UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

The heavy rainstorms hitting across most of the state in the past 7-14 days have changed our focus from drought to disease. Late blight is taking off (see article below) in low-spray tomatoes in both east-central MA and the Connecticut Valley. Diseases related to long leaf wetness periods and saturated soils are showing up, or are on everyone's mind. Diseases we have observed include purple blotch in leeks, bacterial canker in tomato, Alternaria blight in Brassicas. Fruit rots of cucurbits are more of a risk on wet soils, but so far the only outbreak we have observed has been Fusarium fruit rot. Downy mildew of cucurbits has not yet been confirmed north of Connecticut, but the risk that it will move into southern New England is currently high; for daily forecasts consult the Cucurbit Downy Mildew Forecasting website, http://cdm.ipmpipe.org/ . Storms that moved up the coast dumped more than rain: corn earworm numbers have jumped even higher than last week (see sweet corn table). Their activity could spill over beyond corn into tomato fruit feeding. Some fall armyworm and cabbage looper have also moved into the region. Cabbage looper can cause significant damage in late summer chard, lettuce, beans and spinach as well as in Brassicas.

Meanwhile, vegetable farms of MA and New England are pumping out quantity and quality in the full range of summer vegetables. Early-planted pumpkins and winter squash is ripening and harvest might be a better option than the field if more storms move through. Take advantage of good soil moisture to get fall cover crops planted now, when they can take advantage of the heat and daylength (see Radish Cover Crops article).

Spotted wing drosophila numbers are rising, and fall fruits such as raspberries need protection. It appears that SWD cannot penetrate the skin of a healthy tomato to lay eggs, but they will readily ovipcosit where the skin is cracked. Thus, tomato plantings will allow SWD populations to build up, even if sound fruit is not infested.

LATE BLIGHT IS SPREADING IN LOW-SPRAY TOMATOES

.We are seeing rapid spread of late blight into unsprayed or minimally sprayed tomato over the past two weeks. This late blight outbreak threatens all tomatoes in the region. Frequent rains and long rainy periods in the past two weeks combined with the increasing amount of inoculum in the region make it critical that farmers and gardeners protect their tomato crops with fungicides on a consistent 5 day spray program.

With confirmed outbreaks in Franklin, Hampshire, Berkshire, Middlesex, Norfolk, and Plymouth Counties, and the number of fields and gardens infected within each county increasing, this has become a statewide epidemic. Fortunately it is much later in the season than in 2009, and growers that have been using protective fungicides consistently have so far been successful in protecting their crops.

Output from Blitecast, the late blight forecasting model, reinforces just how favorable recent weather conditions have been for this disease. Severity Values for the past week are over 9 at all but one location, as high as 20, and average over 13 for all sites. A value of 6 is the threshold for tightening spray schedules to 5 days! Severity values are based on temperature, periods of RH about 90%, and rainfall. Since mid July, Blitecast output has recommended protective sprays for late blight, but the SV has never been as high as it is this week.

On most farms where the disease has been found, the disease appeared to gain a foothold on tomatoes that were either completely unprotected or had been sprayed infrequently or with inadequate spray coverage. The disease explodes rapidly on unsprayed foliage. Once established these vulnerable blocks become a local 'late blight spore factory' that puts pressure on other nearby tomato fields, requiring a more vigilant spray schedule to prevent disease. The late blight strain

DATE:	8/16/2012					
Location	GDD Base 50F	7-Day Rainfall (in)	LB Severity Values - season*	LB Severity Values - 7 day	Tomcast Severity Values - season**	Tomcast Severity Values - 7 day
Pittsfield	1710	1.03	126	11	70	10
South Deerfield	1892	0.76	74	2	49†	3†
Belchertown	2066	0.43	65	0	88	13
Bolton	1930	1.16	100	13	57†	3†
Stow	--	--	89	11	76†	0†
Dracut	1919	0.23	87	7	56†	6†
Tyngsboro	1988	0.56	82	10	47†	6†
Boston	1965	0.17	56	1	84	12
Sharon	1881	0.09	79	4	82	11
East Bridgewater	1844	0.01	93	5	67	7
†These weather stations are missing several days of Tomcast values.						
*Values accumulated since May 1. Every site is over threshold for Late Blight, even if planting did not occur until mid-May.						
**Values accumulated since May 14. The usual threshold for Tomcast is 25 (since transplanting).						
To access data from a number of different weather stations across the state see http://newa.cornell.edu/index.php?page=degree-days						

