UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 15, Number 18 August 26, 2004

CROP CONDITIONS

Weekend storms brought heavy rain, wind and hail to some parts of the state. Sweet corn stalks were flattened in some areas of eastern and central Mass. The dry sunny weather has been very welcome and a boon for curing and harvesting early vine crops. However, cool nights have shut down the production of summer squash and zucchini. Peppers and eggplants may suffer from slightly lower yields as a result of cool conditions this summer, but quality is generally good. Potato harvest is at about 20% with quality reported to be good. Greens continue to do very well.

DOWNY MILDEW IS WIDESPREAD IN MA CUCURBIT CROPS

Scorching of vine crops from downy mildew- note bed of melons at left, which is completely dead
Hadley, MA

We don't exactly need another disease to contend with in vine crops…but downy mildew is likely to have a widespread impact on the decline of foliage in our vine crops. This week downy mildew symptoms were also found in Central Ma. Fields in the Connecticut Valley are showing a rapid in increase in symptoms, including scorching and death of the foliage. It affects melons and summer squash as well as pumpkin and winter squash, though some crops die back more quickly than others. If the crop is already mature, there may be little impact on yield or quality, since it is not a fruit disease. However, once vines have died back, the fruit is vulnerable to sunscald. Acorn squash seems to be particularly susceptible to sunscald, which causes the skin to turn orange. Harvest quickly to avoid this problem, because it can render the crop unmarketable. If the fruit is still green and needs further energy from the foliage in order to complete its growth and maturity, downy mildew can cause a significant loss in yield. Because powdery mildew is also widespread, one might think that the rapid 'burning' of vine crop foliage is the result of powdery mildew. It is likely, however, that both diseases may be involved.

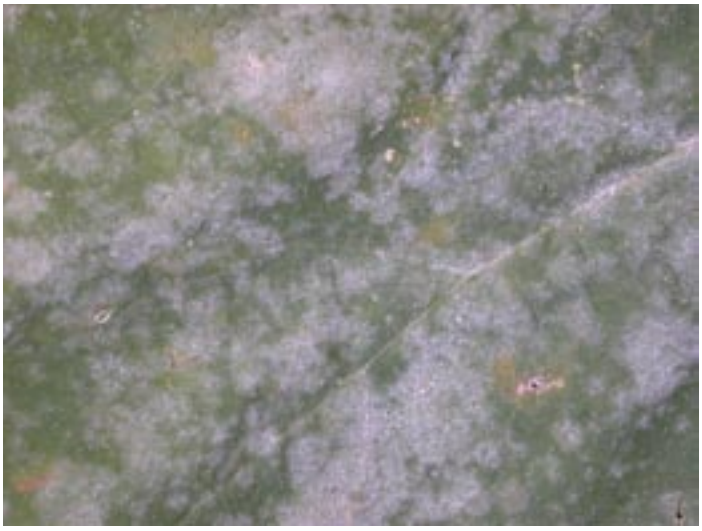
How do I know if it's downy or powdery…?

Last week we published descriptions of both diseases. In this week's newsletter we are also publishing photographs of symptoms. Downy mildew is not obvious at first, but the symptoms are different and recognizable compared to powdery mildew.

Downy mildew(dark areas) and powdery mildew(white circles) on the underside of one squash leaf

The diagnostic characteristics of **powdery mildew** are pure white 'fuzzy' growth on the upper and lower leaf surface, petioles and stems. Symptoms typically begin on older, lower leaves and can develop and spread rapidly under dry, humid conditions. Stems can also be infected.

Downy Mildew – First symptoms are small, slightly yel-



Podery mildew on upper surface of squash leaf

low areas on the upper leaf surface, and angular-shaped, brownish lesions on the underside. They are angular in shape, bounded by the leaf veins. Dark spores are produced on the undersides of the leaves, giving the leaf a downy appearance, which ranges from no color, to light gray to deep purple.. As the disease progresses, progressively larger areas of the leaf turn yellow or brown and die.

How is it different from *angular leaf spot*, which also has angular lesions? Angular leaf spot lesions have papery, brown, dead tissue in the center of each spot, often opening up to a 'windowpane' hole in the leaf. Downy does not do this.

