



UMASS  
**EXTENSION**



# Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 18, Number 14

August 9, 2007

## CROP CONDITIONS

After an intense heat wave last week, the heat and humidity have eased up this week. We are still getting good sun, warmth, and mostly dry weather. Rainstorms brought very welcome water to many parts of Massachusetts and New England and in many places relieved the need for irrigation. Scattered thunderstorms have been helpful in some places but have brought destructive wind and hail at other locations including northern Franklin and Berkshire counties. Some areas remain very dry. Growers continue to rank this as one of the best growing seasons that they can remember with good yields and good quality. Wholesale prices reflect that. Retail sales are excellent. Some long season crops are reaching maturity on time or early, including potatoes ready to dig and butternut squash ready to pick. Things to watch out for at this point are downy mildew of cucurbits that has made its way to southeastern Massachusetts, corn earworm and fall armyworm flights in sweet corn, and the range of late season diseases that affect tomato, cucurbits, and other crops. Don't forget that the UMass Plant Disease Diagnostic lab is just a phone call away (413-545-3209) and that an accurate diagnosis can save you a lot of pesticide cost and crop loss.

## DOWNY MILDEW FOUND IN SOUTHEAST MASSACHUSETTS

Downy mildew was confirmed in a cucumber sample from Westport, MA on Monday August 6. We have not observed it elsewhere in Massachusetts to date, but growers especially in Southeastern, Central and Eastern MA, Connecticut and Rhode Island should apply protective sprays for downy mildew to their all cucurbit crops. See below for fungicide list.

This infections very likely came from mid-Atlantic states on northward-moving air masses. The pathogen normally travels along the Atlantic seaboard from southern sources and in many years does not arrive here until September or later. Cucumbers are most severely affected, although there is evidence that the downy mildew pathogen exists as pathotypes varying in their ability to infect the various cucurbit crops (including pumpkin, squash, and melon). In Westport, other cucurbit crops at the same farm did not show symptoms so it is possible that this is a strain which most readily infects cucumbers; however, growers should apply protective sprays to all cucurbit crops. Crops are susceptible from cotyledon stage through harvest. The destructive potential of this disease is very high. Extensive defoliation can occur when conditions are favorable; when this occurs early in crop growth, yield is lost.

**Scout cucumbers to watch for symptoms on your farm.** Look at cucumbers first, as they are most likely to show symptom first. Only leaves are affected. Leaf petioles often remain green and upright after the leaf blade has died and drooped. In contrast with powdery



*Downy mildew, upper leaf surface.*

mildew, spores of the downy mildew fungus are darker (purplish gray) and develop only on the underside of leaves. Spots on upper and lower leaf surface are angular, bounded by leaf veins. Often several spots occur together in a coalesced group. Initially spots on the upper leaf are pale green, then yellow before the tissue dies and turns brown. Affected tissue in pumpkin can be more orange than yellow. On the leaf underside, spots appear water-soaked at first. Spores are not always present and symptoms can vary greatly, thus diagnosis can be challenging. See photographs in this article. Photographs are also posted at <http://vegetablemdonline.ppath.cornell.edu/> along with further details on early symptoms.

**Most cucumber varieties and a few melons have resistance to downy mildew.** However, one change that has taken place in recent years in the ability of downy mildew races to infect previously resistant cucumber varieties. 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.



*Downy mildew, lower leaf surface*

Manage Downy mildew by planting resistant varieties and monitoring

disease occurrence and weather forecasts. Regularly checking the disease forecast at [www.ces.ncsu.edu/depts/pp/cucurbit](http://www.ces.ncsu.edu/depts/pp/cucurbit) is a critical part of a management strategy as the potential for spore dispersal exists at any time during the growing season. Choose planting sites with good air movement and no shade. Avoid overhead irrigation early or late in the day when leaves will remain wet for extended periods. Avoid excess nitrogen fertility.

The organisms that cause Downy mildew (*Pseudoperonospora cubensis*) and *Phytophthora* Blight (*P. capsici*) belong to a group of organisms that used to be referred to as the “lower fungi”. In actuality, these organisms are not fungi at all and are managed by chemicals with an entirely different chemistry than most fungicides. Because both organisms cause potentially devastating diseases on important vegetable crops, the last few years has seen many new materials introduced to control these pathogens. Major changes that have recently occurred in the US populations of downy mildew include development of resistance to strobilurin fungicides and the ability to infect.

Apply broad spectrum fungicides before detection and systemic (mobile, translaminar), narrow spectrum fungicides that specifically targets Oomycetes pathogens when the disease occurs early in the crop production cycle. Fungicide resistance is a concern with this pathogen and with these narrow spectrum fungicides due to their specific mode of action; therefore, alternate among systemic fungicides in different chemical classes and tank-mix with a protectant material (eg chlorothalonil, maneb).

