



VEGETABLE IPM MESSAGE

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CROP CONDITIONS

Thunderstorms have brought welcome rain across much of the state. However, they tend to be pretty localized and unregulated in their water delivery, and while some areas received an inch or two, some areas, especially in the Southeast, remain very dry. Fruiting crops like peppers and eggplants are approaching maturity. Cucumber harvest for processing is underway. Many growers are bridging the harvest gap from plastic and bare ground corn more easily than anticipated.

TWILIGHT MEETING REMINDER: WEDNESDAY AUGUST 7, BELCHERTOWN

Mark your calendar for Wednesday, August 7, from 5 to 7:30 p.m., for the twilight meeting at the New England Small Farms Institute in Belchertown, MA. Come and see what some innovative young farmers are doing – and how they are making living doing it! The tour will be led by Lampson Brook Farms Cooperative farmers Jeremy Barker-Plotkin, Patrick Taylor, and Matt Rulevich, who grow certified organic produce both in the greenhouse and field. Their crops include heirloom tomatoes, mesclun mix, garlic, melons, greenhouse red and specialty peppers, sweet corn, onions, snap beans, and edamame;. Products are sold through the Amherst and Cambridge Farmers' Markets, through a retail stand located on-site, and through local restaurants and grocers on a wholesale basis. Pests and pest management will be discussed. Rob Wick will demonstrate new technology that makes it possible to send pictures of field

diseases electronically to the Diagnostic Lab for a rapid diagnosis. Refreshments will be served. One hour of pesticide applicator re-certification credit will be offered. This meeting is co-sponsored by Univ. of Massachusetts Extension, Mass. Department of Food and Agriculture, and the Mass. Association of Roadside Stands. For more information contact: Robert Wick at (413) 545-1045.

Directions: From the North (west): Take I-91 to the Route 116 exit #25 at South Deerfield. Follow 116 to the intersection with Route 9 in Amherst. Take a left on 9 East. Travel on Route 9 East to intersection with Route 202 in Belchertown. Take a right on 202 South. Travel on 202 South up toward the center of Belchertown (about .9 miles). At the foot of the town common turn right onto Jackson Street. Lampson Brook Farms and NESFI are located 0.9 miles down Jackson Street on your left.

From the South (west): Exit I-91 at Rte 9 (2nd Northampton exit), turn east over the bridge. Continue on Rte 9 east to Belchertown, then follow directions above.

From the East: Take I-90 (Mass Pike) to the Palmer exit #8. At the end of ramp, take a right on Route 32. Take a right at your second light onto route 20. In about one mile turn right onto Route 181. Follow 181 to the center of Belchertown (about 15 minutes). At the stoplight, continue straight through the center of town. At the foot of the town common (with McCarthy's Pub on your right), turn left onto Jackson Street. Lampson Brook Farms and NESFI are located .9 miles down Jackson Street on your left.

TOMATO

Field tomatoes are maturing steadily and quality is good. Symptoms of bacterial and fungal diseases in tomato can be difficult to distinguish. Bacterial diseases can be more difficult to diagnose and control than early blight. Below are descriptions of our two most common bacterial diseases on tomato. See also

the disease diagnostic information about sending samples for identification.

Growers who have been struggling with bacterial diseases in tomato are reporting good results from a season-long management program that starts with crop rotation, hot water seed treatment and greenhouse sprays with copper, an early copper spray in the after transplanting.

Bacterial canker: typical symptoms on foliage are "scorching" of leaf margins -- brown, crisp edges of the leaves, with a thin, yellow chlorotic band inside the burned tissue. This "secondary infection" is what we see most often. Fruit may have "bird's eye" spots, small raised scars with a tiny brown center surrounded by a white halo. Symptoms of systemic infections include stunting, wilting (especially one half of a compound leaf), development of open stem cankers and fruit lesions. Canker can be seed-borne. It will be carried over in non-rotated fields for at least one year.

Bacterial speck: Symptoms of speck are tiny black spots on leaves, which soon develop a yellow halo. Small black specks can also be seen on fruit. Leaves with a lot of spots usually turn yellow and fall off. This disease is seed born and when wet weather comes along, the disease can really get going. Splashing water from heavy rains will spread the disease easily. When the leaves are wet, bacterial speck is easily spread by tractors or people as well.

