UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

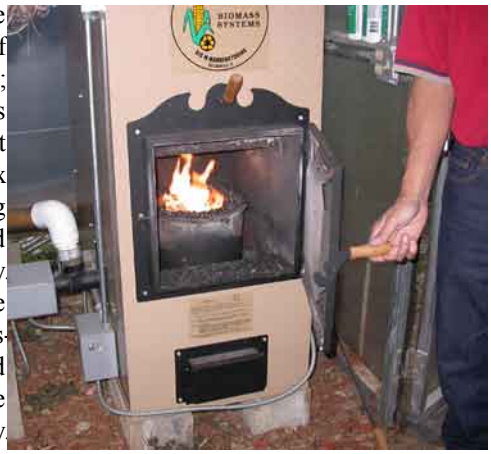
Volume 18, Number 18 September 6, 2007

Crop conditions

Dry and powdery fields, wilting shrubs and trees, and declining crop quality are widespread, probably worse in eastern and southeastern Massachusetts than westward. Everyone is hoping for rain (in regular, moderate doses, preferably) but glad to have a chance to harvest fall squash and pumpkins before any major storms turn terrific fruit into mush. Getting these fall crops out of the field and out of harm's way is keeping crews busy. Where irrigation has been applied regularly, most crops are doing very well. Heavier fields or soils with high organic matter are holding up better. Tomato quality is good, and fall greens and root crops are doing great where water is adequate. Brassica greens are finally free of flea beetles. Getting cover crops established has been nearly impossible. Downy mildew is infecting late cucumber plantings; protective sprays are advisable as long as conditions favor new new infections, which can occur over a temperature range of 60 to 72 degrees F, when foliage is wet.

Announcing green energy website

The UMass Extension Vegetable and Floriculture Programs are excited to present the addition of "Renewable Energy for Farms and Greenhouses" to their websites. The pages are designed to provide a practical and reliable resource base for farmers and growers on using renewable energy including solar, wind, biomass, and geothermal technologies. With high fuel prices, decreasing consumption of fossil fuels is an important step you can take to ease your wallet and to reduce greenhouse gas emissions. The site is arranged to be a guide for the process of adding green energy; it provides resources on the different types of energy, tax incentives, finding a contractor, and energy efficiency. There is also a page that lists other Massachusetts farms and greenhouses that are using green energy. This page includes a section where you can enter information on your farm's use of renewable energy to be added to the website. Visit the website by going to www.umassvegetable.org or http://www.umass.edu/umext/floriculture/ and clicking on the "Renewable Energy" link.



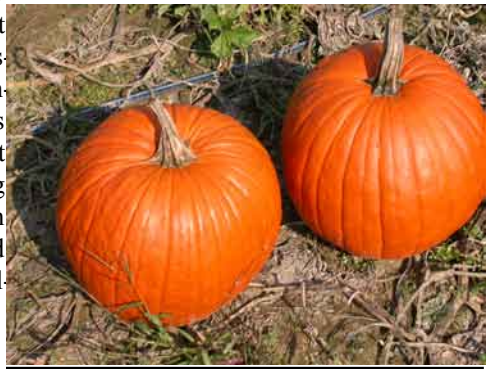
The Green Energy website helps farmers find information about renewable energy sources such as corn burners.

Final IPM field school for 2007: Sept. 18th at Howden Farm in Sheffield, MA

September 18 (Tues) 3-6 pm

Bruce Howden and David Prouty grow a range of vegetable and small fruit crops and raise livestock on 250 acres in the beautiful Housatonic River Valley. Howden Farm is the source of the well-known Howden pumpkin and the farm is still involved with pumpkin breeding as well as growing pumpkins for retail and wholesale. In 2006 the farm installed a 1-kilowatt photovoltaic system to power the pump for their drip irrigation system.

In mid-September the harvest of winter squash and pumpkins is in full swing, and fruit rots are a major concern. Needless to say, the farmers are hoping that we do not find any fruit rots to observe! We will have an opportunity to scout for late season disease, weed and insect pests, discuss harvest and post harvest handling of winter squash and pumpkins, and view the photovoltaic system.



Howden Farm specializes in growing pumpkins and continues to work on selection of new Howden pumpkin types.

Directions:

Take Mass Pike (I-90) take Exit 2 for Lee/Pittsfield. Turn left off the ramp onto Rte 20, then bear right on 102. Follow 102 (4.6 mi) into Stockbridge and turn left on Rte 7 south. Take Route 7 south through Gt. Barrington and Sheffield center. Bear right onto 7-A (Ashley Falls Rd.). After 0.4 miles bear right on Rannapo Rd. Farm is one-half mile down on the right, 303 Rannapo Rd.

Cost: FREE (thanks to our sponsors, there will be no charge for this field school).

Pesticide Applicator Training Credits: 2 contact hours will be given for each field school (private applicator category).

For more information or to register contact: 413-577-3976

SCLEROTINIA DISEASES OF VEGETABLES

We have observed *Sclerotinia* on beans, tomatoes and lettuce on various farms this season. Despite the fact that overall it has been a dry season, these locations had enough rain and soil moisture early in the summer to set off an infection. If this disease is present on your farm, even at low levels, it may be worthwhile to *remove* infected plant parts. *Sclerotinia* produces **sclerotia** which are hard black structures that allow the fungus to survive for many years in the soil. The sclerotia look like large mouse droppings and are usually embedded in the fruit and stems of the plants. A single head of cabbage can have thousands of sclerotia. They will persist for years in the soil and can cause problems in the future on host crops.

Two species of *Sclerotinia* cause diseases on vegetable crops: *S. minor* and *S. sclerotiorum*. Both pathogens are soil-borne as long-lived sclerotia and attack a wide variety of host crops. Many families of vegetables are affected, including beans and peas; Brassicas especially cabbage; tomatoes, eggplants and peppers; carrots; some cucurbits especially cucumber; and lettuce. Corn, onions, beets, spinach and cereal crops are resistant. White mold (*S. sclerotiorum*) is a major disease of bean worldwide, especially in cool, moist regions. Lettuce Drop (*S. minor* and *S. sclerotiorum*) is considered the most important soil-borne disease of this crop and infects lower lettuce leaves and stems that are in contact with the soil. *Sclerotinia* Rot (*S. sclerotiorum*) occurs occasionally in tomato, especially on damaged stems or petioles.

Dark, hard resting structures, called sclerotia, fill a pepper stem infect with white mold caused by Sclerotinia.

Lettuce Drop is characterized by a soft, watery decay of lower leaves and crown. The outer leaves wilt and as the plant approaches maturity, the entire plant may collapse. *S. sclerotiorum* can also infect the upper portions of the plants and usually infects damaged or senescent tissues. Both crown and upper leaf infections are accompanied by white mycelium and black sclerotia.

White mold of beans develops after or during the flowering period, as the fungus needs the senescing tissue for nutrition to begin the infection process. The pathogens infect all aerial parts of bean plants, as well as pods in storage. Symptoms develop during or after flowering, usually first appear low on the stem, and initially consist of circular dark green, water-soaked spots. Lesions expand rapidly and can encompass and kill the affected organ and adjacent tissue. Infected tissues develop a white, cottony appearance and black rounded or irregular sclerotia form. Entire branches or plants may be killed.

On **tomato**, *S. minor* only infects tomato tissue in contact with the soil and causes water-soaked lesions on stems and crowns. The lesion can enlarge, girdle the plant, and cause collapse of the entire plant. The crown and stems turn light tan to off-white, with white mycelium and sclerotia around and within the decayed crown. If you open up the stem, you will find the nugget-like sclerotia. *S. sclerotiorum* can cause infections throughout the tomato canopy, usually on damaged stems or where a senescent flower petal lands. Fruit can become infected and develop a soft, watery rot with white mycelium and black sclerotia.

Sclerotinia rot of cabbage shows up first as watersoaked areas on lower leaves and stem, especially those in contact with the soil. It spreads upward into the head and upper leaves, which becomes covered with mycelia and filled with sclerotia.

Cultural control: If practical, remove diseased plants and fruit from the field. Plowing will preserve the sclerotia in the soil but will put them at a depth that will inhibit germination. Disking will tend to place the sclerotia in a more favorable place to germinate. Like many seeds, sclerotia will only germinate when they are within an inch of the soil surface. A prolonged period of soil moisture (7-10 days) is needed to cause the sclerotia to germinate and produce spores. Encourage good soil drainage. The disease is more common where canopies are dense, cool, and moist. Reduce canopy density by increasing row width or plant spacing, and judicious use of nitrogen fertilizer. Plant rows in the direction of prevailing winds to increase rapid drying. Avoid damaging plants at transplant or by cultivation, as wounds allow entry. In beans, losses of fresh pods can be reduced by timely harvest and rapid cooling. Crop rotation of >4 years with non-host crops (especially cereals or corn) may help reduce the number of sclerotia in the soil.

Biological Controls: Research has indicated that the incorporation of Brassica cover crops such as broccoli can reduce soil inoculum of *S. minor* and reduce lettuce drop. Biological control with commercial formulations of the mycoparasite, *Coniothyrium minitans* (Contans) has shown some promise against *S. sclerotiorum*, but not *S. minor*. It acts by degrading Sclerotinia fungi in the top layers of the soil, thereby reducing the inoculum available to infect the crop. It is best applied to the soil prior to planting and from 60 to 90 days prior to the typical onset of the disease.

Fungicides: Fungicides can be effective if applied to canopy at the beginning of the infection period, which is at the onset of flowering in beans or the rosette stage in lettuce. Registered fungicides include iprodione (Rovral), thiophanate-methyl (Topsin-M), and azoxystrobin (Quadris, Amistar). Once the infection has occurred and

Sclerotia and white mycelia on tomato fruit.

symptoms are present, fungicides will not prevent the disease.

-B. Dicklow, R. Wick, A. Cavanagh, R. Hazzard

COLONY COLLAPSE DISORDER IN MASSACHUSETTS

Dan Conlon, President of the Massachusetts Beekeeper's Association

In the fall of 2006 beekeepers, nationally, began to report heavy honeybee losses at 40-80% due to an unknown cause. These losses would happen within a few weeks, without obvious symptoms, and result in no, or very few, bees left in the hives. To date researchers have not identified a specific cause of what is now being called Colony Collapse Disorder or CCD. It has now been reported in most states, including Massachusetts.

Early collection of bees, honey and beeswax from effected colonies resulted in a list of just about every possible cause. Researchers have been eliminating possible causes and will eventually find answers.

- Viral, bacterial and fungal infections have been found. These are common problems in honeybees and are thought to be the result of CCD, not the cause.
- Pesticides have been found, but not in all samples. Comb from colonies killed by CCD were irradiated and then re-stocked with bees. The irradiated colonies did not show signs of CCD. If it were pesticides the irradiation would not have cleaned up the comb. Researchers are moving away from pesticides as a direct cause, but pesticides known as *neonicotinoids* have been shown to affect honeybee memory & internal guidance systems.
- Toxins produced by fungi are still being considered. Several common fungal infections are known to create toxins that compromise the bee's nervous system causing disorientation and loss of memory.
- Genetically engineered crops are still being considered.
- Management practices are still being considered. Particularly activities thought to stress bees. Extreme stress results in the honeybee's immune system failing. Some researchers have called CCD the Aids of the honeybee. "Organic" beekeepers are also losing bees to CCD.
- It is looking like the cause may be a combination of factors. When tested alone, these factors do not kill bees (sub-lethal effect), but in combination they can weaken and eventually affect the bees nervous and immune systems. It may also be many different combinations that contribute to the eventual death of the honeybee. It does seem to directly affect the immune and nervous systems.
- Honeybee genetics are an important concern. After the introduction of parasitic mites in the 1980s the genetic pool of both managed and feral (wild) honeybees was greatly reduced. This *genetic bottleneck* may have left honeybees more susceptible to diseases, and less adaptable to new threats.

Until the cause(s) of CCD are identified beekeepers are doing what they can to keep the bees healthy. Recommendations include:

- Providing bees with plenty of good nutrition. Pollen and honey are needed to raise large populations of strong, healthy workers.
- Identify & control parasitic *Varroa & Tracheal* mites that carry bee viruses. Reducing the mites helps to reduce the spread of viral infection.

Pollen from male squash flowers is picked up by honeybees, squash bees and bumblebees.

- Control the parasite *Nosema* also known to carry many bee viruses.
- Replace old comb. Pathogens build up in beeswax after several years of use. Replacing with clean wax increases winter survival and eliminates disease.
- Keep colonies strong. Bees can overcome most disease and pests if they have a large population of workers. Strong colonies tend to stay healthy.
- Reduce environmental stressors. Moving, chemical exposure, poor quality water, and excessive splitting of colonies (to make new colonies) are concerns.

The extent of loss varies from state to state and even locations within affected states. Massachusetts has so far not had a serious problem. A few beekeepers have reported a loss of bees to what looks like CCD, but it is not, yet, considered a widespread problem. Mites, bears, and other known pests and disease are still considered the most important problems for Massachusetts beekeepers. It is important to understand that Massachusetts beekeepers are suffering losses, but they are from causes we understand. CCD is an unknown cause and for that reason considered a separate concern to most beekeepers. When we report CCD is not widespread it means only a few beekeepers have reported finding empty hives. Most of the information gathered by the Massachusetts Beekeepers Association represents only 5 to 10% of all state beekeepers. There is a lot we do not know.

At the 2007 spring meeting of the Massachusetts Beekeeper's Association members filled out a survey. Overall our members reported a 30% winter loss. The reasons included; starvation, small winter clusters (few bees) going into fall, queen failure, and other factors normally found to weaken and kill colonies. Among the larger operations (400+ colonies) the winter loss was 10 to 20%. This is a winter survival rate of 70 to 90% and is consistent with the national average. Again this does not represent all state beekeepers and should not be considered a comprehensive survey. It is the only survey currently used to gain information on beekeeping in Massachusetts. It is more representative then most of the figures being quoted in the media, which are based on anecdotal information from a few selected interviews.

So what is the extent of damage beekeepers are experiencing nationally? Two groups have recently released their findings and the problem is serious. The reports describe serious losses attributed to CCD, but even more significant is that heavy losses to other known diseases and pests continue to plague beekeepers in all states and Canada.

Bees transfer pollen to female squash flowers while drinking nectar from nectaries below the pistil. This is essential for fruit set.

The Apiary Inspectors of America found that overall losses were about 32%. Of the beekeepers interviewed 25% reported some losses to CCD. The other 75% lost bees to known causes. 32% is high and represents about 500,000 lost colonies. Unfortunately it is not a significant increase from past years, but a pattern of loss that is slowly reducing the number of managed colonies in the U.S. Beekeepers have been losing 30% of our hives each year since 2000. Managed colonies have declined from 4.5 million in the 1980s (before mites were introduced into the US) to 2.4 million in 2004. CCD is another serious blow to an already struggling industry. Honeybees and beekeepers are becoming a rare and endangered species.

The second report was from the Bee Alert National Bee Loss Survey. To date, 625 beekeepers, in 35 states & 5 provinces, completed the on-line survey. Of those surveyed, 40% reported severe losses in 2006. The survey asked if losses were over wintering loss, pesticide loss, mite disease, or disappearing bees. Degree of loss was low, moderate, to severe. Those reporting low to average losses were due to known problems and CCD was not considered a primary cause. Those reporting severe or heavy loss reported CCD twice as often as any other factor. Severe losses represented 75% of all losses with CCD reported at a ratio of 2 to 1 compared to known reasons for colony loss. Pesticide and mite loss actually went down from previous seasons.

The fact that those encountering CCD have had serious losses, while most beekeepers are not losing bees to CCD makes it a confusing topic for many beekeepers and bee associations. We still do not know the cause of CCD and leaves us unaware of how to protect our bees. We have seen improvement in the control of mites, and fewer incidents of poisoning due to pesticides, but the overall national losses have not been reduced.

How will this impact Massachusetts beekeepers, growers, and consumers? The simple answer is that without honeybees some crops will not produce. Lower yields per acre and poorly pollinated crops result in scarcity and higher prices being paid by the consumer. Growers may not find beekeepers willing to rent for pollination. Already several have stopped providing pollination to growers leaving many to scramble to find available honeybee colonies. I have seen this during the spring fruit pollination and again for summer pollination.

- First, many beekeepers have stopped renting colonies to farms. This is leaving too few colonies to serve the farms depending on honeybees for spring and summer pollination. I am also concerned that native pollinators seem to be declining near farms that did not need supplemental pollination from honeybees in the past. This is in part a result of the CCD scare. Beekeepers are protecting their bees by minimizing environmental stressors and exposure to situations that may harm colony health.
- Researchers are advising us to reduce stress as it compromises the honeybee's fragile immune system. Many of us think the final answer will be that many non-lethal pathogens are the cause of CCD. Alone not killing the bees but together they are a lethal combination. Moving bees, poor foraging conditions, and exposure to chemicals are stressors.
- Another reason is that beekeepers are focusing on honey production. Pollination rarely leaves the beekeeper with a honey crop and the price of domestic honey is going up. The 2007 season is expected to be another below average honey year. Domestic honey is growing in popularity as many imports are being found to be contaminated or to be from questionable sources.
- Pollination can put bees at risk to poisoning, black bear attacks, and even hive theft. Growers rarely share the financial risk a beekeeper takes during pollination.
- It is also reflective of the average age of beekeepers. We are getting older and some have decided it is time to cut back. Commercial beekeeping is physical work and moving hives is an easy activity to give up. Fewer young people seem to be interested in keeping bees for honey production or to provide pollination.

Next year beekeepers and growers should get together to discuss pollination needs before spring fruit bloom, or we may find there is a shortage of available bees. Pollinating fees need to cover costs, beekeepers should provide hives that are healthy with worker populations consistent to do the job, bear fencing in Western Mass is now a necessity, and protection from spraying should discussed, understood and agreed to by beekeeper and farmer. Beekeepers need to improve over wintering, and not leave a farmer without bees during the critical pollinating months.

Beekeepers are actively working on the problem of Colony Collapse Disorder. Research takes money. Beekeepers and beekeeping organizations have been raising funds as fast as they can to keep the researchers working. There is a national CCD working group with state, federal, and university specialists combining their efforts and sharing information to identify the cause of CCD.

Many state Beekeeper associations, including Massachusetts, have passed resolutions to support more funding for honeybee research and to keep the current USDA labs fully funded. We have notified our state Senators and Congressmen to support the additional funding in the Farm Bill. This would be used for research into CCD and other honeybee problems.

The bottom line is that we need honeybees to pollinate crops. Native pollinators are declining, particularly in our agricultural regions. The current trend is fewer available native pollinators, managed honeybees, and professional beekeepers. This decline is becoming critical to our being able to produce many key

food crops within the U.S. Some USDA projections are already predicting that the U.S will become a net food importer within 50 years as result of lost production and farmland. If we do not find ways to keep honeybees healthy our national food production will be replaced by increased imports. This should be a strategic concern to our leaders and to all U.S. citizens. We are risking the loss of control over our food supply, its safety, and its nutritional quality. The U.S. has the best food production in the world and yet we may live to see the day that our food supply is dependent on other countries. Not a very good plan for consumers, growers or beekeepers.

THE 2007 GREENHOUSE TOMATO CONFERENCE NOVEMBER 13TH

Tuesday, November 13, 2007

Sturbridge Host Hotel and Conference Center, Sturbridge, MA

Schedule:

8:15-9:00	Registration *Coffee and Danish*
9:00-9:50	Choosing Varieties of Tomatoes for Greenhouse Production *Freek Knol, De Ruiter Seeds*
9:50-10:50	Nutrient and Water Management *Rich McAvoy, University of Connecticut*
10:50-11:00	Break
11:00-11:45	Reading Your Plants: Managing Plant Vigor in Grafted Crops *Freek Knol, De Ruiter Seeds*
11:45-1:00	Catered Lunch- *Reservations requested by Nov. 7*
1:00-1:50	Pest Management-Using Biological Control for Greenhouse Tomatoes *Carol Glenister, IPM Laboratories Inc, NY*
1:50-2:00	Break
2:00-2:50 Concurrent Sessions	Session A Hands-on Grafting Workshop *Rich McAvoy, Jude Boucher, University of Connecticut; Martin Gent, Connecticut Agricultural Experiment Station* Session B Disease Identification and Management *Sharon Douglas, Connecticut Agricultural Experiment Station*
3:00-3:30	Cause and Management of Plant Disorders *John Howell, New England Vegetable Growers Association*
3:30-4:15	Grower Panel (Innovative growing or marketing ideas or perhaps economics) *Rich Schartner, Schartner Farms, RI; Ryan Voiland, Red Fire Farm, MA; Russ Holmberg, Holmberg Orchards, CT*

Registration: $35/person before Nov. 7

$40/person after Nov. 7

Seating is limited, so register early!

For more information contact:

Tina Smith, University of Massachusetts, 413-545-5306, tsmith@umext.umass.edu

Leanne Pundt, University of Connecticut, 860-626-6240, leanne.pundt@uconn.edu

Registration form is available at: www.umass.edu/umext/floriculture or www.hort.uconn.edu/ipm/

CORN REPORT

The sweet corn growing season is winding down for the majority of growers in New England. Many growers are within a week of picking their latest corn. This means that the last spray for corn earworm and European corn borer has most likely been applied and sprayers can be put away for the season despite the high trap captures that we are still experiencing throughout the state. For sweet corn that you expect to pick in late September or early October, spray schedules can be extended. Cool night temperatures reduce moth activity, flights will continue to decline, and insects hatch and growth will slow down. If you are still catching bewteen 7 and 90 corn earworm moths per week, extend to a 5-6 day spray schedule in silking corn. Over 90 moths per week, the usual 3 day schedule can be extended to 4 days with the cooler weather. In most locations corn earworm is still in one of these categories.

The European corn borer flight appears to be over for the season. Remember that the ECB larvae overwinter in crop debris including corn stalks that are left in the field. Disc fields soon after harvest and get a head start on control for next year. Get rye cover down as soon as possible after harvest to take up nitrogen and store it for next year's crop. Fields may be too dry and powdery to seed cover crops and get good germination, but plant as soon as conditions improve, so that rye has enough time to establish and take up leftover nitrogen.

Dry conditions have caused small ears and unfilled tips in some fields. Even in the heavy land that is often used for late corn, soils are very dry. The latest crops are suffering the most from lack of water.

Common rust has built up in some fields. This fungus does not overwinter in the Northeastern United States; each year it is blown up from the south. Once it is established here, many cycles of new spores are produced. Cool temperatures and long periods of leaf wetness or high humidity favor the disease. Young leaf tissue – at the whorl stage, prior to tasseling -- is most susceptible to infection from wind-blown spores. Rust can cause significant reduction in ear weight and yield on susceptible varieties, and this is most common late in the season. Fungicides will control this disease but should be applied before tasseling. Apply fungicides when 80% of the plants show one or more pustule per leaf. Notice which varieties are most susceptible or resistant, to help you select cultivars for late crops next year.

Overall growers have been reporting that this was a good year for sweet corn sales and production. As the 2007 season comes to an end, you may want to consider how your own on-farm

scouting program could benefit you in 2008. Throughout the season, trap captures and field infestation levels can be very different from one location to the next. By monitoring flight patterns and caterpillar activity on your own farm you may be able to save yourself some time, money and stress! For information on how to set up a scouting program feel free to contact Amanda Brown, UMass Vegetable Extension Program at 413-577-3976 and visit the Great Lakes IPM website at www.greatlakesipm.com.

We would like to thank all of the farmers, consultants, Extension staff and others who have provided sweet corn trapping data this season. Some states have a completely state-run program, which usually relies on county and state Extension staff to maintain a trapping network and publish the information regularly. We don't have those resources here in Massachusetts, but we do have many helpful people who willing to contribute their time and energy to this effort. Special thanks to the farmers who take time out their hectic week to check traps and call in numbers. We also appreciate the financial support of the New England Vegetable and Berry Growers Association, the Environmental Protection Agency, Massachusetts Department of Food and Agriculture, and the Northeast Sustainable Agriculture Research and Education Program, all of which have helped to keep our network up and running.

Thanks to: Charlie Leich, Paul Willard, Jim Golonka, Dave Dumaresq, Wayne Kingsley, Mike Wisseman, Steve Verrill, Noel Brown, Ken Foppema, Mike Miczek, Dave Harper, Skip Pepin, Alan Zuchowski, Joe Czajkowski, Frank Cesliuk, George Hamilton, Jim Mussoni, David Rose, Casey Steinberg, Ryan Voiland, Jeff Bober, Dan Kaplan, (and I'm sure there are others) for their contribution to this network.

--Amanda Brown and Ruth Hazzard

CORN EARWORM THRESHOLDS

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

Sweet Corn Trap counts for September 6, 2007

Location	ZI	EII	Total ECB	CEW	FAW
South Deerfield	0	0	0	-	-
Deerfield	0	0	0	130	-
Whatley	6	1	7	154	-
Hadley (2)	0	0	0	55	-
Hadley (1)	0	0	0	27	-
Sunderland	0	0	0	19	-
Concord	3	5	8	6	-
Leicester/Spencer	3	0	3	11	1
Northbridge	3	1	4	40	6
Tyngsboro	12	25	37	47	0
Dracut	10	1	11	18	0
Lancaster	4	2	6	26	0
Still River	0	0	0	74	-

Pepper Trap Counts for September 6, 2007

Location	ZI	EII	Total ECB
Hadley	0	0	0
Amherst	0	0	0
Hatfield	0	4	4

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

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