The following products are labeled and recommended for downy mildew:

Tanos plus a protectant alternated with one of the following:

- Curzate plus protectant
- Forum plus protectant
- Gavel
- ProPhyt, Fosphite, Phostrol
- Previcur Flex plus protectant
- Ranman plus protectant (not labeled in Massachusetts)

Further notes on these products are below. Numbers in parentheses indicate the Fungicide Resistance Group (FRAC Group). Do not apply fungicides from the same resistance group more than once in succession, preferably not more than once per season.

- Tanos: cymoxanil (27) plus famoxadone (11). Do not alternate with Curzate or Quadris, Cabrio, or Flint.
- ProPhyt, Phostrol, Fosphite: phosphorous acids (33). Affects pathogens directly and promotes plants’ defense system.
- Curzate: cymoxanil (27). Good curative activity (3 day kick-back), but poor residual activity with 2 hour rain fastness. Apply with a protectant. Do not alternate with Tanos.
- Forum: dimethomorph (15). Mix with a protectant.
- Gavel: mancozeb (M5) and zoxamide (22). Do not use on winter squash or pumpkin.
- Ranman 400 SC: cyazofamid (21). Apply with a protectant and an organosilicone surfactant. Limited systemic activity. Not

labeled for use in Massachusetts.

- Previcur Flex: propamocarb (28). Tank mix with a protectant.

-Bess Dicklow, University of Massachusetts

References: McGrath, M.T. 2006. Update on Managing Downy Mildew in Cucurbits. [www.vegetablemdonline.ppath.cornell.edu](http://www.vegetablemdonline.ppath.cornell.edu), McGrath, M.T. 2006. New Developments in Managing Phytophthora Blight in Cucurbit Crops. [www.vegetablemdonline.ppath.cornell.edu](http://www.vegetablemdonline.ppath.cornell.edu)

## FALL COVER CROPS

Now is the time to think about cover crops for the fall especially if you need to order the seed. Here is some information about some of the more common cover crop choices for Massachusetts:

### Non-Legumes

**Winter rye** is easily the most common cover crop used by growers in Massachusetts, and for good reason. It is inexpensive, easy to get and establish, and can be seeded fairly late into the fall and still take. It consistently overwinters here and will continue to grow in the spring producing lots of organic matter. Some growers find it difficult to incorporate in the spring if it is left to grow into May. Seeding rate: 90 – 120 lbs./acre.

**Oats** can be seeded in the fall and will come up quickly, similar to winter rye. Unlike winter rye, oats will winterkill here in Massachusetts and will not regrow in the spring. For this reason some growers prefer it over winter rye since it is easier to manage in the spring. It might have to be lightly incorporated into the soil in order to germinate. Enough growth is required in the fall to give adequate cover through the winter and early spring. Try to seed by Sept. 1. Growers along the coast can plant later. Make sure the oats have not been cooked (used as an animal feed). Seeding rate: 100 lbs./acre.

**Ryegrass** is used by some growers because of its thick root system that is thought to mop up more nitrogen than winter rye or oat. There are two types: annual and perennial. Despite their names, the annual ryegrass may overwinter and the perennial ryegrass may winterkill depending on when you seed them. If you have not seeded them before and would like to evaluate them, I would recommend that you seed a little of each in order to see their growth habits. I have only used these cover crops in the early spring. The seed is small and light, so specialized equipment will be needed if seeding a large area. Seeding rate: 30 – 40 lbs./acre.

### Legumes

**Clovers** are used by some growers as a nitrogen source. There are several types available. Like ryegrass, I have only used clovers as an early spring cover crop. A clover will have approximately 2.5% nitrogen whereas hairy vetch (see below) averages around 3.5% (this compares to winter rye that is usually below 1%). Clovers are a very small-seeded cover crop that need specialized equipment to establish. They can be seeded by hand in a small area, but if you want to do several acres, you will need specialized equipment. Seeding rate: 10 – 20 lbs./acre.

**Hairy Vetch** is an excellent cover crop for Massachusetts. It can be seeded up to mid September and will survive the winter. Growers near the coast or on the cape and islands can seed vetch up till October or even later. When left to grow long enough in the spring, hairy vetch has supplied over 100 lbs./acre of nitrogen.

It is very important that the appropriate rhizobia species is used for hairy vetch (the rhizobia for hairy vetch will work for all vetches and peas). Without the rhizobia the vetch will not give the desired effects.

We have been recommending you mix the vetch with either winter rye or oat. There are several reasons for this:

1. Both oat and winter rye are very efficient in taking up nitrogen from the soil (remember, the vetch is getting most of its nitrogen from the atmosphere, so it does not need much from the soil). By taking up more nitrogen in the late summer and fall we are reducing the risk of contaminating surface or ground water and the nitrogen is recycled so that it can be used by next years cash crop.

2. The oat and rye can produce tremendous amounts of valuable organic matter if allowed to grow long enough.

3. Both of these cover crops will give better erosion control than vetch alone since they emerge and establish themselves more quickly than vetch. This is especially important when vetch is seeded after September 1.

We have been recommending 40 lbs./acre of oat or rye with 30-40 lbs./acre of hairy vetch. If you are using a grain drill then you can use seeding rates as low as 30 lbs./acre of vetch. If you are spinning the cover crop on and lightly disking it in then a rate of 35 - 40 lbs./acre is suggested.

Many growers prefer the use of oat rather than rye because of the tremendous growth of rye that occurs in the spring. This can be desirable if you are looking for increased organic matter in your soils, however some growers find the amount of biomass created by these two cover crops too much to handle. In addition, we have found that we get much more growth of the vetch in the spring when seeded with oat than when seeded with rye. The rye will compete with the vetch in the spring.

-Frank Mangan

## **CROP INJURY, ADJUVANTS, TEMPERATURE, AND TANK MIXING**

When the weather is warm and humid, the potential for crop injury when spraying pesticides increases. This crop injury is primarily contact in nature, causing leaf burning, and happening easily within 24 hours of applications. There are 3 main factors influencing this injury: tank mixing, surfactants, and temperature/humidity.

Tank mixing is often allowed on pesticide labels. Sometimes there are precautions listed. For example, labels preclude mixing some materials such as Sandea or Quadris with emulsifiable concentrates, organophosphate insecticides, or certain surfactants. The reason for this is that one chemical may affect the penetration of another into the leaf causing injury. Another example is

with the insecticide Sevin. There have been cases where both the dry and liquid formulations have caused leaf burn. I have seen it when Sevin was mixed with a surfactant and also when it was mixed with a herbicide (Sandea in the most recent case). High temperature and humidity also enhance this potential injury. If a label does not list a certain tank mix that you want to use AND, at the same time, does not preclude it, you may make the tank mix. Remember, however, that you should try it on a small scale first to make sure that there will be no problems.

Surfactants can increase the potential for crop injury by enhancing penetration of pesticides into the foliage or by just causing some burning on their own. Non-ionic surfactants are usually best for improving mixing of pesticides, for enhancing coverage of leaf surfaces, and to improve retention of the pesticide on the crop or weed. It is best to stay away from silicone-based surfactants, ionic surfactants, or others that you are not familiar with unless you have a specific purpose for using them. One that has often caused crop injury is LI 700. This product, although a non-ionic surfactant, was designed to use with glyphosate (Roundup) to increase penetration into weeds and to reduce the pH of the spray mix. When used as a general surfactant and under the right conditions (warm to hot, humid, very sunny), it can cause leaf burn.

Higher temperatures and humidity also increase the potential for crop injury. A good rule of thumb is to avoid spraying in the mornings or middle of days where you can add the temperature and humidity together and get 150 or more. We have seen injury with Poast and Fusilade plus their recommended surfactants or crop oils under these conditions. One interesting point is that, you can still get leaf burning with lower temperatures and humidity, just by increasing the rate of the surfactant.

The take home message is to avoid hot and humid weather, follow label directions, use surfactants only when the label calls for them, use the right surfactant, follow tank mixing directions, test new tank mixes first, and cross your fingers.

-Rich Bonanno

## **BRASSICAS UPDATE**

The fall Brassica crops are doing well. Transplanting shock from hot, dry conditions can give them a difficult start, but fortunately they crops are tough. If rain is short, be sure to supply irrigation to get them off to a good start (including germination on direct seeded crops), keep up an ample pace of growth, and help heat-sensitive crops such as Broccoli tolerate heat without head injury.

**Flea beetles** are actively feeding in Brassica crops. As usual, they are selecting the *Brassica rapa* type greens over late cabbage or broccoli leaves, but they can be found in both. Crops planted near early season Brassicas will have higher populations than those moved to a new field. We are testing a perimeter trap crop of komatsuna around late broccoli and cabbage, and we do see a concentration of flea beetles on the komatsuna. A demonstration plot will be shown at the UMass Vegetable Field Day on August 21st. Flea beetle activity generally drops off after Labor Day, but at this time, the summer adults are very active.

**Diamondback moths** and **imported cabbageworms** are active. New eggs are being laid. Watch for arrival of the migratory **cabbage loopers**. Be sure to check broccoli and cabbage as the crops begin to form heads, as this is the critical stage to control caterpillars.

Spinosad and pyganic are organic options for flea beetle control; spinosad and Bt kurstaki or Bt aizawai (Xentari) for caterpillar control. Spinosad provides a longer residual and (based on UMass trials) is more effective than Pyganic against flea beetle, but should be rotated with other products (Bt for caterpillars, pyrethrin for flea beetles).

Successive generations of **cabbage root maggot fly** generally result in a period of fly activity in late August. As soils cool down (not yet, but it usually happens later in August and early September), cooler soils allow for better survival of eggs and maggots than during the heat of midsummer. Growers of fall turnips, radishes, and daikon, as well as sensitive crops like Chinese cabbage, should scout these crops for root maggot eggs. Root crops may survive maggot feeding damage and grow well, but a small amount of feeding damage on the roots renders them unmarketable. A single soil drench directed at the root zone should be adequate if eggs are found. Chlopyrifos (Lorsban 75WG) is the sole registered product. Pay attention to “days to harvest” intervals.

Cultural practices and organically allowed sprays that can eliminate root maggot damage to fall root crops are not well developed. In 2005 we worked with growers who tried using row cover to protect fall turnips, and determined that yield was decreased by this practice. This was true even when row cover was only used for part of the growing period. Also, aphids built up under row cover when it was placed on the crop part way through development. We are not aware of any OMRI- listed insecticide products that will effectively control root maggots.

Watch for buildup of **cabbage aphids** at this time of year. See New England Vegetable Management Guide (online at [www.nevegetable.org](http://www.nevegetable.org)) for conventional and OMRI-listed products. **Thrips** may also move from onions after harvest if fields are close by. Symptoms on leaves are bronzing and scarring, most evident on the underside. Spinosad is registered for this pest in several crops.

**Alternaria leaf and head rot** of brassicas can cause problems at this time of year. Fungicides that control this include Bravo, maneb and Quadris. Copper products would also help suppress this disease. Like early blight of tomato, this fungus produces abundant spores that move to successive plantings. Till under summer Brassica crops immediately after harvest to reduce the source of this disease on fall Brassicas.

## **NEXT IPM FIELD SCHOOL WILL BE IN SOUTHEASTERN MASS!**

JOIN US ON AUGUST 15TH AT PARADISE HILL FARM IN WESTPORT

Time: 4-7 pm. We will start promptly at 4 pm.  
Bring disease samples for onsite diagnosis!

Paradise Hill Farm is a 20 acre farm run by Ted & Shirley Robbins. Aptly named for its beautiful location, Paradise Hill Farm specializes in a wide variety of potted herbs, fruits and vegetables. They sell through several farmers markets in south-eastern Massachusetts and RI.

We will tour fields to look at cucurbit crops (summer and winter squash, specialty melons, cucumbers, and pumpkins) with an eye to the wide range of diseases that come in at this time in the season. Rob Wick will have microscopes onsite and will look at any disease samples that you bring! (Not all samples can be diagnosed onsite, but many can be). We will check out insects, weeds and diseases, how to identify them, and what determines whether they are damaging to the harvested crop. Rick Bonanno will discuss weed ID and management. We will check the sweet corn for fall armyworm, and discuss new products that work well for fall armyworm and how to use pheromone trapping for corn earworm. Coastal New England is always hit heavily by these migratory pests, and producing clean sweet corn all season is a special challenge in this region. IPM methods take the guesswork out of spray decisions and can reduce costs while giving high quality corn.

The meeting will end with a barbecue supper including a salad with Paradise Hill’s delicious tomatoes and crispy Brazilian cucumbers!

Two contact hours of pesticide recertification credit will be offered. Registration: \$20.

**Directions:** Take your favorite route to I-195. Merge onto MA-88 S via Exit 10 toward US-6 / Horseneck Beach and go 7.3 miles. Turn left onto Hix Bridge Rd., go 1 mile. Turn Right onto Cadmans Neck Rd for 0.3 miles. The farm and greenhouse are on your right, just past the vineyard.

For more information contact the Vegetable Program lab at 413-577-3976.

## **MARK YOUR CALENDAR FOR THE VEGETABLE RESEARCH FIELD DAY**

August 21 (Tues) 4-7 pm

Crop Research and Educational Center, South Deerfield, MA

Learn about new research on a wide range of topics in vegetable crops, cover crops, and crops for fuel! The UMass Vegetable Team will show what is happening with its latest research.

