UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 23, Number 16 August 9, 2012

IN THIS ISSUE:

CROP CONDITIONS

Harvest of summer fruiting crops is in full swing, as tomato buckets fill the harvest rooms and sorting tables. Growers report their tomato crop looks the best ever. If ripening has been slow, it may be due to extremely high temperatures which slow the ripening process. Eggplant and peppers are also producing heavily now, and growers are picking their second or third summer squash plantings. Traditional fall root crops such as turnips are up, and the successions of fast-growing fall greens are being planted. Germinating fall crops is always a challenge when soils are dry and hot, and growers are using irrigation to get them off to a good start. Potato harvest is accelerating with vine kill being used for sections or fields that are ready for harvest. Harvest of stroage onions has begun. Main season sweet corn is abundant, perhaps too plentiful as blocks mature earlier or closer together than planned. Deer are making their way into winter squash and pumpkin fields looking for just enough taste of each fruit to render it unmarketable; see article on preventing deer damage.

PEST ALERTS

Cucurbit Downy Mildew (CDM) Update. No downy mildew was reported in Massachusetts this week. CDM has been confirmed in several counties in New York, including Ulster County. It was confirmed last week on a cucumber in a 14 acre field in Hartford County, CT, but the incidence rate was low (0.1% of plants, severity 30%). So far, the only reports north of Virginia have been on cucumbers, with squash and melons unaffected. Downy mildew risk is low to moderate for Massachusetts this week.

Cucurbit spray schedules recap: For powdery mildew, always include a multi-site protectant such as except chlorothalonil , mancozeb, sulfur; and rotate systemics among classes (FRAC groups). Top choices are quinoxyfen (Quintec, FRAC group 13) alternated with triflumizole (Procure, FRAC group 3). Other viable rotations for powdery mildew include Rally plus chlorothalonil alternated with Pristine plus chlorothalonil, Quintec alternated with Procure, and Quintec alternated with Pristine. Including Pristine in the rotation will also give increased efficacy against Plectosporium. This pathogen has demonstrated resistance to strobilurins (FRAC group 11 - Quadris, Flint, Cabrio, etc). Strobilurins are no longer recommended for

DATE:	8/9/2012					
Location	GDD Base 50F	7-Day Rainfall (in)	LB Severity Values - season*	LB Severity Values - 7 day	Tomcast Severity Values - season**	Tomcast Severity Values - 7 day
Pittsfield	1710	1.03	126	11	70	10
South Deerfield	1892	0.76	74	2	49†	3†
Belchertown	2066	0.43	65	0	88	13
Bolton	1930	1.16	100	13	57†	3†
Stow	--	--	89	11	76†	0†
Dracut	1919	0.23	87	7	56†	6†
Tyngsboro	1988	0.56	82	10	47†	6†
Boston	1965	0.17	56	1	84	12
Sharon	1881	0.09	79	4	82	11
East Bridgewater	1844	0.01	93	5	67	7

†These weather stations are missing several days of Tomcast values.

*Values accumulated since May 1. Every site is over threshold for Late Blight, even if planting did not occur until mid-May.

**Values accumulated since May 14. The usual threshold for Tomcast is 25 (since transplanting).

To access data from a number of different weather stations across the state see http://newa.cornell.edu/index.php?page=degree-days

powdery mildew but are still effective against Plectosporium, anthracnose (Colletotrichum), scab (Cladosporium) and black rot (Didymella). The fungus causing powdery mildew fortunately is sensitive to many types of chemicals that are approved for organic production. These include oil (mineral and botanical types, eg JMS Stylet-oil, GC-3 Organic fungicide, Organocide), sulfur (Microthiol Disperss), and copper (Champ WG); copper is the best choice against downy mildew. With threat or incidence of downy mildew: rotation options include Presidio or Previcur Flex with a protectant are very effective; other choices Ranman plus mancozeb, Presidio plus Tanos (famoxadone plus cymoxanil) plus chlorothalonil, and Presidio plus chlorothalonil alternated with Ranman plus chlorothalonil. For a longer review of cucurbit fungicides see article in June 7, 2012 Vegetable Notes and at www.umassvegetable.org.