in Massachsuetts has been tentatively identified as US 23 and has thus far been found only on tomato. Recommendations below are for tomato crops. Where potatoes are still growing, continue fungicides on a 5-7 days schedule. Vine killing chemically or with mowing is recommended if the crop is mature.

Confirm a late blight diagnosis, extension specialists or crop consultants, or contact the UMass Plant Disease Diagnostic Lab online, via email mbdicklo@umext.umass.edu or at (413) 545-3209.

Actions needed:

Continue protectant fungicides on a 5 day schedule. Both chlorothalonil and copper products are proving to be quite effective as protectant fungicides when used regularly through the season. Note that the days to harvest interval for Bravo Weather Stik has changed since the editing of the 2012-2013 New England Vegetable Management Guide and is now 0 days to harvest. One of these portectants should be tank mixed with the late-blight specific products listed below. Strobilurin products (Quadris, Flint) also work well as protectant vs late blight but since they are single mod of action production, should not be used as a tank mix with late blight specific products. Also, in the Northeast, early blight has developed resistance to strobilurins.

In addition, tank mix protectants with a late blight specific fungicide on a 5 day schedule. Since tomatoes are ripening steadily, use a product with a short days-to-harvest interval. Recommended options include Ranman (O dh), Revus Top (1 dh), or Presidio (2 dh). Curzate has curative properties and a 3 day PHI. Both Gavel and Previcur Flex have a 5-day PHI. Do not use products from the same FRAC resistance group more than twice.

Good coverage of foliage is critical. In staked tomatoes this is best achieved with drop nozzles between rows directed at foliage from the sides, along with a nozzle over the top. Boom sprayers and mist blowers over staked rows and are less effective at reaching into the canopy; mist blowers actually spread disease through the crop.

If crop becomes infected and the disease is expanding, you have lost the battle and crop destruction is warranted. Now the goal is to prevent further spread of spores locally and in the region. For staked tomatoes, cut strings, remove stakes, mow, pull plastic, and incorporate residue. This is a labor intensive, difficult task. Where possible, do this under sunny skies as strong sunlight will kill spores released into the air. Herbicide may be used to kill vines. When late blight is found in small, localized areas, promptly destroy all symptomatic plants plus a border of healthy appearing plants to prevent disease spread. Pull up affected plants, kill them with a herbicide, or disk them under. Home gardeners should destroy plants by burning, burying, or

	Total severity values during last 7 days					
	<3	3	4	5	6	>6
Total rain/ irrigation for past 10 days	Spray Interval for late blight control (in number of days)					
>1.2 inches	10-14	10	7	5	5	5
<1.2 inches	10-14	10-14	10	7	5	5

bagging them and disposing of bags into a landfill. Piling residue and covering with a tarp or plastic will prevent further spread of spores and kill the vines.

Greenhouse and hoophouse late blight infections: Generally late blight comes later in high tunnels compared to tomato crops in the field, but high tunnels do not guarantee protection. Late blight can be very damaging in high tunnel tomatoes and we have observed the current type of late blight in high tunnel crops. In this case, crop removal is critical. Incorporating residue is not recommended since soils may not freeze.

What is going on with overwintering? Late blight requires living tissue to survive. Currently, the late blight pathogen is not known to overwinter in New England but the pathogen has recently undergone changes in Florida that affect disease occurrence there and in other eastern states. Diseased tomato plants in south Florida have survived cold periods in winter allowing the pathogen to persist there. Late blight has also been active into the spring as late as May in Florida indicating an increased tolerance for warmer temperatures. This means a potential source of inoculum persists until the time of year when susceptible crops are being produced north of Florida. Thus, a 'green bridge' exists for the pathogen to progress on until it reaches the northeast.

