UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 24, Number 9 June 20, 2013

In this issue:

Crop conditions

There is a big gap between growth of plants in well-drained soils, and those where the accumulated rainfall of recent weeks has not drained away. Many growers are still waiting to get back into their wettest fields to plant, cultivate, harvest, apply additional fertilizer, or spray. In these fields, crops are at a standstill, turning yellow or dying where soils remain saturated. Some growers are concerned about getting pumpkins and winter squash in the ground in time, or missing plantings of corn or other crops resulting in a gap in harvest later on. Durring this wet period, some common pathogens found were: *Cercospera* on beets and chard, *Septoria*, *Botrytis* and bacterial spot on tomatoes and root rot pythium on many crops sitting in standing water. Farmers using No-Till and reduced tillage equipment have been able to get into wet fields becuase soil structure is still intact in contrast to disked fields that are too muddy to plant into. Tomatoes, eggplant, peppers, squash and corn are growing strong in fields with lighter, well drained soils. Potatoes are blooming and setting tubers. More farms are seeing silk in the earliest blocks of corn. In some cases, where sweet corn was grown under plastic or transplanted early, ears are developing, perhaps in time for harvest by the 4th of July! Succession plantings of tomato, cucumber, summer squash, zucchini, Brassicas, lettuce, beans are going in. The pace of harvest is picking up in the early fruiting crops such as squash and cucumbers.

Deep Zone Tillage into a covercrop of vetch and rye on June 18th just before a down pour. Pumpkins were planted with a No-Till seeder on June 19th.

Pest alerts

Late blight has been reported in Maryland in a tomato crop, but there are no reports further northward. Despite lower rain, conditions have been favorable for late blight development. Late blight models continue to recommend a five day schedule with protectant fungicides (See Table 1).

Are you seeing wilting vines or leaves in squash or cucumbers? Most likely this is bacterial wilt, which is introduced into the plant when striped cucumber beetles feed (see photo). Plants are most susceptible before the 5 leaf stage, but symptoms develop later. It's too late to do anything once you see the wilt – except

Bacterial Wilt of Squash vectored by Striped Cucumber Beetle

to pay closer attention to any later plantings to keep it from happening again. On seedling (< 5 leaves) cucurbits scout and make sure SCB numbers stay below 2 per plant on squash and pumpkin, or 1 per plant on cucumber.

Cucumber beetles are less likely to colonize new seedlings as we approach the end of June. SCB tends to congregate in flowers once bloom occurs and do not damage fruit or leaves unless they reach very high levels. Care should be taken during bloom to avoid insecticides which are toxic to pollinators. Read insecticide labels and refer to Table 20 (insecticides) in Vegetable Mgt Guide, http://nevegetable.org/table-20-information-about-insecticides-and-miticides for information on bee toxicity.

Thrips numbers are variable but we have found them building up in some onion crops; keep scouting; spray at 1 per leaf.

Aphids are colonizing their host crops at this time in the season. So are their predators and parasites, which generally do a great job of keeping aphid numbers down. If you notice aphids, come back in a few days to see if they are building up.

Cucurbit downy mildew. Hopefully, we won't be seeing this disease arrive in New England for quite a while yet – the later the better! It moves northward from Florida annually, as spores travel on moving air masses and drop into new regions. We will be reporting the output from the forecasting site, http://cdm.ipmpipe.org/ which is an excellent resource for tracking this disease. The pathogen was reported in North Carolina on June 12. Our risk in New England is very low. You specialized downy mildew fungicides can stay in the shed for now.

Growers are planning their **cucurbit fungicide strategy** and would like an update on what works, where there is resistance, how to mix or alternate products, here is an excellent resource: http://plant-pest-advisory.rutgers.edu/?p=5064. We will be putting out more details on this topic next week.

Keep watching for **potato leafhopper** in potato and bean. Beans are especially susceptible to yield loss when PLH builds up at early growth stages.

Table1. GDD and BLITECAST output for Late Blight Management

DATE: 6/19/2013	GDD Base 50F	Accumulated LB Severity Values - 7 days	Accumulated Rainfall - 7 days (in)	Recommended Spray Interval (days)
Location				
Pittsfield	463.5	11	2.0	5
Ashfield	475.8	6	3.2	5
S. Deerfield	626.6	n/a	n/a	5
Belchertown	634.8	10	2.5	5
Bolton	646.3	15	5.6	5
Dracut	617.7	8	1.7	5
Boston	639.1	7	3.0	5
East Bridgewater	631.7	9	2.8	5
Sharon	625.5	8	2.2	5
Seekonk	669.3	6	2.5	5

Colorado potato beetles are still laying eggs and egg masses continue to hatch. CPB larvae have reached the 4th instar in most potato fields. Scouting unit at this stage is single stalks; 1.5 large larvae or 4 small larvae are per stalk is widely used action thresholds in potato.

GDD update: see Table 1 for current GDD, base 50F. We have not yet reached the expected emergence of squash vine borer (900 GDD) but we are in the second flight period of seedcorn maggot flies (2nd peak = 600 GDD). Source for weather and pest updates: (http://newa.cornell.edu)

Sweet Corn Report: European corn borer (ECB) flight has peaked and numbers are declining. Scouting in emerging tassels shows some fields below the threshold for sprays. Scout emerging tassels and look for ECB caterpillars in the florets, or in the stalk. Once silk is forming, always also scout the stalk and between the ears and the stalk, where ECB tunnels into the ear. Earliest blocks are in silk. Make sure Corn Ear Worn (CEW) traps are up to detect incoming flights. Corn eaworm captures were 0 for the

Table 2. Weekly Sweet Corn Trap Captures

Location	Total ECB
CT Valley	
South Deerfield	2
Hatfield	0
Central & Eastern MA	
East Falmouth	6
Rehoboth -1	na
Rehoboth -2	11
Millis	5
Seekonk	na
Sharon	1

week at sites reporting (see Table2) in MA this week; however it is best to have traps on your own farm. For details and photos of traps, lures, how to set them up and how to scout corn, see the Sweet Corn IPM Guide. http://extension.umass.edu/vegetable/publications/sweet-corn-ipm-guide. Printed copies are available at our office, please call 413 577 3976.

Spotted Wing Drosophila Alert: This week we found 2 cases where a single female SWD was caught in traps, one in Hampshire County, one in Southern Berkshire County. Both of these captures were in traps set outside any production field and away from any ripening fruit. No reports have come in of finds within any cropping fields (e.g., strawberry). These two finds don't necessarily launch the spray cycle, but they do mean that growers should be looking closely at their crops and checking their own traps to see what is happening on their farm. Please see the UMass Extension SWD pages at https://extension.umass.edu/fruitadvisor/spotted-wing-drosophila for more information and resources on Identification, Monitoring, and Management of this pest.

UMass Plant Diagnostic Lab: Submit plants for disease diagnostics. 101 University Drive, Suite A7, Amherst, MA 01002. Phone (413) 545-3208. Fax (413) 545-4385. E-mail: Bess Dicklow mbdicklo@umext.umass.edu

UMass Soil Testing Lab: Submit soils for Pre-Sidress Nitrogen Test to determine fertility needs of your growing crops. West Experiment Station, 682 North Pleasant Street, University of Massachusetts, Amherst, MA 01003. Phone: (413) 545-2311. Fax: (413) 545-1931. E-mail: soiltest@psis.umass.edu.

EXPECT AND PREPARE FOR BASIL DOWNY MILDEW

Downy mildew was found on field-grown basil in New Jersey the week of June 13, 2013. This is a very early outbreak and suggests contaminated seed as the source. Basil Downy mildew is always present in Florida and California and has been reported in Virginia. To date, no outbreaks in Massachusetts have been observed.

This destructive disease is expected to occur routinely in the northeastern United States. Downy mildew was first reported on basil in Uganda in 1930. The disease did not attract international attention until it recently appeared in several new locations: Italy (2004), France (2005) South Africa (2006), Iran (2007), Argentina (2008), and the United States, in Florida (2007) and Massachusetts (2008). During 2008 and 2009, the disease appeared throughout the East Coast both in the field and in greenhouses. Considerable economic losses occurred in Massachusetts during that time, and we anticipate basil downy mildew will be a major disease of basil in the US into the foreseeable future. Many states reported 100% of fields and greenhouses infected, often sustaining 100% loss. The initial rapid transcontinental transport of downy mildew likely occurred via infected seed sold internationally. Within the United States, spread of the disease probably occurred via aerial dispersal of spores. Infected basil leaves produce an abundance of spores, which are capable of being dispersed long distances via weather systems. Thus, the pathogen can spread widely once introduced to an area. This could explain the widespread occurrence of basil downy mildew in the eastern USA in 2008.

The basil downy mildew pathogen (*Peronospora belbahrii*) spreads as wind-dispersed spores from contaminated seed grown plants and from infected basil leaves. Much like its relative, Late Blight, Basil downy mildew spreads explosively and cannot be controlled with fungicides once established. Basil downy mildew is pathogenic to many varieties of basil and in 2012 was confirmed on the following varieties in Massachusetts: Genovese, Lemon, Thai, Holy or Tulsi, and Purple basil. Symptoms were first identified on the most economically important varieties Sweet or Genovese basil. Gardeners saving seed from basil should perform hot water seed treatment to reduce the spread of this pathogen. More information on hot water seed treatment can be found here: http://vegetablemdonline.ppath.cornell.edu/News-Articles/HotWaterSeedTreatment.html

Downy Mildew on the underside of a basil leaf

Basil Downy Mildew on Genovese or Sweet Basil

Basil Downy Mildew on Thai Basil

Symptoms of downy mildew on basil can easily be mistaken for a nutritional deficiency. Infected leaves develop diffuse or vein bound yellowing on the top of the leaf

and distinctly vein-bounded patches on the bottom. When spores are produced, a characteristic gray, fuzzy growth on the underside of the leaves is evident. The fuzzy growth looks as if soil had been splashed onto the leaf under-surface, however, close inspection with a hand lens will show the spores. Close-up photographs of the disease are available at: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html

Management:

The most important environmental factors favoring disease development are high humidity and extended leaf wetness. These factors can be reduced by:

- Heating and venting greenhouses, especially when warm days are followed by cool nights reduces relative humidity and prevents condensation and prolonged leaf wetness.
- Improving horizontal air flow in greenhouses by the use of fans.
- Watering in the morning, if practical, or sub-irrigating rather than overhead.
- In the field, planting in well drained sites with good air circulation and orienting rows with the prevailing winds.
- Controlling weeds and spacing plants adequately to enhance leaf drying.

Relative susceptibility of basil types:

Field trials conducted in southern New Jersey in 2009 determined that commonly-grown sweet basil (*Ocimum basilicum*) cultivars such as 'Poppy Joe' and 'Nufar' were the most susceptible to downy mildew. The least susceptible basils included the lemon and spice types such as O. x citriodorum and O. americanum, cultivars , 'Lemon Std', 'Lemon', 'Lime', 'Spice', 'Blue Spice' and 'Blue Spice Fil'. There are no resistant cultivars.

Chemical control:

Few fungicides are labeled for herb plants and there are differences in registrations for field grown plants versus greenhouse plants. Copper products, cyazofamid, phosphites, and azoxystrobin are labeled for use on basil. Quadris (azoxystrobin) is registered for field use while Heritage (azoxystrobin) has emergency registration for greenhouse use in CA, FL, NY, and AL. Cyazofamid (Ranman) and various phosphite fungicides are registered for both field and greenhouse use. Research trials have shown that a mixture of azoxystrobin and one of the phosphite fungicides is the most effective chemical control. Addition of a phosphite fungicide to any of the registered fungicides increases their efficacy. MilStop, OxiDate, Actinovate, and Sonata are the most effective alternative materials. It is the grower's responsibility to read and follow label instructions. The label is the law and any recommendations made here are superseded by the label.

Basil crops should be disked under or otherwise destroyed as soon as possible after last harvest or when abandoned because of disease.

At the University of Massachusetts, we are investigating methods to control this disease with biological control agents. We are interested in collecting live, infected plants from residential gardens, greenhouses and field grown basil. If you think your basil plants are infected, please call or email Dr. Robert Wick – Stockbridge School of Agriculture; tel. (413) 545-1045, rlwick@umass.edu

-Robert L. Wick and M. Bess Dicklow, University of Massachusetts, Amherst
-Margaret Tuttle McGrath, Department of Plant Pathology and Plant-Microbe Biology, Cornell University

SQUASH BUGS

Squash bug adults are moving into summer squash and zucchini plantings, mating and starting to lay eggs. These are their favorite host plant, especially when these plants are large and provide ample shelter, food and egg-laying sites. Sheltered and protected areas such as field borders, woods edges, brush or wood piles provided a home for unmated adults from last fall through the winter, and now they are busy locating mates and host plants.

Host crops and damage. Squash bugs (*Anasis tristis*) are a major pest of pumpkin and squash crops throughout the US, southern Canada, and Central America. The most susceptible and attractive crops are yellow summer squash, zucchini, Hubbard, and pumpkin. Watermelon, cucumber, muskmelon and butternut not only resist damage, but provide poor food

Squash Bug Eggs

Squash Bug Nymphs

Adult Squash Bug

Adult Brown Marmorated Stink Bug

quality for adult and nymph survival. Resistant varieties also include sweet cheese pumpkins (*Cucurbita moshata*) and royal acorn squash (*C. pepo*). Both adults and nymphs feed by inserting their beak and sucking sap from plant tissue. Places on the leaves where the bugs feed develop small, yellow specks that eventually turn brown; high densities and intensive feeding causes foliage to wilt, turn black and die. Squash bugs also feed on the fruit, causing scarring that makes the fruit unmarketable.

Life stages and identification. Adults are 0.5 to 0.75 of an inch long, flattened and grayish-brown. The edge of the abdomen is marked with alternate gold and brown patches. Adults are long-lived and lay eggs over several weeks. Yellow to bronze colored eggs are laid on the underside of leaves, often in the junction of leaf veins, in an orderly cluster. Wingless nymphs are light green or gray when small, with a brown head and dark legs, and are usually found in groups. Nymphs become darker gray and more solitary as they grow and molt through the five nymphal stages. The fifth instar shows distinct wing buds. There is one generation per year in the Northeast, and the complete life cycle requires 6-8 weeks.

Note: Squash Bug and Brown Marmorated Stink Bug (BMSB) adults can look similar, however BMSB has distinct light and dark bands on the antennae and causes damage in apples, peaches, figs, mulberries, citrus fruits, persimmons, sweet corn, tomatoes, lima beans, soybeans, and green peppers. To learn more about BMSB, please visit: https://extension.umass.edu/fruitadvisor/brown-marmorated-stink-bug

Squash bug vectors yellow vine disease. The squash bug has recently been identified as the vector of the bacteria, *Serratia marcescens* that causes cucurbit yellow vine decline in the United States. The bacterium is inoculated into a cucurbit plant by the piercing-sucking mouthparts of the squash bug and enters the phloem of the plant. Disease symptoms usually take four weeks or more to be manifested in infected plants. Because the bug prefers to feed on squash and pumpkin, the disease will ordinarily appear in these plants before it does in watermelon and cantaloupe. Symptoms of yellow vine decline include a general yellowing of the entire vine within a two to three day period. Infected plants usually collapse completely approximately 10 to 14 days before the fruit matures. This disease was found in 2003 in MA, but has not been confirmed since.

Cultural strategies. If possible, rotate cucurbit crops between fields as far apart as possible. Squash bugs like sheltered hiding places. Thus, their numbers are reduced by clean cultivation. Keep headlands and field borders mowed and free of trash to reduce overwintering sites. Black or white plastic, straw mulch, and reduced tillage systems encourage higher populations, probably by providing good hiding places. In small plantings, boards can be used to attract adults seeking a protected hiding place; check in evening or morning and spray with insecticide or capture and remove. Placing row covers over the young crop prevents access until blooming, when covers are removed. Squash or pumpkin, especially certain winter squash (Hubbard or marrow), have been used effectively as perimeter trap crops to protect the less attractive watermelons and cucumbers from incoming adult bugs. Plant the perimeter 1 or 2 weeks before the main crop, and treating the trap crop just prior to main crop emergence or prior to transplanting, and 5 to 10 days later.

Monitoring and chemical control. Squash bugs are generally difficult to control, especially on larger plants, because the bugs feed on the undersides of the leaves and when the plants are large, the bugs have a very effective shelter from insecticides. Additionally, larger nymphs and adults are less likely to be effectively controlled than are small nymphs. Cucurbit plantings should be monitored throughout the growing season for the presence of squash bugs. The two most critical periods when plants should be protected from these bugs is at the seedling stage and at early flowering. Although large, damaging populations of squash bugs early in the growing season is unusual, occasionally the overwintering adults will become numerous on seedlings and will need to be controlled. One or two applications of a pyrethroid insecticide at this time will provide excellent control of adult squash bugs. Pyrethroid sprays for cucumber beetle – usually applied before the 5-leaf stage - may reduce squash bugs.

Squash Vine Borer Adult

The second critical control period during early flowering is the time when squash bugs will typically become a major problem. If the bugs are allowed to increase during early flowering, they will become very numerous, damage plants, and reduce yield. Foliar insecticides become necessary for control of squash bug nymphs if the average number of egg masses per plant, either before or at flowering, is greater than 1 to 1.5 per plant. Time squash bug sprays to kill young nymphs just after hatch, because this stage is the easiest to control. Treat late in the day when the flowers are closed to reduce risk to bees.

Squash Vine Borer larvae with frass

A mixture of two botanicals that has shown promise for control of nymphs is a mixture of pyrethrin (a contact toxin) and azadiractin (an insect growth regulator, made from neem). This can be achieved by mixing separate products or with a product called Azera, which has both. This would be easier on bees, and would include two modes of action. IGR products work to disrupt the molting process so are useful only on immature stages. These products are both OMRI listed, approved for organic production.

- Adapted by R. Hazzard & A. Cavanagh.
Source material: Handbook of Vegetable Pests by A. Capinera; Michigan State; Utah State University Extension.

SQUASH VINE BORER

Squash vine borer is a pest to watch out for in the coming weeks. Squash vine borer moths are day-flying 'clear wing' moths with a 1.0 to 1.5 inch wingspan, black forewings, clear hind wings, and a bright orange abdomen. In flight, they look like wasps. There is one generation each year and adults emerge in late June/early July. Eggs are oval, redish brown in color, and glued to the stem or petiole. They are concentrated on the stem within a foot of the soil. Larvae bore into the stem, where they feed for 4-6 weeks before exiting to drop into soil, spin a brown cocoon, and pupate not far below the surface. They remain in soil till the following spring.

Thick-stemmed *Cucurbita* species including summer squash and zucchini, *Cucurbita pepo*, and *C. maxima* type winter squashes (eg Hubbard, buttercup) are preferred and are most suitable for larval development. Yield of summer squash can be reduced by 1/3 if larvae exceed 5 per plant. Pumpkins can sustain high infestations without yield reduction. Butternut squash, cucumber and melon are resistant to this pest.

Cultural strategies: fall or spring plowing to destroy or bury pupae; crop rotation. Do not plant summer squash near last year's pumpkins.

Monitoring: The onset of adult emergence and flight occurs at 900 GDD (base 50) according to the University of Wisconsin, and the egg laying period continues for about 3 weeks. In the Midwest, this coincides with full bloom of roadside chicory. Pheromone traps (Multipher bucket trap with lure for *Melittia cucubritae*) can be used monitor adult flight (sources include Gempler's, Great Lakes IPM, Trece) . Once flight begins, Checking base of stem for eggs or entry holes

of larvae. Note: Currently, GDD in MA range between 460-700 (Table 1).

Chemical control: Because larvae are protected inside the stem, chemical control depends on protecting stems before eggs hatch. Threshold for sprays: if 5 or more moths are captured per week in pheromone traps, make 2 to 3 applications 5-7 days apart targeting the base of the stem. Timing is key: spray before eggs hatch and larvae bore into stems. Many of the insecticides labeled for this pest are broad-spectrum materials with high toxicity to bees and are not recommended for use during bloom. This is a problem: vine borer activity and squash bloom periods overlap. Several selective products (with low or medium bee toxicity) including spinetoram (Radiant), spinosad (Entrust), and *Bacillus thuringiensis* are labeled for squash crops and have been shown in trials to provide control when used as described above. *Bt aizawi* (Xentari) was somewhat more effective than *Bt kurstaki* or spinosad in some trials.

-R Hazzard. Sources include U. Wisconsin Extension-Horticulture, B. Caldwell et al, Resource Guide for Organic Insect & disease Management, New England Vegetable Management Guide.

BUTTONING OF BROCCOLI

Buttoning Broccoli

Every so often in some fields of early planted broccoli, there is a plant that prematurely forms a loose head (Fig. 1). According to plant physiologist Thomas Bjorkman (Cornell University), this is a form of "buttoning". It usually happens when transplants go from growing quickly in the greenhouse to slowly after transplanting and flowering is triggered. This year, the cold may have both slowed growth and been an additional cue to flower through residual vernalization. Vernalization is a process through which plant flowering is promoted by exposure to the prolonged cold of winter. This ensures that reproductive development and seed production occurs in spring and summer, rather than in autumn. Vernalization usually plays a minor role with broccoli, both because of its cooler growing season and because the vernalization response is fairly weak compared to other cole crops. Bjorkman says that there is not good data on which varieties are more sensitive to vernalization, but that it would be useful to know for spring plantings. Buttoning can also be caused by other stresses including hardening-off too quickly before transplanting, excessively wet or dry soil conditions, low soil nutrient levels, or high pressure from weeds, insects, or disease. Early season varieties are usually more susceptible to buttoning and bolting.

. - Adapted from article by Christy Hoepting, Vedge Edge Weekly: June 12, 2013, Cornell Vegetable Program

GARLIC UPDATE

Bulbs are starting to form and scapes are emerging on garlic. The focus for this month is on making sure that the garlic plant that you have already grown is able to put all of its available energy into a strong, healthy bulb. Controlling weeds, maintaining adequate field moisture, and removing scapes will all help to maximize yield. Continued field culling will maximize quality, an especially important factor in seed garlic production.

Avoid Over-Fertilizing Garlic: Garlic will not respond with improved yield to applications of nitrogen after the summer solstice; June 21st. These late applications of nitrogen could delay the normal maturity of garlic and may even aggravate some diseases.

Weed control: Continue to control weeds in the garlic planting for at least the next few weeks. Weeds will compete for moisture and will make it more difficult to harvest garlic. Most growers will want to complete at least one more cultivation pass on bare ground, and may need to hand-weed mulched beds.

Maintain Field Moisture: Garlic needs adequate moisture as it forms the bulb to maximize size. If you can, supply one inch of water per week to the garlic if we are not receiving rain. Plasticulture growers and those with heavy straw mulch should keep checking moisture levels under the mulch, though they may need to water less than bare ground growers. Keep watering until a couple weeks before harvest, as needed.

Scaping: Removing the scape may provide up to a 30% yield boost, depending on soil conditions and weed competition. If you can sell the scape to recoup the cost of labor used to remove it, even better! If you can't sell them, snap them and leave them in the field to speed up the process.

Field Culling: Continue to walk the garlic field and pull plants which are unusually wilted on warm, dry days; plants that are distorted or curled; and plants that are an off color (yellow or bright green, usually) and discard them (Figure 1). All of these plants will either have a physical defect such as feeding injury or will have a disease such as Fusarium. This is a particularly important step if you plan to save your garlic for seed or to sell it as seed. Even sickly garlic will often still make a small bulb. Once it is cured, a small bulb with disease issues can look remarkably like a healthy small bulb, though the disease inoculum is still present. Field culling is your best quality control option.

What you should not be worried about: YES! There are some abnormalities that you might see which you don't need to worry about. The biggest one this year is tip burn. Garlic across the region has more tip burn than we usually see. It might be from the period of dry weather; it might be because the garlic was exposed to some very cold temperatures this spring after it was actively growing. Either way, it isn't affecting the quality of the bulbs.

-Crystal Stewart, Eastern New York Horticultural Program, Weekly Vegetable Update: June 6, 2013.
(ed. C. Hoepting, CVP)

Vegetable Notes. Ruth Hazzard, Katie Campbell Nelson, Lisa McKeag, Susan Scheufele, 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.