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

Late Blight Update. Late Blight is continuing to spread to additional fields in New York and New England, though its extent in no way parallels the epidemic of 2009. The Disease Diagnostic Lab has had numerous late blight confirmations from Middlesex, Hampshire, and Franklin counties. There has been one confirmation from Plymouth County and from Barnstable County. Samples sent to the lab and confirmed were from organic farms especially in unsprayed blocks, home gardens, and community gardens. The isolate present this year has only been seen on tomato, is sensitive to mefenoxam (Ridomil), and MAY be adapted to warmer temperatures. Growers are encouraged to report and confirm suspected outbreaks to the Disease Diagnostic Lab. Heavily infected crops should be destroyed. Blitecast weekly severity values range from 0 to 13 across the state. Crop protection is most critical prior to extended periods of cloudy rainy weather but should be maintained on a regular schedule.

PREVENTING DEER DAMAGE

The population of deer in Massachusetts continues to grow, and damage on vegetable and fruit crops can be serious. They can be especially damaging in vine crops, and now that fall pumpkins and winter squash have developing and ripening fruit, it is critical to take action to prevent damage if you are in a high- pressure deer area. Temporary electric fencing can be an effective barrier but should be installed before deer begin feeding in a field. Repellents may also help deter deer, especially if the pressure is not severe. As deer pressure increases, it becomes critical to design and build a deer fencing system that fits your farm's needs. Permanent tall wire fences while more expensive may be a worthwhile investment on the home farm, or where you will always be planting vulnerable crops. Moveable electric fences make sense in fields that are rented, far from the home farm, or are planted to different crops each year.

Electric Fencing. Electric fencing may be the most cost-effective measure to prevent deer damage. Many small fields can be protected by portable units that can be put up and taken down in half a day. Woven ropes and tapes enhance protection by being very visible to deer, even at night, while providing an electric shock on contact. They are also more visible to people. As few as two strands of electric wire can be effective if installed before feeding begins, baited, kept always "hot", and kept clear of weeds and grass grow. Solar chargers make it possible to set up a fence even in remote locations.

Baiting the fence enhances the deterrent powers dramatically. Deer are extremely well-insulated over most of their body, which means that if they are attempting to under or through a fence and contacting it with their back or neck, they are likely not to be badly shocked. Baiting the fence with store-bought lures or a metal tab smeared with peanut butter entice the deer to contact the fence with its nose and tongue -- wet parts that will conduct the electricity quite well. This first shock on sensitive parts will educate a deer to respect the fence for quite some time. Space the bait 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.

In a two-wire fence, first wire should be at a height of 10-12 inches. The second wire can be at a height of 30 to 36 inches. 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. A higher fence can provide greater protection. We have observed 6-8 ft fencing that was built using longer posts (7 ft) or homemade extended posts constructed from shorter metal posts welded together. 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.

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

Non-electric Deer Fencing . Permanent fencing is the most effective long-term solution to deer damage. Deer can easily jump a fence 10 feet high, but much prefer to go under or through a fence. 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.. 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 with smooth wire designs. Having a clear border will increase the effectiveness of the fence and aid in maintenance.

Repellents. Repellents 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. Once a feeding pattern has been established, repellents are usually less effective. Repellents fall into three categories: taste, odor, and combination taste and odor. Different formulations allow the user to change the repellent and keep the deer on guard by providing a change in the range of odors and tastes.

For protecting vegetable and fruit crops, make sure that a product is approved for use on edible crops. Certain taste-based repellents can be used on edible plants such as vegetable crops, fruits, berries, nuts and herbs, but they must be removed (washed off) prior to eating. The following repellents are approved for use on edible plants: Hinder, Millers' Hot Sauce, Deer Stopper, Plant Pro-Tec, Deer buster deer and & rabbit repellent, Repel. Hinder and Repel (ammonium soaps of higher fatty acids) are odor repellents that can be applied directly to plants. They are effective but are easily washed off by rainfall. These materials can be applied in combination with normal pesticide applications but are not effective when applied to bare ground. Consult label for details and directions.

Some growers report that foliar applications of fish emulsion, which is sold and applied as a nutrient supplement, have an additional benefit of repelling deer. There are also numerous home-made products that may serve as repellents; as with many commercial products, repeated application is needed.

With the use of repellents, some damage must be tolerated, even if browsing pressure is low. None of the existing repellents provide reliable protection when deer densities are high. Repellents should be applied before damage is likely to occur, when precipitation is not expected for 24 hours, and temperatures will remain between 40° to 80°F for that period. Hand-spray applications may be cost effective on small acreages, while machine sprays will reduce costs for larger areas. If the materials are compatible, spray costs may be reduced by adding repellents to pesticide sprays.