Sources of P. infestans in New England include potatoes saved year to year for seed, tubers that survive the winter unfrozen in the soil, and volunteer potato and tomato plants in compost, cull piles, or fields. Other more recent sources of the pathogen have been infected tomato transplants, infected petunia bedding plants, and infected crops in frost-free areas producing wind dispersed spores. There has been speculation that the source of P. infestans this year overwintered in greenhouse tomatoes. Growers need to be sure that no live tomato tissue survives. Open the house to let it freeze deeply. Avoid continuous cultivation at above-freezing levels through the winter after a tomato crop. This is another form of 'green bridge' risk.

--R Hazzard, MB Dicklow

NOW IS THE TIME TO ESTABLISH RADISH COVER CROPS

As New York vegetable growers gain more experience us-ing radish cover crops, there is consensus developing around the right planting date. That date is now.

Our recent work investigating planting dates for crucifer cover crops has shown that the biomass production declines rapidly during August. A location that would produce 3 tons per acre planted August 10, will only produce one and 1/2 tons if planted August 20, and not enough to make a difference if planted in September.

Most of the time, the different crucifer cover crops pro-duce a similar amount of biomass. The exception is radish-es that are sown in the first half of August on fertile ground. Then they can produce twice the biomass of the other crucifers by fall. In short, if you are planning to use a radish cover crop this fall, plant right now, and plant where there is good residual fertility.

The radish roots will grow quite large, and they will con-sistently die in the winter. Even in the very warm winter we just had, when the radishes looked well preserved through the winter, their waterlogged texture revealed that they had already died .

Thomas Bjorkman, Plant Physiologist, NYSAES, Cornell

SWEET CORN REPORT

Corn earworm has flooded the region, both coastal and inland, river valley and upland. All trap sites report numbers high enough to require a four day schedule, and two are over 150 moths per night – requiring a tight three day spray schedule. Sharon nor Still River, with these very high count, are not close to the coast, nor in a river valley, breaking the usual pattern for CEW movement into the region. Longer drying period before the rainfall generally gives a more rainfast residue, but drenching downpours of several inches require a more

Corn Earworm Threshold		
Moths/Night	Moths/Week	Spray Interval
0-0.2	0-1.4	no spray
0.3-0.5	1.5-3.5	every 6 days
0.6-1	3.6-7	every 5 days
1.1-13.0	7.1-91	every 4 days
Over 13	Over 91	every 3 days

frequent return to the field. Some fall armyworm also moved into the region so watch the late whorl-stage corn. Note that some of the newer products for CEW also give excellent FAW control such as Coragen , Belt, Radiant. Rotate products to in your CEW program. European corn borer flight continues, though not at high levels, so we can expect moderate borer infestations at the emerging tassel stage. The heat pushed many blocks into earlier maturity and some markets are saturated with main season corn. It's time to encourage customers to put some fresh corn into their freezers, since that would soak up some up that excess sweet corn, and especially since that's one of the best ways to preserve the taste of summer in New England to savor on a cold January day.

Sweet Corn Weekly Trap Captures for Week Ending August 16

Location	Z1	EII	Total ECB	CEW	FAW
CT Valley					
Sheffield	0	0	0	45	
Deerfield	4	14	18		
South Deerfield (1)	1	0	1	28	
South Deerfield (2)	0	0	0		
Sunderland	1	12	13	19	0
Hadley	0	4	4	20	0
Feeding Hills	0	6	6	25	0
Central & Eastern MA					
Spencer	0	6	6	61	0
Dracut	0	15	15	24	0
Tyngsborough	0	3	3	9	0
Lancaster	0	2	2	29	0
Still River				183	
Concord	2	6	8	36	1
Millis	4	0	4	19	
Sharon				191	
Northbridge	0	2	2	31	0
East Falmouth	5	9	14	27	4
Barnstable		14		67	4
NH					
Litchfield	0	6	6	91	1
Hollis	0	1	1	55	2
Mason	0	2	2	32	3

CERCOSPORA LEAF SPOT OF SWISS CHARD, BEETS AND SPINACH

Cercospora leaf spot on beet leaves.