Downy mildew symptoms on upper surface of a squash leaf

Are sprays for downy mildew worthwhile? If fruit is >1-2 weeks from maturity, and the disease has not already reached an advanced stage, probably. There are several fungicides labeled for control of downy mildew and many will help control other important diseases in cucurbits. Alliette (phosethyl Aluminum) has systemic properties and could have some activity against **Phytophthora**. One of its effects is to help induce resistance mechanisms in the plant. This is also true of other materials which contain phosphorus, such as Phosphite. These have no direct fungicidal activity, but achieve a disease management benefit by triggering increased resistance to disease in the crop. This often extends to several diseases. There is research evidence that phosphates reduced downy mildew in grapes, and had credible activity against powdery mildew as well. We are not certain whether this effect occurs when the crop is nearly mature, or if it is more pronounced when these materials are applied early. However, if they are not expensive, phosphorus materials may provide a benefit. Ridomil/Bravo and Ridomil. Gold MZ (which includes manzate) are good choices because the Ridomil has systemic properties and both the Bravo and Manzate are active against downy mildew (as well as other diseases). Ridomil by itself is not recommended (and not labeled for cucurbits). There is some possibility that resistance to Ridomil could be present, because the areas of the country from which the downy mildew traveled to the Northeast are very likely to be areas of heavy Ridomil use. However, there is no evidence that the downy mildew that is here is resistant. Strobilurins would also be effective but overuse should be avoided in order to avoid resistance in powdery mildew..

Plectosporium symptoms have been described in past newsletters. Spray materials that are effective against powdery mildew should control this disease; however Alliette and Ridomil would not be effective.

Downy mildew lesions on the underside of a squash leaf- note angular shape and dark purplish color

-R Hazzard and R. Wick, UMass Extension, photos:R. Hazzard.
Call for diagnostic information: ***Dr. Rob Wick****, UMass Disease Diagnostic Lab: 413-545-1045.*

GET READY FOR FALL COVER CROPS

As your fields finish up with crops, be prepared to turn under crop residues and sow a cover crop as soon as you can. This will help improve soil quality by adding organic matter, reducing erosion, and even avoiding compaction from the force of raindrops, which can be significant. Cover crops will also help suppress weeds. Options include crops that will winter-kill and be and to work in next spring such as annual ryegrass or oats. If you want to grow some of your own nitrogen sow 20 pounds per acre of hairy vetch around the end of August, mixed with a bushel of rye or oats. Let this grow until mid- to late-May next spring to get the most N out of it.

For ideas on a variety of cover cropping options, including permanent beds, intercrops, no-till and spaders, order the video called Farmers and their Innovative Cover Cropping Techniques at: **www.uvm.edu/vtvegandberry/Videos/videos.html** or call: **(802) 656-5459** for more info on how to obtain the video.

Order cover crop seed right away if you haven't already. 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 September 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. Clovers can be seeded as an early spring cover crop, or in late summer. 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%). Sweet clover and red clover (especially mammoth red clover) produce heavy growth in spring after overwintering. Red clover, sweet clover and white clover are all sufficiently hardy to withstand most winters in the Northeast. 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 Sept. 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.

Cover crops for no till

If you plan to use a no-till system, select your fields and plant your cover crops accordingly. **Rye** should be seeded at higher rates for a no-till system, such as 3 bushels (168 pounds) per acre. This gives a thicker, more weed-suppressive cover and should be allowed to grow to at least 30 inches to produce enough biomass for weed control.

-**Hairy vetch** is another option for no till which has worked well in more southern areas but also shows promise in New England. The dense mat of vines gives a thick cover of organic matter which can last throughout the season. Vetch also provides nitrogen to the crop. It may be best for use with transplants. We have observed good success this season in on-farm trials with pumpkin transplanted into a vetch cover. It is difficult to plant direct-seeded crops through hairy vetch without specialized no-till equipment that can cut through the viney matt. In spring, hairy vetch can be killed using glyphosate or by mowing at the flowering stage.

-Adapted from articles by Vern Grubinger, University of Vermont and Frank Mangan, University of Massachusetts, and the Pumpkin Production Guide (Dale Riggs, editor, published by NRAES). See also article in August 5 Vegetable Notes by Marianne Serantonio (see archives at www.umassvegetable.org)*

Pumpkin Production Guide

-This guide is a comprehensive resource on pumpkin production – cultural practices, varieties, insect, disease and weed management, wildlife, economics, harvest,and marketing. Excellent photographs. Edited by Dale Riggs with contributions from pumpkin experts throughout the Northeast region. Published by Natural Resource, Agriculture, and Engineering Service(NRAES) www.nraes.org (607)-255-8770

BLIGHT UPDATE IN TOMATO AND POTATO

To date, we have not had any reported cases of late blight in Massachusetts. Fortunately, the weather conditions this week are more favorable for crop growth and maturity, and less favorable for diseases. Late blight continues to cause problems in western Pennsylvania, central and western New York, Maine, and the Maritime provinces of eastern Canada. Early blight is, as usual for this time of year, widespread in both tomato and potato crops in MA, and bacterial canker is present in some fields. If current dry weather continues, the spray schedule for preventative sprays in tomato crops can be extended. Many potato fields have been dessicated for harvest. Tomato fruit is ripening well and quality is generally excellent.

We continue to urge growers to scout potatoes and tomatoes for late blight, and contact the Disease Diagnostic Clinic at **413-545-1045** if you think you might have found the disease. .

Late blight stories continue to be in the news, even though it is not currently a problem here and, in fact, the tomato crop is great. Home gardeners who suspect they may have the disease or want more information can contact consultants at the Western Mass Master Gardeners Hotline in Stockbridge, MA (413 -298-5355), or the Massachusetts Horticultural Society, Dover, MA (617-933-4929). There is also a new Western Mass Master Gardeners Hotline in Holyoke at 413-533-0414.

-R. Hazzard

PUMPKIN AND WINTER SQUASH HARVEST AND STORAGE

Although there are many fields with immature fruit, pumpkins in some fields are orange. Sugar pumpkins, especially, are ready early. Butternut in some fields is showing the dull, dry skin that characterizes mature fruit. If the current warm sunny days continue, more and more pumpkin fruit will color up in the next several weeks. Fruit sitting in the field faces a daunting list of diseases and insects – not to mention possible heavy weather events -- that could threaten fruit quality. Early harvest and careful storage is preferable to leaving fruit in the field. This is especially true if you know that your pumpkins or squash are in fields that is infected with Phytophthroa blight.

Pumpkins may need to be held for several weeks before they can be marketed. There can be extra work involved in bringing fruit in early, especially for growers who normally have pick-your-own harvest, but we recommend that growers harvest as soon as crops are mature and store under proper conditions, if it is feasible. Attention to curing and handling will go a long way toward improving the life of winter squash and pumpkin fruit.

What about pumpkin stems, ie, handles? In some cases, it's the handle that sells the pumpkin. Pumpkins are not marketable if the handle is broken off or dried up. Ideally, if the timing is right, pumpkins would be cut one to two weeks prior to marketing. However, if they are harvested now they may sit much longer before being sold. The discussion of how early to cut handles is an old one with many different opinions. One view is that it is advisable to cut the handles from the vine to save them from advancing powdery mildew and reduce shrinkage. Whether or not handles shrink and shrivel after cutting is affected by plant stress, genetics (variety), moisture and temperature conditions, and disease. There are many diseases that can affect handles, including Plectosporium, Fusairum, Black Rot, Alternaria. Again, proper curing and storage conditions are key.

Ideally, pumpkins should be harvested when fully mature, with a deep orange color and hardened rind. However, as long as pumpkins have started to turn color, they will ripen off the vine if held under the proper conditions. While not

ideal, this may be preferable to leaving them in the field if conditions are not favorable. If necessary, pumpkins can be ripened in a well-ventilated barn or greenhouse. The best temperatures for ripening are in the seventies to low eighties. Night temperatures should not drop below the sixties. Even if pumpkins are ripe, a period of curing can improve storage life. The curing period should be about 10 days. During this process, the fruit skin hardens, wounds heal and immature fruit ripens – all of which prolongs the storage life.