--R. Hazzard, Sources: J. E. McDonald, Jr., formerly US Fish & Wildlife; Craig Hollingsworth, UMass; R.Ashley and N. L. Gauthier; University of CT; MD Dept. of Agric. (http://www.dnr.state.md.us/wildlife/ddmtrepell.asp); and growers who build deer fences.

EGGPLANT: LEAFHOPPERS, FLEA BEETLES

Flea beetles. This is the time when summer adults of potato or eggplant flea beetle are emerging from the soil and feeding on eggplant foliage. As with leafhoppers, the damage may at first seem insignificant but can build up to a level that will reduce plant vigor and yield. Eggplant leaves become riddled with tiny holes where numbers are high. Several materials can be used as a foliar spray. The two main groups are synthetic pyrethoids and necotinoids. See the New England Vegetable Management Guide for specific products. To avoid developmentof resistance, do not use nicotinoids for both soil and foliar applications, and rotate chemistries after one or two sprays. For organic growers, spinosad, pyrethrin and kaolin are options that are OMRI listed, with spinosad likely the better choice for this time of year. Kaolin (Surround WP) is not advisable during harvest since it won't easily wash off the fruit.

Early symptoms of hopperburn injury in eggplant (marginal yellowing.Note also flea beetle feeding holes.

Potato leafhoppers arrived early and have been active in beans, potatoes, and eggplant all season. Leafhoppers can build up in eggplant, and we have seen several crops with nymphs and hopperburn spymptoms present. In eggplant this shows as yellowing of the tips and margins of leaves; leaves also curl up. It is possible that leafhopper symptoms could be confused with verticilium wilt – see verticilium article for more on symptoms. Generally it does not

cause as severe a reduction in yield as it does in potato and bean, but as with other crops, leafhoppers and their damage can go undetected until injury is severe.

Adults and nymphs feed by inserting a needle-like beak into the plant and sucking out sap. They also inject a toxin into the plant, which causes yellowing, browning, and curling of leaves. University of Connecticut has established an action threshold of 1.5 leafhopper per leaf in eggplant. In potato and eggplant, some materials registered for Colorado potato beetle adults will also control leafhopper, including neonicotinoid foliar sprays such as Provado. These and several other carbamate, synthetic pyrethroid and organophosphate products are also registered for leafhopper in potato, eggplant and snap beans. Refer to the New England Vegetable Management Guide for registered products.

On organic farms, pyrethrin (PyGanic EC5.0) has been shown to be the most effective product for reducing leafhopper numbers and damage. Good coverage is important. The residual period is short. Spraying late in the day or in the evening may provide better control than spraying early in the morning.

If the crops or weeds within the crop field are flowering, bees may be active in the field, and selection of products with lower toxicity to bees is advised. See Table 20 in the Vegetable Guide for bee toxicity ratings. While the classes of insecticides listed above tend to have high toxicity to bees, there are variations within classes; for example, neonics are considered very toxic in general, but Assail (acetameprid) is much less so.

VERTICILLIUM AND FUSARIUM WILT

Verticillium and Fusarium are both soil-borne fungi widely reported and well known - at least by name - among gardeners and growers alike. The symptoms of these two diseases are very similar, and the cause of disease cannot be reliably determined in the field. An important distinction between these two is a generalization, but a useful one for disease management. The fungus Verticillium tends to have a wide host range (infects many unrelated plants), whereas Fusarium has a very narrow host range; that is, a particular strain can only infect one species. For example, a Verticillium isolate from potato can infect a maple tree. By contrast, the Fusarium that infects tomato cannot infect basil and visa versa. This is an important distinction for vegetable growers in particular because it helps growers plan an appropriate crop rotation. An important feature that both diseases share is that once introduced they will survive in the soil for many years.

Eggplant is very susceptible to Verticillium and therefore is a very good indicator that the fungus is present. Growers are advised to rotate eggplant around land they own or rent to determine where Verticillium is present. A plant infected here and there does not mean an epidemic will occur. The fungus is soil-borne and does not easily move around the field. Plowing and harrowing will extend the fungus down the row a bit, but it does not easily spread the way a fungus that infects the above-ground parts of plants would. Nevertheless, continuous planting of susceptible crops will build up the population density of Verticillium (or Fusarium) and reduce yield of subsequent crops.

Leaf scorch caused by Verticilium wilt in eggplant .

If Verticillium wilt on eggplant develops in your field then many vegetable crops would potentially be affected on the same site. The list of crops susceptible to Verticillium is very long and includes vegetables, flowers, herbaceous perennials and trees. Nevertheless there is some specialization with some strains of this fungus. For example, the strain that attacks peppers appears to be restricted to peppers (we have not seen this strain in the eastern U.S.). Unfortunately, there is no simply way to determine the host range of a particular strain of Verticillium. When we confirm Verticillium as the cause of disease, we can only advise to plant crops that are known to be resistant. Usually this means corn or other grasses. Because Verticillium wilt has such a wide host range, one may not want to develop a nursery in an old potato field.

Symptoms of Verticillium and Fusarium wilt are similar. Early stages of disease result in a one-sided yellowing, wilting or scorching. In contrast, Pythium, Phytophthora, Rhizoctonia, Sclerotinia and other root and crown rot pathogens result in the entire plant wilting more or less uniformly. The reason for the difference is that Fusarium and Verticillium enter into a limited section of the root system and colonize the water conducting cells that feeds water to a section of the plant. Therefore early symptoms of disease (wilting, scorching) are localized because only a localized section of the plumbing system is colonized by the fungus. With the crown and root rot pathogens, the vascular system is shut down more uniformly resulting in a uniform wilt.

Verticillium and Fusarium also generally cause a discoloration of the vascular system, especially at the base of the stem. The discoloration can be observed by splitting the stem down the middle; the vascular system is just under the outside of the plant, not in the center. A combination of vascular discoloration and one-sided wilt is a fairly reliable symptom of these two vascular wilt fungi.

We encourage you to send specimens to the Plant Disease Diagnostic Clinic where the exact cause can be confirmed. Identification of the cause of disease will help you plan how to rotate your crops (or rent land) for next year.

--M. Bess Dicklow, UMass Extension Plant Pathologist

Vascular discoloration in eggplant due to verticilium wilt, compared to healthy stem

TOMATO HORNWORM

Late July and early August are usually the time when we see tomato and tobacco hornworms. These large caterpillars typically appear in small numbers and cause major feeding damage to just a few leaves or plants. Larvae consume large amounts of foliage on peppers, tomatoes, eggplant, potatoes, and related solanaceous weeds. Now is the time to 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 adult tomato hornworm (Manduca quninquemaculata) is known as the five-spotted hawk moth. The adult tobacco hornworm (Manduca sexta) is known as the Carolina sphinx. Both species appear as large moths, predominately gray or gray-brown with lighter markings. Their wingspread may reach five inches. There is one generation per year in northern areas. 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 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. Larvae feed for 3-4 weeks, molt five times, and may reach four inches in length and 1/2 inch in width when full grown. The 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 tobacco hornworm has white marks on the sides which 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.

Cocoons of a parasitic Braconid wasp attached to Tomato Hornworm caterpillars

A parasitic Braconid wasp is an important and fairly common 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: There is no set economic threshold for this pest in tomato. Where damage is unacceptable, or if there are high numbers, foliar sprays can be used. Use a selective 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, Agree, or Xentari, etc.), indoxycarb (Avaunt), tebufenozide (Confirm 2F), or spinosad (SpinTor 2SC or Entrust). Several synthetic pyrethroids are also labeled (note: these could result in aphid outbreaks). Although Bt usually works best on small larvae, in this case it will work very well even against large hornworms. In peppers, any controls used for European corn borer should control hornworms.

SWEET CORN REPORT:CORN EARWORM HAS ARRIVED

Corn earworm flights jumped up this week to counts from 8 to 88 moths per week. Though the counts are not consistent within regions of the state and vary from farm to farm, most most locations are in the range that warrants a 4 day spray schedule. Only the Still River count of 88 is close to the threshold for a 3 day spray schedule. European corn borer flight continues at moderate levels. Check emerging tassels for larvae and spray if needed. Silk sprays will take care of ECB and CEW. Fall armyworm pressure is low. Sap beetles are invading ears with poor tip cover. Note that lambda-cyhalothrin products are now available (see below)

Corn earworm larva on corn. Note golden head capsule and rough texture. Photo by RVH

Corn Earworm Review. Our major corn earworm (CEW) infestations come from moths that migrate annually into the Northeast, traveling north on storm fronts. Numbers are increasing across the state this week, with records of very high counts on some farms in east-central Massachusetts (e.g. Northbridge, Still River). Heaviest numbers are usually found in coastal areas and up the major river valleys.