One benefit of the dry conditions this summer has been the nearly total absence of Cercospora leaf spot. It has been a pleasant change from 2011 when it started early and stayed with us through the fall. With the change in weather conditions we can expect this disease to appear again. It is caused by Cercospora beticola occurs wherever table beets, Swiss Chard, sugar beet, and spinach are grown. It is one of the most important diseases affecting the Chenopodium group. It can result in significant losses, particularly in late summer when conditions are favorable (high temperatures, high humidity, long leaf wetness periods at night). Leafy greens become unmarketable, and beet roots fail to grow to full size when disease is severe.

Identification. Symptoms appear as numerous, initially small circular leaf spots (see photo). Spots have a pale brown to off-white center with a red margin. Lesions expand in size, coalesce, turn gray as the fungus sporulates, and can result in extensive loss of foliage. Leaves at the center of the plant are often less severely affected. The pathogen produces sclerotia or stromata which can be seen with a hand lens as small, black dots in the center of lesions. Lesions may also occur on petioles, flower bracts, seed pods, and seeds. Leaf symptoms are similar to those caused by Beet Phoma (Phoma betae), except that the phoma will have more obvious tiny fruiting bodies in the lesions and can also affect the roots.

Source and survival. C. beticola survives between crop cycles in residues from infected crops (as sclerotia), in weed hosts, and on seed. It can survive in the soil for up to two years. High levels of disease can result from just a few infected plants, since each lesion produces numerous conidia. Several cycles of infection and conidium production may occur with favorable environmental conditions. Spores can penetrate the leaf directly through open stomates. The pathogen is favored by high relative humidity and temperatures between 75-85˚ F and is spread by rain splash, wind, irrigation water, insects, workers, and equipment. Leaf wetness during the night, even with dry conditions during the day, encourages disease. Successive plantings made close together can allow disease to move from one planting into the next.

Cultural management. Bury infected crop residues and destroy volunteer plants and weed hosts. Start with certified, disease-free seed or treat seed with hot water or fungicides. Rotate to non-host crops (not in the Chenopodium family) for 2-3 years. If disease is present, do a once-over cut rather than cutting chard or spinach for regrowth. Avoid planting succession crops close together. Avoid overhead irrigation if it will result in prolonged leaf wetness periods (eg, through the night); irrigate mid-day when leaves will dry fully or use drip irrigation.

Chemical controls. For optimum results use protectant fungicides as a preventive treatment, prior to infection and symptom development. Pathogen populations resistant to sterol demethylation-inhibiting (DMI's, FRAC Group 3) fungicides have been reported, so although these products are labeled, fungicides with other modes of action should be used. These include azoxystrobin (Quadris) (Group 11); basic copper sulfate (Basic Copper 50W HB and other copper products) (Group M1); pyraclostrobin (Cabrio) (Group 11); trifloxystrobin (Flint) (Group 11). Do not alternate Group 11 strobilurin fungicides with each other (Cabrio, Quadris and Flint). Products that simply kill spores on contact will not prevent the continuing production of spores nor protect leaves from new infections. For more details check the Beets and Chard section of the New England Vegetable Management Guide, www.nevegetable.org

--by Bess Dicklow, Rob Wick and Ruth Hazzard, UMass Plant Soil and Insect Science Dept.

INSECTS AND NON-PATHOGENIC DISORDERS OF LATE SUMMER BRASSICAS.

Non-pathogenic disorders of broccoli include Brown bead, heat injury, and hollow stem of Broccoli. Each of these disorders can be caused by a combination of factors – heat stress during head initiation, excessive water especially after a dry period, excessive nitrogen, rapid growth during head formation, deficiency of boron, and cultivar susceptibility.