If either of these bacterial diseases is present, applications of copper on a weekly schedule are recommended to reduce the spread of the disease. If possible, applications should be made with a boom sprayer, as an airblast sprayer can spread the bacteria to new locations in the field. If possible, harvest infected fields only when they are dry to avoid spreading the disease. New options also include Messenger (see July 5 issue).

Keep an eye out for **spider mite** in tomato fields; they are favored by hot and dry weather. Treatment is warranted if mites are on new growth or throughout the planting, especially in later plantings that need to stay healthy for several more weeks. Till under residues as soon as harvest is completed, if possible. Control options for spider mite include Agri-Mek 0.15 EC (note

7 DH interval) and Kelthane (2DH, also labeled for pepper). Organic growers could use Cinnamite, which is a contact toxin; however, phytotoxicity can occur -- make a test application and do not use on water-stressed or wilted plants. Insecticidal soap (MPede) and neem (Ezozin 3%, Neemix) are other options for suppression, if not complete control. Release of predatory mites may suppress spider mites if initiated when infestations are low.

TOM CAST UPDATE

The past week has seen extremes in disease-related weather: hot humid nights with long leaf wetness periods, and cool breezy nights with little or no dew. We accumulated 15 DSV's in 11 days at South Deerfield. That means that if we had applied a fungicide on July 15 or earlier, its time to apply again. This model applies to both Septoria leaf spot and early blight.

DSV VALUES, July 11 - 25, 2002

SOUTH DEERFIELD RESEARCH FARM

Date	DSV's/Day	Date	DSV's/Day
July 10	2	July 19	3
July 11	0	July 20	2
July 12	0	July 21	2
July 13	1	July 22	1
July 14	1	July 23	0
July 15	2	July 24	2
July 16	2	July 25	1
July 17	1	Days to reach 15 DSV's	11
July 18	0	Cumulative DSV's since May 24	74 DSV's

S DeGray, R Hazzard

HORNWORMS FOUND IN PEPPERS AND TOMATOES

Late July is typically the time when we see **tomato hornworms**. Hornworms have been observed in peppers in the Connecticut Valley, which means they are likely to be in other areas as well. These large caterpillars typically appear in relatively small numbers, but a few can cause their impressive feeding damage to just a few leaves or plants. Scout by searching leaves for damage, frass or larvae. Often one sees defoliated stalks or the characteristic dark-green droppings (fecal pellets) before the caterpillar is located.

The adults are large moths, predominately gray or gray-brown with lighter markings. They are commonly referred to as sphinx, hawk, or hummingbird moths. The adult tomato hornworm (*Manduca quinquemaculata*) is known as the **five-spotted hawk moth** while the adult tobacco hornworm (*Manduca sexta*) is called the **Carolina sphinx**. The wingspread of these impressive insects may reach five inches. They emerge from over wintered pupae in the soil in late spring or early summer. The moths are commonly seen at dusk, hovering hummingbird-like over beds of petunias and other flowers with long corollas. Nectar is extracted through their long, coiled, tube-like mouthparts. The hairy, robust abdomen of the tomato hornworm has five yellow spots on each side of the abdomen while tobacco hornworm moths have six. The tomato hornworm moth has two distinct, narrow, dark, zigzag, diagonal lines running across the center of the hind wings. These fine lines are obscured and fused into a single, dark, indistinct stripe in the tobacco hornworm.

The **spherical greenish-yellow eggs** are deposited singly on the undersides of host plant leaves. The eggs hatch in approximately one week and larvae begin feeding on foliage.

Caterpillars feed for 3-4 weeks, molt five times, and may reach four inches in length and 1/2 inch in width when full grown. Both species are green with a distinct "horn" on the top of the tail end. The sides of the tomato hornworm are marked with a series of white marks resembling a "v" laying on its side and pointing toward the head. The white marks on the sides of the

tobacco hornworm form a series of seven diagonal lines. The tip of the tomato hornworm's horn is black while that of the tobacco hornworm's is red. Full-grown larvae burrow 3-4 inches into the soil and form dark brown, two-inch long **pupae**. A sheath for the mouthparts projects from the head of the pupa and curves downward, resembling the handle of a pitcher. There is one generation per year in northern areas. Larvae consume large amounts of foliage on peppers, tomatoes, eggplant, potatoes, and related solanaceous weeds. Loss of foliage decreases production and increases the amount of sunburned fruit.