Monitoring. Monitoring moth flight with pheromone traps is key to season-long control, both to respond quickly to changes in flight and to avoid unnecessary sprays. Reports of moth trap captures at selected locations are provided in most New England states. The most accurate and timely flight information will be obtained by monitoring your own fields. Heliothis net traps baited with Hercon Heliothis zea pheromone lures are commercially available and widely used in the region. The threshold charts are based on this trap/lure combination. Place traps in blocks with fresh silk and move traps to new blocks of fresh silk as needed – these blocks will give you the highest and most accurate counts. Counting moths twice weekly is the most accurate way to monitor and will help you avoid missing a sudden jump in the CEW population on your farm. Calculate the average nightly catch (divide total count by the number of nights since the last count). Replace lures every two weeks.

Identification. Adult CEW moths are light tan with a distinctive dark spot on each forewing, a dark band near the margin of the hind wing, and a wingspan of 1.2-1.5 inches. Live moths have bright green eyes. Moths are active at night. Eggs are laid directly on fresh silk and hatch in 2.5 to 6 days, more quickly at higher temperatures. Newly-hatched caterpillars crawl down the silk channel and feed on the kernels at the tip, leaving unsightly frass. In the tip they are protected from insecticide sprays. Sprays or other control measures must be timed to prevent larvae from entering the ear. Corn earworm larvae may be brown, tan, green, or pink, with light and dark longitudinal stripes. They reach 1.5 to 2 inches when full grown. The head capsule is plain golden brown, and small bumps and hairs give the body a rough texture.

Control. Control depends upon maintaining insecticide coverage on the silks (unless you are using the Bt hybrids that express the Bt toxin in leaves, silks and kernels). Directed sprays to the ear zone provide the best coverage. Repeat applications to silk every three to six days depending on trap captures according to the chart below. If maximum daily temperature is below 85°F for 2 to 3 days, spray intervals may be extended by 1 day. Continue treatments until 5 to 7 days before final harvest or until silk is completely dry and brown.

The spray intervals in the CEW table assume use of synthetic pyrethroid or carbamate products. Some newer products in the diamide class (Coragen, Belt, or mixtures such as VoliamXpress and Besiege) have a longer residual that should allow the spray interval to be extended by one or two days.

Insecticides for CEW. Growers have been reporting that the products containing lambda-cyhalothrin (e.g. Warrior, Lambda-T) were unavailable this year. Apparently there was a holdup in the supply chain of this active ingredient, but that has now been resolved and these products are again available from ag suppliers. This active ingredient has dominated

Sweet Corn weekly Trap Captures for Week Ending August 9

Location	Z1	EII	Total ECB	CEW	FAW
CT Valley					
Deerfield	0	6	6		
South Deerfield	0	10	10		
Sunderland	4	14	18	9	0
Hadley	12	2	14	11	0
Feeding Hills	2	6	8	12	0
Central & Eastern MA					
Spencer	3	4	7	5	0
Dracut	3	55	58	10	0
Tyngsborough	1	2	3	3	0
Lancaster	1	4	5	8	0
Still River				88	
Concord	3	4	7	10	0
Millis	0	0	0	9	
Sharon				46	
Northbridge	1	7	8	38	1
East Falmouth	9	6	15	5	0
New Hampshire					
Litchfield	0	4	4	20	1
Hollis	0	1	1	18	0
Mason	0	3	3	5	1

corn earworm control products for many years, which has led to concerns about development of resistance to synthetic pyrethroids in the corn earworm populations. Of course, resistance in the population that we deal with in New England is the product of what is happening farther south, since only a small portion of our moths live till the following year. Nonetheless it is a good thing to bring alternative chemistries into our spray programs. Thus the supply gap that prompted farmers to try something else might not be such a bad thing. Other options which are effective not only on CEW but also ECB and FAW include the new diamide class which includes Belt SC (flubendiamide) labeled just for corn, chlorantraniliprole (Coragen) with a broad crop label, and the mixtures of lambda cyhalothrin and chlorantraniliprole which include Voliam Xpress and Besiege. Besiege is a recent arrival on the market and is a 'generic' with the same active ingredients and same label as Voliam Xpress. Spinosyn products including Radiant (spinetoram) and Entrust (spinosad, OMRI listed) are also effective against CEW.