Experiments include:

- biological and chemical controls for *Phytophthora capsici* in summer squash;
- evaluating new ethnic crops for production in MA – especially for Brazilian and Salvadoran markets
- organic weed management for stale seedbed and between plastic;
- cover crop planting dates for fall N uptake and spring N production
- perimeter trap cropping for controlling flea beetles in Brassicas;
- selection of cold hardy greens;

- growing switch grass as a biomass fuel
- sweet corn nitrogen response and stalk tests for nitrogen
- vegetable soybean (edamame) variety trial and planting dates

We will tour the brand new equipment workshop that is just being completed at the research farm! The Field Day will end with a barbecue, salads and desert featuring delicious Brazilian and other ethnic foods.

Two contact hours of pesticide recertification credit will be offered. Registration: \$20. For more information contact the Vegetable Program lab at 413-577-3976.

**Directions:**

**Coming north on I-91:** 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 I-91:** 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.

## CORN REPORT

Overall, sales of sweet corn continue to be strong and some growers have been able to keep their retail prices up around \$5.00 a dozen or higher since the beginning of the season.

The European Corn borer second flight has picked up in most areas. We have found some very small larvae feeding in pre-tassel and green tassel corn indicating that hatch has occurred. Where flight is over 7 moths per week maintain a 6-7 day spray schedule in silking corn to protect ears. This is a good time to test out selective lower-risk alternatives to synthetic pyrethroids which will control FAW and ECB in pre-silk corn (e.g. Avaunt) or through silking if CEW pressure is low (e.g. Spintor). Aphid populations have been lower in fields where these chemicals are used to control ECB since populations of beneficial insects are preserved through the use of less toxic materials. We are expecting the second flight of ECB to remain steady for the next week or so before it starts to decline. Remember to continue scouting and spray once your fields are 15% infested

A 6-7 day schedule should be maintained where corn earworm is 2-3 moths per week. If you are catching 7 or more moths per week, you should be on a four day schedule (1.1-13 moths per night), and in many areas a five day schedule is adequate (0.6-1 moth per night). If you have pheromone traps make sure that you move them to fresh silk to get an accurate measure of CEW activity. In silking corn, Baythroid, Warrior and Larvin are good for high pressure corn earworm situations; Spintor is good for ECB in silk and for low or moderate levels of CEW. Keep checking your traps twice a week so you don't have

a surprise attack from a CEW infestation in your silking corn. Numbers can reach alarming levels overnight when weather fronts move up the coast from the South.

Fall armyworm has been caught in a few locations throughout the state. The larvae that we are finding are in various stages feeding in the developing tassels of whorl stage corn. If you are seeing ragged looking feeding in your fields you may have a FAW infestation. Caterpillars are smooth and dark green or brown with lengthwise stripes and dark spots. Full-grown larvae can reach up to 1.5 inches. The head capsule is dark with a distinctive light colored marking in the form of an upside down Y. This is contrast to the CEW which always has a plain tan colored head. FAW needs to be controlled in whorl stage corn when 30% of the plants are infested and when 15% of the plants are infested in pre-tassel and tassel corn.

### CORN EARWORM THRESHOLDS

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 - 0.5	1.4 - 3.5	6 days
0.5 - 1 day	3.5 - 7	5 days
1.0 - 13.0	7 - 91	4 days
Over 13	Over 91	3 days

-Amanda Brown, UMass Extension

### Sweet Corn Trap counts for August 9, 2007

Location	ZI	EII	Total ECB	CEW	FAW
Sheffield	9	6	15	8	-
South Deerfield	1	17	18	-	-
Deerfield	9	215	224	5	0
Whatley	9	4	13	12	6
Hadley (2)	0	14	14	10	
Holyoke	0	1	1	0	0
Sunderland	15	1	16	0	0
Rehoboth	47	17	64	43	-
Concord	1	3	4	3	0
Leicester/Spencer	4	2	6	6	0
Northbridge	11	3	14	6	1
Tyngsboro	1	2	3	8	0
Dracut	7	1	8	4	0
Lancaster	15	6	21	1	0
Still River	4	2	6	72	-
Mason, NH	0	0	0	14	-
Hollis, NH	0	52	52	5	1
Litchfield, NH	0	0	0	20	1

## Pepper Trap Counts for August 9, 2007

newsletter if it is in conflict with the label.

Location	ZI	EII	Total ECB
Hadley	3	10	13
Amherst	7	3	10
Hatfield	7	264	271

--Thanks to our scouting network: R.Hazzard, P.Westgate, A.Brown, A.Lopez-Swetland, D.Rose, J.Golonka, S.Pepin, G.Hamilton, P.Willard, J.Mussoni

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