Pumpkins should be stored in a cool, dry place. Ideal temperatures are between 50° and 60° F and relative humidity of 50 - 70%. Higher humidity allows condensation on the fruit with risk of disease, and lower humidity can cause dehydration. Higher temperatures increase respiration and can cause weight loss. Temperatures lower than 50 F cause chilling injury (see squash, below). In a greenhouse, temperature can be managed with ventilation on sunny days. Unless it is quite cool, heat is not likely to be needed if the house is closed up at night.

Often it is not feasible to harvest pumpkins early and store them until they can be marketed, and so they must be 'stored' in the field. If vines and fruit are healthy, storage in the field can be successful for a few weeks. If the vines die back, damage to the fruit from sun, disease and insects is more likely. In any case, it is important to scout for insects feeding on the fruit and handles, which may include **squash bug** nymphs or adults, or **striped cucumber beetle**. Control them if damage is evident. In fields that have a history of **Phytophthora** blight, **Fusarium** fruit rot, or **black rot**, field storage may increase the incidence of these problems, particularly if we have a period of wet weather or a major storm while fruit is sitting in the field. This has been one of the causes of significant losses in recent years, and one reason that we recommend bringing fruit in as soon as it is mature.

Winter squash is also maturing in some fields. Fruit that are free from disease and haven't been subject to much chilling (below 50°F) should be selected for long-term storage. Fruit from fields where Phythophthora is present are not the best choice for storage.

Storage life depends on the condition of the crop when it comes in and your ability to provide careful handling and a proper storage environment. All fruit placed in storage should be free of disease, decay, insects, and unhealed wounds. When harvesting squash and pumpkins, it is important to handle the fruit with care to avoid bruising or cutting the skin. Despite its tough appearance, squash and pumpkin fruit are easily damaged. The rind is the fruit's only source of protection. Once that rind is bruised or punctured, decay organisms will invade and quickly break it down. Place fruit gently in containers and move bins on pallets. Use gloves to protect both the fruit and the workers.

Removal of the stem from squash (butternut, Hubbard, etc.) will also decrease the amount of fruit spoilage because the stems frequently puncture adjacent fruit, facilitating infection.

A period of curing after harvest can help extend storage life of squash. This may be done in windrows in the field -- especially with a series of warm, dry days -- or by placing squash in a warm dry atmosphere (70-80°F) with good air circulation, such as a greenhouse, for up to two weeks. This pre-storage treatment permits rapid drying of the outer cell layers, and when combined with a dry atmosphere for storage inhibits infections that can take place at this time. Any clean cuts during harvest a likely to heal over and are no longer a source for injury or infection.

Take care to avoid subjecting squash to chilling injury. Chilling hours accumulate when squash or pumpkin is exposed to temperatures below 50oF in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. Chilling injury is of particular concern with squash intended for storage because it increases the likelihood of breakdown. If squash has been exposed to chilling injury it should be marketed first and not selected for long-term storage. Remove squash from the field if temperatures likely to drop below fifty degrees for any length of time.

After curing, move squash or pumpkins to a dry, well-ventilated storage area. Pressure bruises can also reduce storage life, so avoid rough handling, tight packing, or piling fruit too high. Fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation, which can lead to rot. Ideally, the storage environment should be kept at 55-60°F with a relative humidity of 50-70%. Lower relative humidity increases water loss, resulting in reduced weight, and if excessive, shriveling of fruit. High relative humidity provides a favorable environment for fungal and bacterial decay organisms. Under ideal conditions, disease-free pumpkins should have a storage life of 8-12 weeks and butternut squash up to three or four months. Even if it is difficult to provide the ideal conditions, storage in a shady, dry location, with fruit off the ground or the floor, is preferable to leaving fruit out in the field.

As you plan for storage and marketing, keep in mind that the market for pumpkins seems to get earlier every year. Fall decorative displays include pumpkins, and those displays begin showing up as Labor Day approaches. One of the best solutions to early-maturing pumpkins may be finding an early market. With so many late-planted field this year, early pumpkins are likely to be in demand.