A **parasitic wasp** is an important natural enemy of the hornworms. The wasps lay their eggs inside the body of the caterpillars. After feeding within the caterpillar body, the larvae of the wasps eat out through the skin and spin the cocoons on the caterpillar surface. The adult wasps later cut out circular lids and escape from the cocoons to attack other hornworms. If one is hand-picking hornworms, those with cocoons of parasitic wasps on their back should not be killed.

Controls: If only a few plants are involved, larvae can be removed by hand. In large fields or if there are high numbers, foliar sprays can be used. Use material that will conserve beneficial insects, because those predators and parasites are very likely keeping your aphid populations under control. Insecticides which are specific for caterpillars include Bacillus thuringiensis (Bt) kurstaki or aizawi strain (Dipel DF, Mattch, Agree, or Xentari, etc.), indoxycarb (Avaunt), tebufenozide (Confirm), or spinosad (SpinTor). Although Bt usually works best on small caterpillars, in this case it will work very well even against large hornworms. In peppers, any controls used for European corn borer should control hornworms.

--R Hazzard. Sources: Utah State Univ. Extension Fact Sheet # 74, Purdue Vegetable Crops Hotline # 409 (Frankie Lam)

POTATO

Watch for new **Colorado potato beetle** adults, which are beginning to emerge from the soil and can do a lot of feeding damage. Beetles that emerge before August 1 will lay eggs and produce another generation of larvae. If you see adults now, it's

a good idea to control them and prevent this late-season infestation. Those beetles that emerge later will feed, but then will leave the field to seek overwintering sites. Avoid using Provado in fields that were previously treated with Admire. See the *New England Vegetable Management Guide* for a list of the many other choices.

No late blight has been reported in the Northeast in the past few weeks. Maintain a protectant fungicide schedule to prevent early and late blight. Bravo Weatherstik has long been an industry standard, and if used at the very early stage of disease development can be quite effective. The newer formulations of Dithane DF Rainshield and Manzate 75DF will provide growers with good control under times of less intense disease pressure. Metiram (Polyram) plus triphenyltin hydroxide (Super Tin) have a place in mid-season sprays when disease pressure from late blight and early blight are less intense, and this combination can be alternated with other fungicides. Any outbreaks of late blight can be expected to be resistant to ridomil; therefore, growers should not depend on this for late blight control.

For organic growers, several fixed copper fungicides are available (Basicop, Champ, Kocide, etc.) and provide fair control of late blight and early blight, again if used preventatively. These and other copper products are registered for use on both potato and tomato.

Potato leafhoppers will build up in potato and cause early crop decline if not controlled. Populations that were not controlled earlier are likely to include both adults and nymphs at this time in the season. Leaf margins turn brown and crisp, whole leaves yellow and die, and the crop stops growing. This is not a disease, but the result of a toxin injected into the vascular system when leafhoppers are feeding. There are many options that conventional growers can use against this pest, but the choices for organic growers are limited. Pyrethrin products have shown some efficacy. Several are on the market (eg Liquid Rotenone & Pyrethrin) but we are only aware of one that is approved, Pyganic Crop Protectant.

CUCURBITS & DEER

If you have had deer damage in vine crops in the past, or are using a field where you might expect deer damage, **now is the time to get electric fencing in place – before deer start feeding!** Deer populations in Massachusetts are increasing by 15% per year, finding favorable habitat throughout the state. Normal adult deer will eat anywhere between 6 and 10 pounds of food per day during the growing season, typically selecting weeds and broad-leaved plants, not grass. This places most planted crops at risk to damage from deer. Some of the crops most susceptible to damage are pumpkins, squash, beans, peas, lettuce, strawberries, and most other fruits and the plants that bear them, including grapevines.

Damage caused by deer is usually easy to identify. Deer tracks are the familiar cloven-hoof type. Because deer do not have upper incisors, they tear plants when they browse them, rather than making a clean cut like a woodchuck or rabbit. Deer will also gnaw pumpkins and squash, leaving tooth marks in the fruits that can eventually rot.

Fencing: Fencing, the construction of a barrier between the crop and the deer, is the most effective long-term solution to deer damage. The basics of fencing apply to both electric and non-electric fencing. It is important to understand that deer can easily jump a fence 10 feet high, but much prefer not to. Deer prefer to go under or through a fence than to jump it if at all possible. Thus, the bottom wire of an electric fence should be no more than 10 or 12 inches off the ground and non-electric fences should either have an even lower bottom wire (about 6 inches) or be of mesh construction.

Fence maintenance is critical in both applications. If a tree falls on the fence or a hole is cut in the fence, the fence should be repaired immediately. Once deer have gotten inside and discovered the crop, it will be harder to keep them out, even with an electric fence. No gaps should exist in the fence, access must be provided through gates that are closed at all times.

Fences should have a clear perimeter, at least 5 or 6 feet on the outside of the fence, so deer have to cross an opening before

encountering the fence. This also enhances visibility of the fence to the deer. Deer will blunder into a fence placed tight to a wooded edge and can actually damage or take down sections of a fence simply because they do not see it very well, especially smooth wire designs. Having a clear border will increase the effectiveness of the fence and aid in maintenance.

Electric fencing: Electric fencing is a cost-effective remedy to deer damage. Portable units that can be put up and taken down in half a day can protect many small fields. Larger farmers and orchards may want to invest in permanent fences, but even here using solar chargers and having clear perimeters can reduce costs.

For small fields of a few acres or less, portable fences either of regular electric wire or a product called “Hot Tape” will provide relief from deer. Hot tape is a wide, colored tape with several wires embedded inside. It enhances protection by being very visible to deer, even at night, while providing an electric shock on contact.

As few as two strands of electric wire can be used to protect crops if it is put up immediately after planting, it is baited initially (explanation to follow), it is always “hot”, and is maintained properly (e.g., do not let weeds or grass grow up into the fence). The effect that being shocked by an electric fence has on deer behavior and their subsequent avoidance of the fence allows a landowner to use a lower fence than in the non-electric case.

Baiting the fence is quite simple but enhances the deterrent powers dramatically. Deer are extremely well insulated over most of their body with fur. Couple that with their tendency to go under or through a fence, where they are most likely to contact the fence with their back or neck and it is easy to see how deer can penetrate an electric fence and not be shocked too badly. Baiting the fence, usually with a metal tab smeared with peanut butter, will make the deer contact the fence with its nose and tongue, wet parts that will conduct the electricity quite well. This first contact and the resulting shock on sensitive parts will educate a deer to respect the fence for quite some time. Obviously, the fence must be off to apply the tabs and bait, but

turn it on immediately upon finishing. Space the tabs about 30 feet apart and keep the fence baited for several weeks after the fence is installed. When the deer have become acquainted with the fence the baits can be removed if desired. However, deer will occasionally test a fence that has shocked them and new deer may enter the area so keeping the fence baited is not a bad idea. Most important is to keep the fence hot at all times.

Deer will try to go under or through the fence, thus keep the bottom wire 10 to 12 inches above the ground. In a two-wire fence, the second wire can be at a height of 30 to 36 inches above the ground. A three-wire fence can have strands at 12, 24, and 40 inches. Keep in mind that adult deer are about 36 inches at the shoulder. Fence posts do not need to be as stout as with the non-electric fence. Fiberglass posts driven into the ground at 30 to 40 foot intervals, close enough to keep the fence from sagging are adequate. It is the electric shock that provides the deterrent here, not the strength of the fence.

Electric fence supplies can be found at farm supply centers or through fencing specialty companies. Three fencing specialists in the Northeast are: Wellscroft Farm, 167 Sunset Hill-Chesham, Harrisville, NH 03450, (603) 827-3464; Kiwi Fence Systems, 1145 E. Roy Furman Hwy, Waynesburg, PA 15370, (724) 627-5640; Walnut Grove Farm, 50 Cartland Rd., Lee, NH 03824, (603) 659-2044.

Repellents. Repellents are advertised to reduce deer damage by making the target crop taste or smell unpalatable to deer. All repellents are billed to reduce, not eliminate, deer damage. To achieve this reduction, they must be consistently applied and reapplied as directed. If applied after deer damage has occurred, repellents likely will not repel deer from something they have already eaten. For a recurring deer problem, fencing is very likely more reliable.

One grower reports promising results in repelling deer on strawberries, vine crops and sweet corn (where they eat the silks) with foliar applications of fish emulsion fertilizer. He cautions that burning can result if the material is not agitated or is used at rates higher than recommended.

