG. . NuFarm Americas Inc. \$5.70/A at 2 lb/A.
 19. Microthiol Disperss. 80% sulfur. Labeled for powdery mildew. Will be OMRI listed soon; other sulfur products OMRI listed. Cerexagri. \$2.64/A at 4 lb/A. EPA Reg No. 4581-373.

Note on copper: in MA, Copper Sulfate 53 (Albaugh) is currently both OMRI approved and registered in the state. EPA registration #45002-8.

-Margaret Tuttle McGrath

PEST AND DISEASE UPDATE

Squash bug: It seems that the squash bug populations may be on the increase, as every year we hear growers saying that there are more squash bugs than the year before. Adults are difficult to control with insecticides, but by the time nymphs hatch cucurbit crops are usually flowering, and we want to avoid injuring our pollinators. We observed one field of early-planted winter squash this week where the fruit is nearly mature and the squash bugs are nearly all in the nymph stage. And there were LOTS of squash bug nymphs! This seems to be a good time to spray, to bring the population down, as squash bugs are reportedly easier to kill as nymphs. Controlling them now will prevent damage to the fruit and will keep adults from dispersing all around the farm.

Squash bugs are often resistant to all but a few insecticides (i.e. bifenthrin). Thorough coverage is necessary. During flowering, treat late in the day when the flowers are closed to reduce risk to bees. Organic insecticide options are limited to neem, which may not be particularly effective on this pest. 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.

Flea Beetle: We hear continued reports of flea beetle damaging late Brassica crops. Where possible, spray while crop is small to prevent stunting and damage to harvested leaves. Conventional growers should rotate among classes of insecticides to avoid selecting for resistance. For organic growers, spinosad seems to be the only effective insecticide available. Use a high rate. If row covers are used, apply immediately after transplanting or seeding. Seed late greens far from earlier crops. It's less than four weeks till the flea beetles usually leave the field for overwintering sites, but it's a critical time to get good control for healthy fall brassicas.

Peppers: European corn borer flight is generally declining. The exact threshold to use to decide that regular sprays are not needed has not been determined, but we have used the threshold of 20 moths per week for many years with good success. This year in many cases the second ECB flight did not reach that number, even in the CT Valley where ECB typically causes a lot of fruit damage.

Pepper fields are being hit with Phytophthora, sometimes spreading from cucurbits and sometimes serving as the starting point for infections that move into vine crops. Enterprise, a resistant variety, did show substantial resistance to crown rot in one field though some fruit was infected.

Location	Z1	EII	Total ECB
CT Valley			
Granby	0	1	1
Sunderland (1)	8	20	28
Sunderland (2)	4	8	12
Amherst	2	6	8
Hadley	2	1	3

Late blight in tomato and potato: The good news is that the strain of late blight that hit western Massachusetts does not seem to be as destructive in tomato as it is in potato. However it may be more active on tomato fruit than on foliage. Unsprayed potato fields that we have scouted in the Connecticut Valley have all showed late blight. In many cases the crop has died completely, leaving blackened foliage and bare stalks. Where fields have died back, we encourage use of vine killers where possible; organic growers should mow and chop vines down as close to the soil as possible to reduce living tissue and prevent more spore production and reduce infection of tubers. Protect healthy potatoes and tomatoes with curative or systemic fungicides that are active against Phytophthora; see New England Vegetable Management Guide for details. Septoria leaf spot and early blight have been expanding upward on tomato foliage – the long leaf wetness periods create perfect conditions. Many tomato growers have succession crops and are looking for their late crop to keep the production season going. Tomatoes have been slow to ripen and are just now moving into full production.

VEGETABLE NOTES WOULD LIKE TO THANK THE FOLLOWING COMPANIES FOR THEIR SPONSORSHIP:



25 Elm St., South Deerfield, MA 01373. Phone 413-665-2115.

Field Works

61 Hicks Brigade Rd.
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508-636-9336

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