--R. Hazzard; mMany thanks to the following sources: J. Howell, A. Carter, and Robert Wick. University of Massachusetts; Dale Riggs & Robert Rouse, **Pumpkin Production Guide**, **NRAES**; *Maurice Ogutu, University of Illinois Extension, in* **Vegetable Growers News**, *August 2004; and Liz Maynard, Purdue University*

Brassicas

In fall brassica root crops, watch for a late flight of cabbage root maggot flies. Successive generations of cabbage root maggot fly generally result in a period of fly activity in late August. Cooler soils allow for better survival of eggs and maggots than during the heat of midsummer. In soil samples taken this week from the roots of brassica crops at South Deerfield Farm, cabbage root maggots were numerous. This suggests another adult flight could occur later in September. 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. Pay attention to "days to harvest" intervals. The caterpillar complex continues to munch on fall brassicas. While some cabbage loopers have reached Massachusetts, populations are not terribly high, at least in the CT River Valley – the situation could be quite different in the Southeast. Rotate control materials to avoid resistance.

Bolted brassica crops provide an underground nursery for flea beetle larvae

Flea beetle feeding activity is dropping off. Flea beetles may be starting to depart fields to locate overwintering sites. For the most part, greens will be increasing free of flea beetle damage from now on. However, there could be a second emergence of adults later in September. Watch out for those patches of bolted midsummer bak choi or other greens that are now in flower. Underneath, in the roots, may be a nice flea beetle nursery where larvae are developing. Till under these abandoned crops to disturb the soil, and cut off the pest's reproductive cycle.

Sweet corn and pepper update

Corn earworm flights are still going strong. Depending on location, growers need to be on a 3 day (captures > 90 per week) or a 4 day (captures at 7-90 /week) schedule. This can be extended a day if nights are <60° and days <80° F. Focus especially on each new block that comes into fresh silk, as these are the favored locations for egg laying. European corn borer flight is declining but also remains quite strong. A few locations dropped below 10 moths per week, but many are over 20. ECB larvae have hatched out and are showing up in higher numbers in pretassel corn. They will also invade ears through the tips of the ear. This behavior seems to increase toward the end of the season -probably because there is less corn available at the earlier stages, so more eggs are laid in silking corn. During silk stage, ECB eggs tend to be laid on flag leaves near the ear, and small borers enter the ear directly through the tip. Scout any remaining whorl and pretassel corn for fall armyworm and ECB. There are still some new captures of FAW. **Pepper growers:** continue regular sprays to control borers for at least one week after ECB flights drop below 10 moths per week at your location.

SWEET CORN TRAP COUNTS 8/20 - 8/26

Town	Date	ECB Z1	ECB E2	Total ECB	CEW (Avg.)	FAW	%PT
Berkshires/ Champlain Valley							
Brandon, VT	8/25	-	-	-	0	-	-
Pittsfield	8/25	-	-	-	7	-	-
Sheffield	8/24	1	5	6	56	-	-
Westminster, VT	8/26	3	5	8	48	0	-
CT River Valley							
S. Deerfield	8/25	15	0	15	-	-	-
N. Hadley	8/25	31	2	33	90.5	-	-
Hatfield	8/23	144	9*open	153	133	-	12
Hadley (pepp.)	8/25	24	1	25	-	-	-
Feeding Hills	8/24	3	1	4	25	2	8
C.&E. MA							
Dracut	8/24	12	14	26	49	-	-
Dighton	8/23	0	2	2	82	4	-
Still River	8/24	6	4	10	211	-	-
N. Andover	8/19	1	12	13	70	0	30
Concord	8/23	3	1	4	26	1	22
Ipswich	8/20	11	1	12	27	1	60
Leicester/ Spencer	8/25	3	2	5	12	0	12
Northbridge	8/25	4	2	6	59	6	15
Tyngsboro	8/23	30	5	35	51	0	25
Monson	8/25	3	1	4	6	0	18
Seekonk	8/24	-	-	-	278	-	-
Sharon	8/24	17	21	38	253	-	-

Vegetable Notes, Ruth Hazzard, editor and Ben Hunsdorfer, Assistant Editor. *Vegetable Notes* is published weekly from May to September 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 is R. Hazzard if none is cited.

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