Heat injury is most often manifest as unevenness of the crown and uneven bud size on the head, as well as small head size. Brown bead appears as heads approach maturity and is usually associated with rapid growth during periods of high temperature, followed by abundant rainfall. Floral buds turn tan or brown and become easily detached. These may then become infected with soft rot bacteria.

Boron deficiency, which shows up as hollow stem of broccoli or cauliflower, brown discoloration of turnip or rutabaga roots, or internal discoloration of cauliflower, can be more severe if plants are water stressed or pH is greater than seven. Adequate supplies of soil organic matter, consistent and adequate water levels in the soil, and supplemental boron applied before planting if boron levels are low can all help in avoiding these problems.

Cabbage root maggot can cause root injury in fall turnips and rutabagas as well as daikon and radishes. Occasionally maggots cause injury to fall broccoli or cabbage, but that is less common. Root crops are more sensitive to injury since the root is marketed. Damage includes both superficial scarring and tunneling in the root. Feeding injury allows entry of soft rot and other pathogens. The timing of control measures is more difficult than in spring crops, because the flight periods are less well defined. In this region there are probably four full generations of cabbage root maggot, with the third flight period taking place in mid August and the fourth in September. Based on research done forty years ago in New York, the third adult flight would be predicted to begin at the same time that the early goldenrod blooms. At the UMass Crops research farm we are looking at a number of alternative controls, both chemical and cultural.

Monitoring for adults is can be done using yellow sticky cards placed in the crop. Monitoring for eggs is the same as in the spring: search soil at the base of the stem and look for tiny oblong white eggs in the soil. Application of controls depends on method to be used.

For conventional root crops, application of Lorsban at seeding or transplanting is an option. Since this is a long-lasting material, it is likely to provide control of eggs laid in the third flight and possibly into the fourth.

Non-chemical options include drenches with *Steinernema feltiae* nematodes at planting or at detection of eggs; this method has been researched enough to know that this species of nematode is the most effective and the field damage can be reduced, though most of the research has been on spring cabbage. Sources include IPM Laboratories in Locke, New York, #315-497-2063 and BioLogic Company, Willow Hill, PA, #717-349-2789.

Non-heating row covers also have some potential, if they are applied at planting before any aphid populations get established and if they do not overheat the crop. However we found in last year's trials that three types of 'non-heating' row covers all had negative growth effects on turnip roots. Roots had physiological damage and were of poor quality. We tested lightweight spunbonded Covertan row cover, 'Proteknet' from Dubois Agrinovation in Quebec, and 'Smartnet' which is often used for bird protection in fruit.

Imported cabbageworm (ICW), Diamondback Moth and Cabbage Looper are active now, and numbers are increasing. The same conditions that favor large influx of corn earworm also bring loopers. Finding them in non-Brassica crops is often an indication that numbers are high. Loopers will grow rapidly and cause a large amount of damage. Look for the 'inch-worm' style of movement.

It is a critical time to scout Brassicas and control caterpillars. If 15% of plants have caterpillars at the time when heads form or when leaves are being marketed, a spray is warranted. Look on the undersides of leaves for new feeding damage and young (well-camouflaged) caterpillars.

Flea beetles. In late August, flea beetles are still very active and feeding heavily. In September, flea beetle activity will drop off as adult beetles leave the field to find overwintering sites in leaf litter in field borders. They lose interest in feeding and focus on finding a safe spot for the winter. This is a relief for Asian greens, Nappa cabbage, arugula and all the other favorite greens that are often severely damaged earlier in the season. It is a relief for the farmer also, because this is

the time when high quality greens can usually be produced without row cover. Take note of where you last saw heavy flea beetle feeding during August. Since flea beetles will most likely overwinter near that field, that is the field to avoid next year when you decide where to plant your early spring Brassicas!

Vegetable Notes. Ruth Hazzard, Amanda Brown and Andrew Cavanagh, co-editors. Vegetable Notes is published weekly from May to September and at intervals during the off-season, and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted.