



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

Growers have turned on their trickle and pulled out their overhead irrigation this week, for the first time since May. Prices and demand are higher than usual for this time of year, but that's useful only when you have good crop to sell. Some crops have grown well this year. Onions are approaching maturity and bulb size is reported to be very good. Potatoes, if they survived late blight, are yielding well. The same may be true for other root crops. Eggplant is looking pretty good. The story is variable with peppers but some have picked up. Tomatoes in many cases are still struggling, even if late blight is under control. Growers are starting to pull in pumpkins and winter squash; hot and dry conditions are pushing crops toward maturity. There is concern about powdery and downy mildew in cucurbits; downy mildew so far has been confirmed on cucumber and cantaloupe. Blueberry harvest is almost over as apple and pear picking is just beginning on certain varieties while the peach harvest continues. Overall crops are still showing signs of stress from the extreme weather patterns this season.

BRASSICA UPDATE

Watch for caterpillars and thrips in late season Brassicas. Thrips sometimes move from onions as the crop dies down, to infest late Brassicas that might be nearby. They cause brown scarring on leaves and on outer and inner leaves of cabbage heads. See June 25, 2009 issue for details on insecticides and resistant varieties.

A dry spell after a period of moisture may aggravate tipburn. There are no external symptoms. Margins of inner leaves turn brown and later desiccate to become papery. This may cover a large portion of the leaf and be invaded by secondary bacterial organisms. Chinese cabbage is particularly prone to this disorder, which also affects cabbage, cauliflower and Brussels sprouts. It is most likely to show up in vigorous varieties and those that are not tipburn tolerant. Tipburn is caused by inadequate transport of calcium to rapidly growing tissues. Low levels of calcium at the leaf margin result in tissue collapse. Conditions that favor rapid growth also favor tipburn – 1) excess nitrogen results in large outer leaves that accumulate calcium at the expense of young expanding leaves within the head; 2) excess moisture reduces soil oxygen levels, which in turn reduces calcium uptake and movement. Crucifers grown on sandy soils are more prone to tipburn. To alleviate tipburn, grow tolerant varieties, maintain optimum fertility (i.e. a 1:1 ratio of phosphorous to potassium) and soil moisture (i.e. irrigate in between natural rainfall events), and harvest promptly once plants have reached maturity. The addition of calcium to the soil or as a foliar feed do not alleviate the problem.

Aphids build in warm weather in the absence of rainfall, especially in fall Brassicas. Green peach aphid (GPA) and cabbage aphid (CA) are the two most important aphids in cole crops. Colonies tend to form in younger, upper leaves, in cabbage heads, between cauliflower curds, or in long-season Brassicas such as Brussels sprouts. Large colonies can stunt plants or cause curled leaves, and CA will contaminate harvested parts. Early control is essential with Brussels sprouts. Beneficial insects are usually present but may not provide adequate control.

Most treatments used for worm management will not control aphids. A lot of systemic insecticides that are used to control onion thrips also control cabbage aphid, including Assail, Leverage, Venom, Provado. Other insecticides labeled for aphids include Provado, Fulfill, and Beleaf (new this year; registered in MA). Orthene can be used only on Brussels sprouts and cauliflower for GPA. Include an adjuvant in the tank mix. OMRI approved products for organic include Neemix, MPede (insecticidal soap), Pyganic (pyganic), and Mycotrol-O (*Beauveria bassiana*); all of these with the possible exception of pyrethrin are compatible with supporting beneficial populations, and will need to be started early and use more than once to be effective.

Watch for *Alternaria*, which can expand from older leaves into new growth and affect the heads and leaves that are destined for market. The most common symptom of *Alternaria* diseases is yellow, dark brown to black circular leaf spots with target like, concentric rings. Lesion centers may fall out, giving the leaf spots a shot-hole appearance. Individual spots coalesce into large necrotic areas and leaf drop can occur. Brussels sprouts develop blackened spots on the developing sprouts and may become unmarketable. Wide crop spacing, keeping weeds under control, disking in older crops as soon as they are marketed, planting late crops far from earlier crops are cultural controls that can help. Fungicides include chlorothalonil (Bravo or generics), Quadris, and maneb products. Copper products are labeled for *Alternaria* on some Brassicas; check specific labels.

--R Hazzard, adapted from *Pest Minder*, 16.16, August 19 2009, Cornell Cooperative Extension.

POST HARVEST AND STORAGE DISEASES OF ONIONS AND GARLIC

Onions are approaching maturity, but should not be pulled and cured until temperatures drop. Bulbs will sunburn if they are uprooted and laid on soil when temperatures exceed 90 degrees and will not dry well in high humidity. Wait until cooler, less humid weather before pulling unless they are to be marketed immediately. Most garlic crops have been curing for the past several weeks and may be ready to top and store. The number of growers producing these crops seems to be increasing, and in many cases growers plan to store bulbs into fall and winter. It is also important to be aware of possible pathogens that affect onions and garlic in storage.

Fusarium basal rot of onion & garlic (caused by *Fusarium oxysporum* f. sp. *cepae*) can affect onion, garlic, and other *Allium* spp. The fungus lives a long time in soil. Infection often is associated with mechanical or insect injury. Foliar symptoms appear as a unilateral or general wilt and a yellow to tan dieback of leaf tips during mid to late season. Foliage death may occur over several weeks.

In onions, red-brown rot appears where roots are attached to the basal plate. Rot and discoloration usually affect all of the base and up into the bulb scales; affected tissue appears brown and watery when bulbs are cut open. Sometimes, a white moldy growth develops on the stem plate or between affected scales. Bulbs may appear normal at harvest, but rot may progress in storage.

In storage, garlic bulbs appear spongy or sunken. Infected bulbs are softened, brown and watery when cut open. There



Neck Rot on Garlic

may be a white, light pink or reddish fungal growth (mycelium) covering the cloves, or in the rot cavities. Deep cracks form in the cloves, followed by break down of the tissue, which will eventually dry down to a portion of its original size, the cloves becoming crinkled and small.

There are resistant onion cultivars available. In a Malheur County, OR test, these cultivars had less basal rot: 'Golden Cascade', 'Cima', 'Oro Grande', 'Valient', and 'Cashe'. Your mileage may vary in the Northeast. Other onion cultivars described as tolerant are 'Bronze Reserve', 'North Star', 'Sassy Brassy', and 'Sentinel'.

Cultural control:

- Use 4-year or longer crop rotations.
- Protect plants from insect, fertilizer, or other injury.
- Storing bulbs at 39oF minimizes postharvest losses.

Botrytis Neck Rot of onions & garlic is caused by fungi that overwinter on plant debris in soil, on infected bulbs, and as sclerotia in soil. The pathogen can also be seed-borne. Botrytis neck rot is caused by a different pathogen from Botrytis leaf spot. Botrytis neck rot is seen primarily in storage. Most common causes of severe losses are excessive nitrogen, which delays crop maturity; irrigation and/or rain late in the season; inadequate or improper curing; and improper storage. Infection is through neck tissue or wounds in bulbs. Some bulb infections may arise from symptomless leaf infections, but often the fungus directly enters the neck via airborne spores when onions are topped before soft, susceptible top tissues dry properly.

Symptoms: In onion, the disease is more apparent after harvest, while bulbs are in storage. At first, soft neck tissue looks water soaked, and a yellow discoloration moves down the neck into the scales. Bulbs break down to a soft mass. A gray mold develops between the onion scales, later producing small to large black bodies (sclerotia) which develop as a solid layer around the neck.

In garlic, the disease usually appears first on necks near the soil line at any time after spring greenup when weather conditions permit. The disease becomes worse when it starts early in the season. Extensive development of sclerotia is best seen on maturing bulbs just before and during harvest. The fungus moves rapidly into the succulent garlic bulb's neck region, producing a water-soaked appearance. A gray mold develops on the surface of or between garlic scales, later producing black bodies (sclerotia) which develop around the neck. Before bulbing, plants may die or recover if weather permits. Bulbs infected late break down to a soft mass, and secondary infections by other organisms follow.

Cultural control: Bulb onions:

- Allow tops to mature well (at least half of leaves brown), then lift or undercut the onions. In dry weather, cure onions on the ground 6 to 10 days.
- Be sure onions are well dried and necks tight (i.e. the tissue does not slide when you roll your neck between your fingers) before topping. Bacterial diseases and Botrytis Neck rot can move through green tissue into



Leaf Spot Caused by Onion Purple Blotch.

the bulbs. These diseases do not move in dry tissue.

- Increase the length of onion necks when trimmed at harvest.
- Minimize bruising and mechanical injury in topping and storing.
- Store in well-ventilated houses at 32°F or slightly higher. Use higher temperatures if humidity cannot be held below 75%.
- Practice a crop rotation of at least three years.

Cultural control: Garlic

- Allow the tops to mature well, then lift or undercut the garlic.
- If normal dry weather prevails, cure garlic on the ground for 6 to 10 days. Otherwise, cure in a well ventilated area at 70-80 °F.
- When topping, minimize bruising and mechanical injury.
- Store garlic in well-ventilated houses at temperatures of 32°F, or just slightly higher.
- Avoid frequent and excessive irrigation.
- Visual inspection of seed garlic with a hand lens may help. Examine the basal plate or bottom of garlic for gray mold.

Purple Blotch of onion & garlic is caused by *Alternaria porri*, a fungus that overwinters on infected bulbs and debris in the field, and can be seedborne in onion. Another fungus, *Stemphylium vesicarium*, can also cause purple blotch in onions. These are most common as leaf diseases, but can affect bulbs in storage. Infection often follows injury caused either by other fungi, such as *Botrytis*, by thrips feeding injury or by sand or dust during windstorms. Older leaves are more susceptible, and plants approaching maturity are more susceptible than young plants. Spores require rain or persistent dew to cause infection. Optimum temperatures are 77 to 81°F. Almost no infection occurs below 55°F. 'Sweet Spanish' onions are very susceptible.

Symptoms: A small, water-soaked lesion develops on leaves and soon develops a white center. Zones may appear as the spot enlarges and the lesion turns brown to purplish. Red or purple margins often encircle the purplish centers and are surrounded by yellowish tissue. In moist weather, the spot's surface usually becomes covered with a brownish black, powdery fungus growth. Leaves with large spots turn yellow and are blown over by the wind.

Bulbs may decay during and after harvest. Decay shows first as a watery rot around the neck and is particularly noticeable because of the yellowish to wine-red discoloration in the neck region. As the fungus moves through onion scales, the tissue turns yellow then a wine-red and dries to a papery texture.

Cultural control:

- Practice long rotations with unrelated crops.
- Reduce hours of leaf wetness with wider plant spacing and good weed control.
- Destroy old onion cull piles and bury debris.



White Rot on Onion. Note The Black Sclerotia in the White Mycelium

- Avoid injuring bulbs during production.
- Properly cure bulbs in the field; lift and allow onions to dry several days before topping.
- Plant tolerant or resistant varieties. Avoid Sweet Spanish onion because they are extremely susceptible.

White Rot of garlic & onion is caused by a fungus, *Sclerotium cepivorum*, that produces hardy sclerotia which may live in soil for years. Only *Allium* spp. such as onion, leek, and shallot are attacked. Sclerotia can infect plants from 12 inches below the soil surface. One sclerotium can infect a group of 20 to 30 adjacent plants. Fungal activity is favored by cool soils and is restricted above 75°F. Once the disease is in a field, it is very difficult to grow *Allium* spp. successfully. Disease spreads with infected sets or transplants, grazing animals, and movement of infested soil.

Symptoms: Leaves decay at the base, turn yellow, wilt, and topple over. Older leaves collapse first. Roots rot, and the plant can be pulled up easily. Fluffy mycelium may be on remaining roots and bulb. Affected bulbs may become watery, and outer scales crack as they dry and shrink. Small sclerotia (0.02 inch, or about the size

of a poppy seed) form in and on the surface of affected bulb parts, often around the neck. White rot can continue to decay infected bulbs in storage if humidity is not kept low.

Location	Z1	EII	Total ECB	AVG CEW	FAW
CT Valley					
South Deerfield	14	61	75	-	-
Deerfield	7	29	36	5.5	0
Deerfield (2)	2	34	36	0	
Sunderland (1)	3	35	38	8	0
Sunderland (2)	1	0	1	13	0
Hadley (1)	4	5	9	-	-
Hadley (2)	1	0	1	6.7	-
Granby	5	5	10	-	-
Easthampton	0	1	1	12.75	-
Hatfield	1	7	8	15	-
Berkshire County					
Sheffield	3	0	3	1	0
Central & Eastern MA					
Lancaster	2	0	0	1	3
Tyngsboro	0	0	0	14	0
Concord	0	1	1	5	0
Northbridge	1	2	3	5	3
Spencer	0	0	0	25	0
Dracut	3	1	4	10	0
Nantucket	6	1	7	49	0
Rehobeth	0	10	10	23	0
NH					
Litchfield, NH	0	21	21	38.6	34
Hollis, NH	0	0	0	25	5
Mason, NH	0	6	6	14	10
VT					

- Plant only disease-free material in disease-free soil.

- When working in infected fields avoid moving soil contaminated with sclerotia into new fields by washing equipment before it enters another field.

- If practical, dig out all plants in infested spots in the field and the healthy plants growing next to diseased ones. Remove some soil with both diseased and healthy plants. Dispose of the material in a landfill or hot composting operation.

Blue Mold of garlic, caused by *Penicillium* spp. fungi, is a harvest and storage disease and may be particularly prevalent on fresh garlic. Several *Penicillium* species cause Blue Mold and these species are common in soil, on plant and animal debris, and in senescing plant tissues. Some species may be borne in infected cloves or seed. Invasion is usually through wounds, mechanical bruises, or freezing injury.

Cultural control:

- Control other diseases in the field to

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

prevent avenues for infection.

- Harvest bulbs with a minimum of bruising and wounding and dry promptly.

- Store bulbs at 5° C (40° F) with low relative humidity.

- adapted by A. Cavanagh & R. Hazzard, information & images from Oregon State Extension: <http://ipmnet.org/plant-disease/>

CORN REPORT

Harvesting of sweet corn remains strong and sales are good across the state. Those fields that are in tassel and pre-silk stage corn should still be checked for fall armyworm and ECB feeding damage. More and more early and mid season fields are being tilled under and ready for cover crops. The sooner that rye or oats is planted, the more nitrogen you will recover from the soil and hold over for next year. Cover crops planted in August develop larger, deeper roots and more canopy – providing better Nitrogen uptake, less leaching, and more protection of soil from erosion. For more information on cover crops, see last weeks article on Fall cover crops.

European corn borer flights dropped much lower this week in central and eastern Massachusetts while portions of Franklin County are still catching 10 moths per night. Where there is flight, we can assume that eggs are still being laid and that hatch will continue as well as feeding. Keep an eye on susceptible plantings where flight is above the 15 moths per week threshold. It is also important to know that the ECB overwinters here in New England in corn stalks and stems of other host plants. If you are finished picking in a field make sure to chop stalks and till in the plant debris to cut down on next years population.

Location	Z1	EII	Total ECB
CT Valley			
Hadley	0	31	31
Deerfield	2	24	26

Pepper Trap Counts

Corn earworm trap counts remain high in southern New Hampshire and throughout Massachusetts. Most growers are on a three to five day spray schedule. Days in the 90's and nights in the seventies have not allowed spray schedules to be safely stretched out an additional day. Weather patterns have not brought any major new moth flights to the northeast in the past week however, CEW remains the driving force behind spray schedules in silking corn. If you have caught under 7 moths per week you can move to a five day spray schedule. Make sure to move your CEW traps into fresh silk so that your counts reflect current moth activity. Most growers rely heavily on synthetic pyrethroids such as Warrior for CEW control, but reliance on a single type of chemistry is not the best approach for any insect or disease pest. For rotation of insecticide chemistry, alternate synthetic pyrethroid products with Lannate (a carbamate) or a new insecticide, Belt SC (flubendiamide) which is used at 2 to 3 oz/A (1 dh, REI 12h, Group 28). Trials in mid-Atlantic states indicated that this new chemistry is very effective. Synthetic pyrethroids are generally cross-resistant; that is, if resistance to one pyrethroid is present in a population, then that population will also be resistant to other pyrethroids. Spinosyn products (Entrust, Spintor, and Radiant) have efficacy against corn earworm at moderate pressure so could provide another rotation product under some conditions. The dry formulation (Entrust) that is allowed in organic production has been working well for growers, when used in an IPM program in organic fields.

Fall army worm trap counts remain low in Massachusetts but numbers in southern New Hampshire climbed this week. FAW numbers can vary from site to site in the same region, and some growers have found high numbers in their fields. We are continuing to monitor for adult populations in what whorl stage corn remains but have yet to catch any flight. Damage has been seen in some whorl stage fields and sprays have been recommended where more than 15% of the plants were infested. The best time to clean up FAW is in the whorl and pretassel stage. Recommended materials include Avaunt at 2.5-3.5 oz/acre in whorl stage corn. Radiant SC at 3-6 oz/acre

can be used in silking corn where sprays are warranted.

Peppers

Pepper growers can stop ECB sprays a week after counts drop below 20 moths per week. Despite the poor fruit set many pepper fields had at the start of this season, fields with raised beds and black plastic have caught up and harvests have been great. *Phytophthora capsici* is a concern in some fields with a history of disease. Several different species of *Phytophthora* cause root, crown or fruit rot of cucurbits, tomato, pepper and eggplant. Root and crown rot are particularly destructive because the entire plant collapses. If you suspect *phytophthora capsici* in your fields, send a tissue or fruit sample to the UMass diagnostics lab for diagnosis. Confirmation of disease presence may change your planting and management schedule for next season.

- *Amanda Brown*

UPCOMING MEETINGS

Organic Wheat Seminar

Aug 23, Sunday, <sit.edu <<http://sit.edu/>>> Brattleboro, VT *

Aug 24, Monday, <mofga.org <<http://mofga.org/>>> Unity, Maine

1:00 - 4:30

Dr. Anders Borgen and Eli Rogosa

Learning from the European Experience to Increase Wheat Production and Quality in New England.

Dr. Borgen is an organic farmer and wheat breeder with a collection of heritage wheats, a seed quality researcher and former board member of the Danish Organic Farming Association.

See: <<http://agrocologica.dk/>>>

SCHEDULE

1:00-Organic Wheat Production:* From the basis of wheat evolution and biodiversity, we will discuss how to improve small-scale cereal production under organic conditions in terms of economy, seed quality, markets and improving farmers' skills.

2:00-Discussion:Participants will share their work and interests, and identify key cooperative goals to improve local production.

3:00-Break

3:15-Organic Breeding:Guidelines to develop wheat varieties best suited to Northeast organic systems by drawing on the rich genetic resources of heritage wheat and 'composite-cross' gene pools for on-farm selection to improve the yield and quality of wheat.

4:00-Seed Exchange: The seminar will conclude with a wheat seed exchange and discussion of varieties, traits and wheat breeding goals.

\$15. to pre-register on-line: *growseed.org <<http://growseed.org/>>*

\$20 Registration at door. For details contact: growseed@yahoo.com

Directions to SIT:

Exit 3 on I91, RT 5 South for 1/4 mile,

Right at Light to Black Mountain Rd.

Funded by NESARE

Redesigning a Garden Center and Farm Stand for Future Growth

September 2, 2009

Volante Farms, Inc., 226 Brookside Rd., Needham, MA

4:30 PM to 7:00 PM

Program details: www.umass.edu/umext/floriculture/upcoming_events/index.html

Volante Farms, farmstand and garden center recently redesigned and constructed their garden center featuring a new, state-of-the-art 16,000 square foot gutter-connected greenhouse with rainwater collection, ebb and flood benches, heated floor, shade curtains and more. Join us for pizza and an evening learning about their renovation.

Cosponsored by University of Massachusetts Extension Greenhouse Crops and Floriculture Program and Massachusetts Flower Growers Association.

For more information, contact: Tina Smith 413-545-5306 – tsmith@umext.umass.edu, Paul Lopes 508-295-2212 ext. 24 – lopes@umext.umass.edu or Bob Luczai 781-275-4811 - bluczai@ballseed.com

New England Vegetable and Fruit Conference

Tues-Thurs Dec 15-17.

Center of New Hampshire Radisson, Manchester, NH

Three days of informative sessions and farmer-to-farmer networking! More details to come. Mark your calendars now! Get the latest info at <http://www.newenglandvfc.org/>.

Wed Sep 2. New Hampshire Vegetable & Berry Twilight Meeting. UNH Woodman Horticultural Research Farm, Durham NH. 5:30-7:30 pm. Ag Experiment Station Research on Horticultural crops. For info, please contact Becky Grube at becky.grube@unh.edu or 603-862-3203..

Wed Sep 2. Soil and Soil Health. Wellspring Farm CSA, 182 LaFirira Pl, Marshfield VT. 5-7 pm. Sponsored by NOFA-VT. \$10 for NOFA members, \$15 for non-members. For info, please contact NOFA VT at 80-434-4122 or info@nofavt.org.

Thurs Sep 17. Biological Control for Ornamentals in Greenhouses – Putting it all together. Tolland County Extension Center, Vernon, CT. 9:30am-3:30pm. For info, see http://www.umass.edu/umext/floriculture/upcoming_events/index.html.

Mon Dec 14. GAP Training for Vegetable Growers. Center of New Hampshire Radisson, Manchester NH. 1:00 pm-5:30 pm. This meeting will introduce the basics of USDA/FDA's GAP (Good Agricultural Practices) Certification Program for whole-sale fruit and vegetable growers. For info, contact Shirley Mietlicki-Floyd at 413-545-4420 or mietlicki@umext.umass.edu or Becky Grube at 603-862-3203 or becky.grube@unh.edu.

Tues-Thurs Dec 15-17. New England Vegetable and Fruit Conference. Center of New Hampshire Radisson, Manchester, NH. Three days of informative sessions and farmer-to-farmer networking! More details to come. Mark your calendars now! Get the latest info at <http://www.newenglandvfc.org/>.

If you would like to become a Vegetable notes sponsor, please contact Jessica Dizek at jdizek@outreach.umass.edu or 413 545 1445

Vegetable Notes. Ruth Hazzard, editor and Amanda Brown and Andrew Cavanagh, assistant 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; author and photographer is R. Hazzard if none is cited.

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