For a copy of the entire fact sheet *Preventing Deer Damage*, contact 413-545-3696, or visit our website http://www.umassvegetable.org/soil_crop_pest_mgt/vertebrate_pests.html

-- Adapted from fact sheet *Preventing Deer Damage* by: John E. McDonald, Jr., formerly of MA Div. of Fisheries & Wildlife, and Craig S. Hollingsworth, Univ. of MA.

DISEASE DIAGNOSTICS

This is a time of year when many vegetables begin to show symptoms of disease. **Effective disease management begins with an accurate diagnosis** because selection of pesticides and cultural practices should be made to target a particular pest. An inaccurate diagnosis can result in using a pesticide that is ineffective – hard on the pocketbook and risky for the crop. Some diseases are easily recognized in the field but many are not. Fungi, bacteria, nematodes, viruses, chemical or environmental injury, and nutritional disorders can produce symptoms that are difficult to distinguish from one another.

We encourage growers to use the Plant Disease Diagnostic Lab to help you make the best decisions about managing diseases on your farm. Overnight mail can get your samples to the lab in good shape, no matter where your farm is located! Or, if you are within an easy drive of campus, samples can be dropped off at the lab, on the first floor of Fernald Hall. There is metered parking

beside the building. Below is a map of the location at the UMass Amherst Campus. It's not hard to find from Routes 116, Rte 9, or I-91 (or from the Mullins Center)!

If you have any questions regarding plant diseases please call the Lab at 413-545-1045.

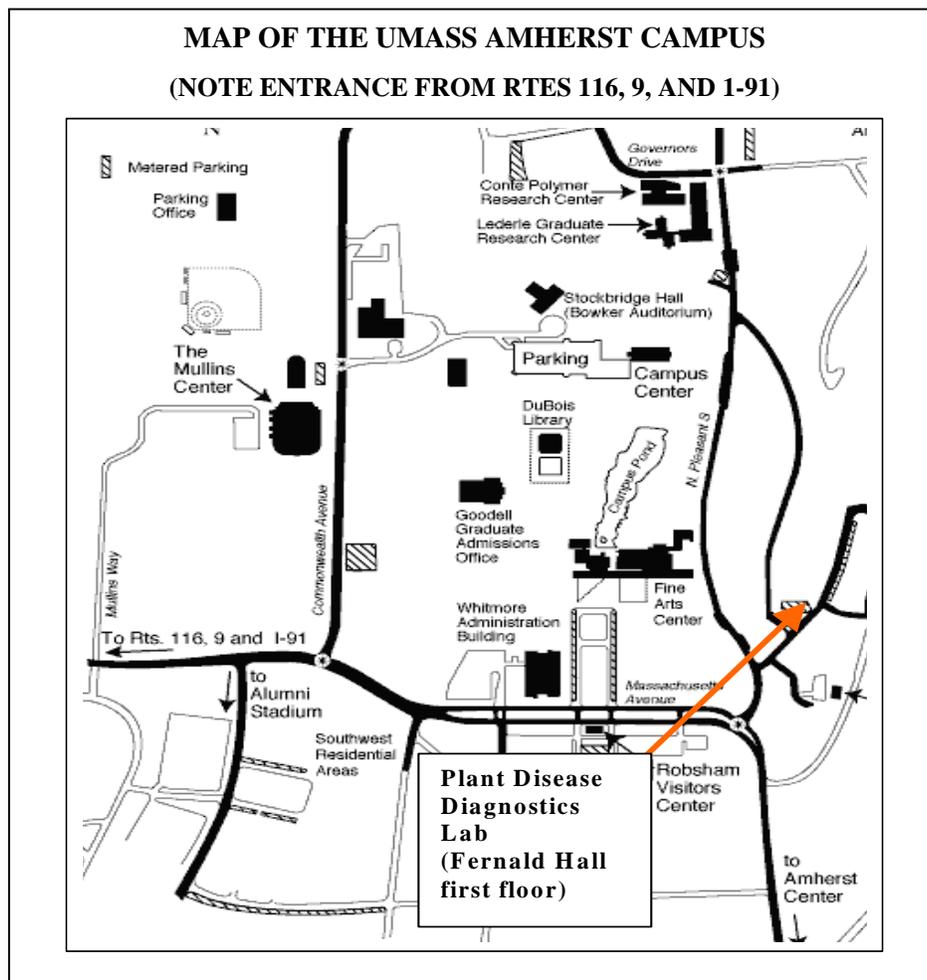
Taking samples properly and providing good field information is essential to a good diagnosis. The form to submit with samples, and instructions for how to take samples are enclosed with this newsletter.

UMASS DIAGNOSTIC CLINIC SEEKS PHYTOPHTHORA SAMPLES.

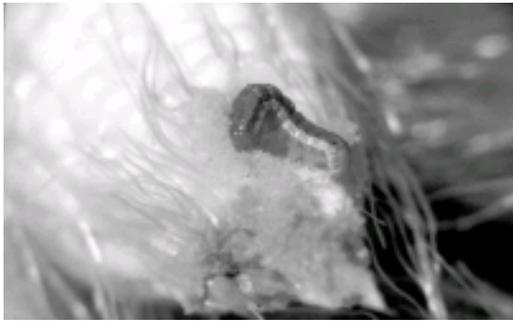
Research is underway at UMass to identify different strains of **Phytophthora blight** of pepper and cucurbits that occur in Massachusetts. Rob Wick and Bess Dicklow are looking for samples of Phytophthora and will come to your farm to collect

the sample. Any time an infected soil is saturated by a heavy rain, new outbreaks of this disease may occur in pepper or vine crops. If you see fruit or crown rot, contact the Disease Diagnostic Lab at 413-545-1667. Symptoms on the pepper plants include the typical water-soaked, dark brown stem lesions on the lower stem which extend upward several inches.

-R Wick and B. Dicklow



SWEET CORN



Corn earworm is trickling in to the lower Connecticut Valley and the Southeast. The **second flight of European corn borer** is just beginning in the Connecticut River Valley, but has not begun yet in the somewhat cooler areas of central, eastern and southeastern Massachusetts. Higher counts of ECB in southern Vermont and NH (Bennington, Plainfield NH) may be the univoltine strain. This strain has one generation per year, with flight moth peak during the gap in flight between the two-generation strains.

Growers in areas where CEW is active with captures of 4-7 per week should spray silking corn at 5 day intervals. Where ECB flight is starting, use a 6-7 day schedule. We can expect ECB flight to pick up next week at more locations.

Pepper growers don't need to worry about ECB sprays for another weeks – then, be ready!

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	3.5 - 7	5 days
1.0 - 13.0	7 - 91	4 days
Over 13	Over 91	3 days

Note: Spray intervals can be lengthened by one day if daily maximum temperatures were below 80° F for the previous 2-3 days.

Vegetable IPM Newsletter, Ruth Hazzard, Editor and Stephanie DeGray, Assistant Editor. The Vegetable IPM Newsletter is published weekly from May to September and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted; author is R. Hazzard if none is cited.

Where trade names or commercial products are used, no company or product endorsement is implied or intended. Always read the label before using any pesticide. The label is the legal document for product use. Disregard any information in this newsletter if it is in conflict with the label.

Sweet Corn Trap Captures and Scouting Data July 19-25, 2002

Town	Date	ECB Z1	ECB E2	TOTAL ECB	CEW	FAW	% PT
		Iowa	New York				
Berkshire Region							
North Bennington VT	July 23	30	0	30	--	--	
Sheffield, MA	July 25	0	2	2	1	-	-
Conn. River Valley North to South							
Walpole, NH	July 25	2	1	3	1	0	9
Plainfield, NH	July 25	0	16	16	0	0	6
Westminster, VT	July 25	0	0	0	1	-	9
South Deerfield	July 25	0	11	11	-	-	-
Whately	July 23	1	7	8	(peppers)	-	-
Sunderland	July 25	0	8	8	0	-	-
Hadley #1	July 25	0	0	0	-	-	-
Hadley #2	July 24	6	1	7	0	0	0
Feeding Hills	July 24	4	0	4	6	0	0
East/Central MA, North to South							
North Andover	July 20	4	0	4	1	0	14
Ipswich	July 25	0	0	0	5	0	11
Lancaster	July 25	11	0	11	0	0	0
Still River	July 24	0	0	0	0	0	-
Concord	July 22	0	0	0	0	0	22
Leicester	July 23	0	0	0	0	0	0
Northbridge	July 23	0	0	0	0	0	2
Belchertown	July 25	2	2	4	-	-	-
Rehoboth	July 25	0	0	0	7	-	-
Sharon	July 25	0	0	0	4	-	-