Cornell University Cooperative Extension

Eastern NY Commercial Horticulture Program

Vol. 1, Issue 17
July 25, 2013

Weekly Vegetable Update

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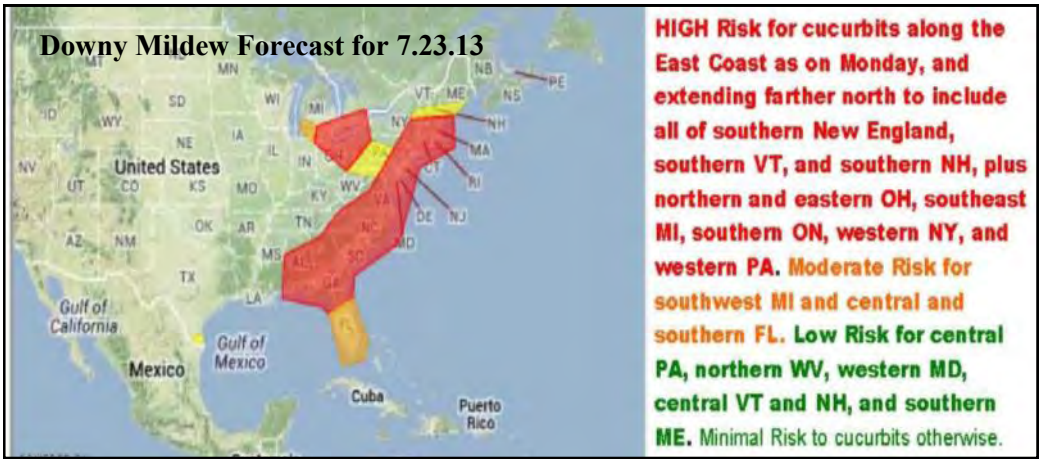
The hot, dry weather slowed down many of the diseases that we had been seeing until a couple of weeks ago, but don't let that lull you into a false sense of security. Downy Mildew has continued to move Northward and Westward, and has now been confirmed in Erie and Suffolk Counties. With the storms that blew through on Monday DM may have moved even closer. The outlook for DM as of Tuesday, using the IPM Pipe website available here, shows parts of our region at high risk for infection:



For more information on cucurbit downy mildew, including lists of organic and conventional fungicides available for use, please see the full article inside this *Update*.

Harvest is approaching full-swing for sweet corn. There have been some gaps in cool season and short season crops like greens and now we are seeing the damage the heavy rains did to early plantings. Damage from high temps is visible on some crops but has yet to be seen on plants that may have dropped flowers or missed pollination because the bees didn't venture out. We will continue to see the evidence of heat stress this week.

As mentioned, many diseases that had gotten a good start earlier were stopped in their tracks by the hot, dry, sunny weather. However, recent cooler temperatures and rain showers will likely get them going again so be sure to keep your veg plantings protected from threatening diseases. **Late blight** has been identified in 3 counties in our region (Washington county also has an unconfirmed case), plus all of central and western New York. Northern Corn Leaf Blight has been sighted in sweet corn in our area.

Insect pressure continues to be an issue. As harvesting ramps up and weed pressure increases insect issues can sneak up on you. Watch for squash bugs, a second flush of cucumber beetles, leaf hoppers, aphids, and spider mites. Many of these insects are best controlled by a couple of well-timed sprays just as they are starting to become an issue. Wait too long, and control gets really tough.

Effectively Managing Cucurbit Downy Mildew in the Northeast and Mid-Atlantic Regions of the US in 2013

By Margaret Tuttle McGrath, Department of Plant Pathology and Plant-Microbe Biology, Cornell University. Co-authors: Beth Gugino (Penn State), Kate Everts (Univ. Maryland), Steve Rideout (Virginia Tech), Nathan Kleczewski (University of Delaware), and Andy Wyenandt (Rutgers). Edited by CLS—for the full, original article please click here.

The most important component of an effective management program for downy mildew is an effective, properly-timed fungicide program. The key for conventional growers is to apply mobile fungicides targeted to the pathogen starting when there is a risk of the pathogen being present in your area. Mobile (or translaminar) fungicides are needed to manage the disease on the underside of leaves. **Because these fungicides have targeted activity towards oomycete pathogens, which include those causing downy mildew and Phytophthora blight, additional fungicides must be added to the program when there is a need to manage other diseases such as powdery mildew.**

Resistant varieties have historically been another tool for managing downy mildew. There are currently no commercially available cucumber varieties resistant to the most recent strain of DM, but seed companies and universities, including Cornell, are working to release varieties with proven improved resistance. Varieties resistant to older forms of Downy Mildew are still considered an important part of a complete management strategy for organic and conventional growers.

When to apply fungicides. An important resource for determining when fungicide applications are warranted is the NCSU Cucurbit Downy Mildew Forecasting (CDM ipmPIPE) website at http://cdm.ipmpipe.org. Forecasts enable timely fungicide applications based on the risk of disease development. Applying fungicide right before infection is the ideal time. Growers can subscribe to receive customizable alerts by e-mail or text message.

Organic Fungicide Program: Options are still very limited for organic growers. Efficacy data for some of the products listed is not yet available.

Copper products offer some protection against downy mildew, and should be considered part of the fungicide rotation.

Double Nickel 55 (*Bacillus amyloliquefaciens* strain D747) is labeled for foliar applications at a rate of 0.25-3lbs/A to control downy mildew, gummy stem blight, and powdery mildew.

Regalia Biofungicide *(Reynoutria sachalinensis)* is labeled for foliar applications at a rate of 1-4 Qts/A

Serenade ASA/MAX (*Bacillus subtilis)* is labeled for foliar applications and showed efficacy in the one trial it was featured in by the IPM program.

Conventional Fungicide program. Alternate among targeted, mobile fungicides from different FRAC groups and apply with a protectant fungicide to manage resistance development and to help avoid control failure if resistance occurs, and also to comply with label use restrictions. The pathogen has demonstrated the ability to develop resistance to fungicides, thus a diversified fungicide program applied to resistant varieties when possible is critical for success.

Recommended downy mildew specific fungicides. Use in alternation and tank mixed with a protectant fungicide. Label directions for some products state to begin use before infection or disease development. The forecasting program helps ensure this is accomplished and lets you know when your crops are at risk.

Ranman (FRAC code 21). Use organosilicone surfactant when water volumes are less than 60 gallons per acre. REI is 12 hr. PHI is 0 day. Apply no more than 6 times in a season with no more than 3 consecutive applications.

Previcur Flex (28). This fungicide is more systemic than others and has good activity for downy mildew, but it is not effective for Phytophthora blight, which usually is also a concern in cucurbit crops. REI is 12 hr. PHI is 2 days. Apply no more than 5 times in a season.

Revus (40) and Zampro * (40 + 45). * Zampro is not registered in NY yet. While in the same fungicide chemical group, these products may have a slightly different mode of action, thus there may be benefit to using one early in a season-long fungicide program and then switching to the other product later in the program. REI is 12 hr. PHI is 0 day. Apply no more than 3 times (4 for Revus) in a season with no more than 2 consecutive applications (none with Revus). Revus must be applied with a spreading/penetrating type adjuvant. Revus has exhibited differential activity among cucurbit types. It is very effective for downy mildew in pumpkin but not in cucumber and therefore it is not recommended for use in cucumber.

Curzate (27) or Tanos (11 + 27). These have some curative activity (up to 2 days under cool temperatures) but limited residual activity (about 3-5 days). They can be a good choice when a fungicide application is not possible at the start of a high risk period when temperature is below 80 F. Apply another targeted fungicide 3-5 days later. Both must be tank-mixed with a protectant. REI is 12 hr. PHI is 3 days. Apply no more than 4 times in a season (6-9 for Curzate depending on rate); no consecutive applications of Tanos are permitted. Curzate is not labeled for Phytophthora blight.

Gavel (22). This is the only product that consists of a targeted fungicide (zoxamide) and a protectant fungicide (mancozeb). REI is 48 hr. PHI is 5 days. Apply no more than 8 times in a season. Some cantaloupe varieties are sensitive

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Managing Cucurbit Downy Mildew, continued from page 2

to Gavel. Workers must be notified that a dermal sensitizer was applied both orally and by posting at entrance to treated area for 4 days.

Presidio (43). Control was moderate to poor in several fungicide efficacy trials conducted in the eastern USA (FL to NJ) in 2011 and especially in 2012 suggesting that resistance likely has developed. REI is 12 hr. PHI is 2 days. Apply no more than 4 times in a season with no more than 2 consecutive applications. Presidio must be applied with another fungicide.

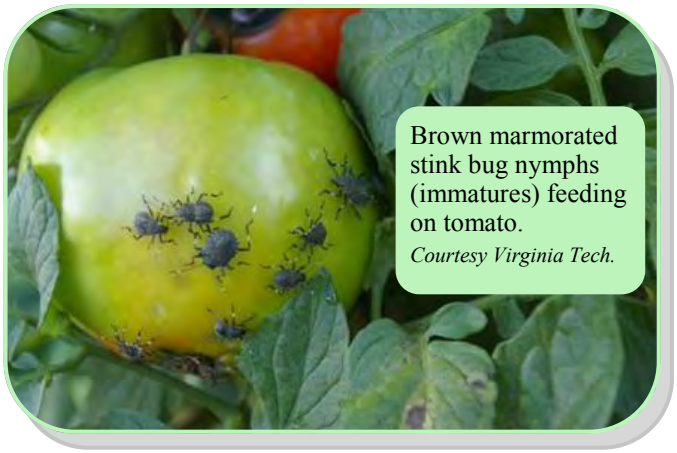
***Recommended protectant fungicides*.** Chlorothalonil and mancozeb are the main protectant fungicides for downy mildew. Copper is not as effective. Dithane has a supplemental label that includes pumpkin, winter squash and gourd.

No longer recommended. Resistance to mefenoxam and metalaxyl and to strobilurins is sufficiently common that fungicides with these active ingredients (e.g. Ridomil and Cabrio), which used to be highly effective, are now ineffective. These fungicides should not be applied for managing downy mildew.

Stink Bugs Damaging Tomatoes

Last week I mentioned seeing stink bugs on tomato. Well, this past week I've seen more tomato plantings with stink bugs and damage. Check your fields; you don't want to be surprised by the damage when you go to pick fruit. It seems to me that populations and damage is higher in weedy fields and field edges, but I've certainly seen them in clean fields as well. I've seen feeding damage on both ripe and green fruit. The damage appears as a pin prick surrounded by a cloudy irregularly shaped spot. Spots may coalesce when feeding is heavy. Spots tend to be yellowish to green on ripe fruit and whitish on green fruit. Below the surface, the flesh of the tomato will turn whitish and have a spongy texture. The stink bug damages the fruit when it inserts its needlelike proboscis into the fruit to feed on the sap. The feeding may also introduce pathogens into the fruit that can cause decay. I have observed several types of stink bugs in the mid-Hudson Valley, one of them being the Brown Marmorated stink bug; we also have green and brown stink bugs.

Stink Bug damage on ripe tomato. *Photo by TR*



Brown marmorated stink bug nymphs (immatures) feeding on tomato. *Courtesy Virginia Tech.*

For more info and management recommendations see: http://veg-guidelines.cce.cornell.edu/27frameset.html and scroll down to Stink Bugs -section 27.6.3. Organic controls for stink bugs are limited to labeled Neem and Pyrethrum products. *-TR*

Important Links for Disease Control this Summer

We will continue to feature specific diseases each week in the newsletter, along with recommended controls, but you can access the most up-to-date information on any of the major diseases you might see using the following links. We have also included a comprehensive list of OMRI products approve in New York. If you need a paper copy of a resource, let us know.

As always, if you need help diagnosing your problem before deciding what spray to use, please give one of us a call. We are happy to help. Next week look for a detailed article on powdery mildew control to follow up on the downy mildew article this week. *–CLS and MRU*

2013 listing of OMRI Products by Category and NYS registration status:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/OMRI%20JUL%20Product%20List.pdf

2013 Tomato, Eggplant, Pepper Fungicide Roster:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/TEP%20Fungicide%20Roster.pdf

2013 Potato Fungicide Roster:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Potato%20Fungicide%20Roster.pdf

2013 Cucurbit Fungicide Roster:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cuc_OverviewRoster.pdf

Managing Cucurbit Powdery Mildew in 2013:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cucurbit%20Powdery%20Mildew%20MGT%202013v2.pdf

Managing Cucurbit Downy Mildew in 2013:
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cucurbit%20Downy%20Mildew%20MGT2013.pdf

Keep an Eye Out for Aster Yellows

Aster Yellows, a phytoplasm which causes chronic virus-like symptoms in a over 300 species of cultivated plants and weeds, was identified on celery last week in Eastern NY. Aster yellows can infect lettuce (although many modern varieties have some level of tolerance/resistance), carrots (currently where the most economic damage occurs), potatoes, tomatoes, onion and celery.

Aster yellows symptoms can look virus or herbicide-damage-like in their appearance. Plants can be mottled or striped, and leaves and stems can be deformed with twisting or puckering. Phyllody can occur (where flower petals are replaced by multiple leaves).

Aster yellows on onion umble. *Credits: Univ Wisconsin*

Aster yellows in celery. *Credits: M. Lacy*

Witches broom can also be a symptom (where multiple stems grow from one point) and flowers can lack their usual color (they are green instead of the color they are supposed to be). Carrots can have a reddish tint to their leaves, have "hairy" tap roots and suffer from bitter taste.

A plant infected with Aster Yellows will begin to show symptoms within a week or so after transmission. The warmer the weather the sooner it will be evident. However, plants that are under stress will show symptoms less as they are more apparent in a vigorously growing plant.

There is no cure for Aster Yellows but there are ways to decrease infection rates:

1) Keep leafhopper populations to a minimum, especially early in the crop cycle. The longer the crop has the disease the more likely it is to suffer economic loss.

Crop		Aster Yellows Index
Carrots	resistant	100
	intermediate	70
	susceptible	50
Celery, Romaine		30-35
Head Lettuce		20-25

2) Rogue out infected plants, where possible. This may be as severe as discing infected areas or fields to prevent spread to other plantings.

3) Manage weed populations in and around fields. Many weed species are hosts and act as reservoirs for the pathogen.

4) Investigate resistant varieties for the future.

5) Use the Aster Yellows Index (AYI) to determine control timings. The AYI is calculated by multiplying the infectivity level by the average number of leafhoppers collected per 100 sweeps (Infectivity Rate) x (100 Sweeps) = (Aster Yellows Index). Not all crops have resistance determined so it is suggested to apply an AYI of 70 for those crops.

Carrots with Aster yellows. *Michigan State Univ*

Carrot with Aster yellows. *Courtesy Colorado State Univ.*

Reference: http://www.omafra.gov.on.ca/english/crops/facts/98-057.htm

Weekly Weed Spotlight on Pigweeds: Amaranthus species

By Justin O'Dea, CCE Ulster County

You are a rare grower in the northeast if you aren't seeing pigweeds at this time of year entering their prime, getting large and setting seedheads left and right. These *prolific* seed producers are among multiple species of weeds that absolutely thrive during the hottest points of the summer while most of our other crops (except corn) are photosynthesizing less efficiently or not at all during hot spells. Consequently, this is the time of year when weeds like pigweeds, purslane, and numerous grassy weeds like barnyardgrass, crabgrasses, *panicum* species, foxtails, shattercane, and Johnsongrass can gain an edge over many crops.

Pigweed seedlings

Top: Green - *Courtesy Cornell Weed Ecology & Management Lab*

Bottom: Redroot - *Courtesy South Dakota State University*

Green pigweed and flowers

Courtesy Max Licher, Arizona State Herbarium

Redroot pigweed and flowers

Courtesy Max Licher, Arizona State Herbarium

Pigweeds are broadleaved warm-season summer annuals belonging to the Amaranth family, native to the Americas. This weed is very closely related to cultivated amaranth. This article largely refers to the more common northeastern pigweed species, green (aka. "Palmer amaranth") and redroot pigweed (*Amaranthus powellii* and *retfroflexus,* respectively), but applies generally to other common pigweeds such as prostrate pigweed (*Amaranthus blitoides*). Pigweeds are problematic weeds in agriculture largely because they are very competitive during the warm season and can produce prolific numbers of long-lived seed.

- Pigweed **seeds** have variable dormancy depending on depth in soil and environmental conditions. Seedbanks may be reduced by ~50% after 3 years but seeds can remain viable for up to 20 to 40 years. Seeds are very small, hardy, and can pass through animal's digestive tracts; if animal manure composting doesn't reach optimal temperatures pigweed seeds may remain viable. Seeds begin germinating after soil temperatures begin to reach ~85 to 105°F in spring.
- Pigweed biochemistry is more closely related to tropical plants that thrive in in hotter, drier climates, and use resources more efficiently than most temperate weeds and most crops in mid-summer conditions. **Seedlings** are therefore less competitive in cool weather and conversely thrive in hot weather, and with more drought tolerance. Plants **flower/produce seed** throughout summer. One plant may commonly produce ~10,000 to 100,000 viable seeds, but are capable of producing up to a 1,000,000 seeds. Pigweeds are frost intolerant.
- **Controlling pigweed** with cultivation or flaming is most effective when seedlings are young (~.25 to 1.5" tall) and weather is still cool. Older pigweeds can often rebound from cultivation damage. Later cultivation or manual removal efforts should include pulling roots or cutting below the growth point, under the soil surface. Removing select plants with maturing seed will help reduce seedbank buildup. Pigweed is intolerant of shade and may be suppressed by competitive crops (including cover crops) that form dense canopies *before* pigweed establishes, and *persist* throughout summer. Practices that keep seedbeds cool and dark (such as mulching or cover cropping) may also help inhibit pigweed germination. Many selective post-emergence broadleaf herbicides registered for use in vegetable crops are reported to be effective on pigweeds. Note: There have been recent reports of glyphosate ("Roundup") resistant pigweed.

For more information see:

- http://weedecology.css.cornell.edu/weed/
- http://www.msuweeds.com/worst-weeds/pigweeds/
- http://extension.psu.edu/pests/weeds/weed-id/redroot-pigweed
- NY vegetable crop herbicides: http://www.nysaes.cals.cornell.edu/recommends/herbicidechart12.pdf

Meetings and Notices

None this week

Corn Trap Catch Numbers

Location	ECB-E	ECB-Z	Corn Earworm	Fall Armyworm	W. Bean Cutworm
N. Washington	0	0	0	0	0
C. Washington	5	0	1	0	0
N. Rensselaer	0	0	1	0	0
Albany	NA	NA	NA	NA	NA
C. Fulton	0	0	0	0	NA
N. Columbia	NA	NA	NA	NA	NA
Saratoga	0	0	0	0	0
Schoharie	7	0	0	0	NA
C. Ulster	0	0	0	0	0
S. Ulster	8	0	0	0	0
N.Ulster	50	0	8	0	0

Weekly and Seasonal Weather Information

	Growing Degree Information Base 50^{O} F			Rainfall Accumulations		
Site	**2013 Weekly Total** 7/17—7/23	**2013 Season Total** 3/1 - 7/23	**2012 Total** 3/1—7/23	**2013 Weekly Rainfall** 7/17—7/23 (inches)	**2013 Season Rainfall** 3/1—7/23 (inches)	**2012 Total Rainfall** 3/1—7/23 (inches)
Albany	**186.2**	**1406.3**	**1690.8**	**0.65**	**21.29**	**15.05**
Castleton	**195.3**	**1522.1**	**1673.5**	**4.40**	**19.71**	**14.62**
Chazy	**168.2**	**1336.3**	**1728.3**	**0.71**	**18.78**	**12.60**
Clifton Park	**189.2**	**1454.3**	**1576.8**	**0.82**	**20.28**	**18.00**
Clintondale	**212.1**	**1653.7**	**1275.8**	**NA**	**NA**	**13.53**
Glens Falls	**182.6**	**1341.2**	**1404.5**	**2.91**	**16.87**	**13.55**
Granville	**176.5**	**NA**	**1324.5**	**2.89**	**NA**	**17.60**
Guilderland	**201.0**	**1323.8**	**1417.4**	**0.16**	**5.42**	**5.52**
Highland	**210.4**	**1634.3**	**1737.0**	**1.02**	**14.65**	**16.49**
Lake Placid	**137.9**	**911.8**	**NA**	**0.77**	**19.40**	**NA**
Montgomery	**211.0**	**1544.9**	**1596.5**	**0.97**	**14.46**	**NA**
Monticello	**156.2**	**1119.2**	**1401.5**	**0.00**	**0.18**	**1.12**
Redhook	**203.2**	**1534.2**	**1602.5**	**0.85**	**14.28**	**11.91**