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

-R Hazzard, with thanks to Zara Dowling, Jim Mussoni, David Rose, Paul Willard, George Hamilton (UNH Coop Extension), Larry Dapsis (UMass Extension), Bruce Howden, and others for trap and field observations!

ORGANIC CONTROL FOR CORN EARWORM IN SWEET CORN.

When corn earworm captures in pheromone traps are in excess of 2 per week, we know that a damaging population is present. Often in late summer weekly captures reach 10, 30 or over 90 moths per week. For organic growers, options for effective control includefolilr sprays with allowed products, and direct silk applications. Foliar sprays of Entrust will be effective for control of European corn borer in the tassel, as well as for control of moderate populations of corn earworm. Higher populations (in the range of > 30 per week) may not be fully controlled by this product. As with other products, control is better when application equipment is set up for good coverage of the ear zone. Follow the spray intervals recommended in the corn earworm chart.

The direct silk application of vegetable oil mixed with a pesticide reduces corn earworm and corn borer damage to ears by coating the silk channel and the kernels in the tip where CEW (and also some ECB) larvae feed. This method may be used alone or in combination with foliar sprays. Certified organic growers must be careful to select approved materials. Direct silk treatment is especially useful for farmers who grow certified organic sweet corn, do not own a sprayer suitable for sweet corn, or grow relatively small acreage of corn. It works by coating the silk channel with oil, which is toxic to caterpillars and which carries the insecticide down the silk and onto the tip where caterpillars feed. A handheld oil applicator (the Zealater™) designed to make this hand-application method economical and comfortable, is available from Johnny's Selected Seeds http://www.johnnyseeds.com/ .

Success with the direct oil method takes attention to detail and timing. Here is a summary of some key points:

Timing. Corn should be treated with 0.5ml (not 5.0ml!) of oil, once during early silk stage. The best time to apply oil is generally 5-7 days after silk growth starts, or 3-4 days after silk is full grown. At this time, the tips of the silks have just begun to wilt and turn brown and pollination is nearly complete. A good way to check the timing is to carefully husk a couple of representative ears and examine the kernels. The ideal time to treat is when the silk has detached from all but the top 1" or less of the kernels.

There is a window, somewhere between 5 and 8 days after silk initiation, that provides the best combination of corn earworm control and ear fill. Oil applied too late after silk initiation can result in more feeding damage to the kernels caused by caterpillars that entered the ear prior to the oil. Applications made too early after silk do not give better control, but may result in a higher rate of "cone" tips. This occurs when oil interferes with silk pollination resulting in unfilled kernels in the tip. While partially filled tips are a relatively common occurrence in sweet corn, cone tips caused by oil can be more pronounced.

Materials. Materials that may be used for the carrier include corn and soy oil and carrageenan (derived from seaweed). Food grade corn or soy oil from the grocery store is allowable in most states because federal regulations state that these oils are exempt from requirement of a pesticide registration and label; check with your state pesticide office to be sure on this as regulations do vary. The oils penetrate the silk channel more easily than carageenan and do not need to be injected as deeply into the tip. Materials that may be used for the toxin added to the carrier include spinosad, Bt and neem (azadiractin). Addition of a toxin reduces earworm damage to the tip compared to oil alone. Based on studies conducted at UMass and with farmers, we recommend using corn oil or soy oil with added spinosad (Entrust) for the best overall insect control while minimizing physiological damage to the corn ears (cone tip). Another effective option is carrageenan with Bt.; carageenan does not cause cone tip. Bt with corn oil has been used in many trials and also works well, though compared with spinosad with oil was somewhat less effective and compared with Bt and carageenan caused more cone tip (unfilled kernels at the tip). Use the labeled rate of pesticide per acre in corn. Add this to the approximately 2 gallons of oil it takes to treat 1 acre. For 2 oz per acre of Entrust (assuming 16,000 ears/acre), use 0.25 oz (4 tsp) per liter of oil and for1/2 lb Dipel DF per acre use 3 tablespoons of Bt per liter of oil.

With a dry formulation of pesticide, an emulsifier to the oil will help to keep the pesticide suspended in the oil. We have had luck with liquid lecithin. Add 5% volume of liquid lecithin to the oil before adding the dry material that has been suspended in water. Liquid lecithin is the consistency of molasses: we strongly recommend that you add it directly to the oil instead of measuring into a separate container first. Lecithin will mix more readily with oil than water, making cleanup difficult: be careful not to spill the lecithin. Use the labeled rate of pesticide per acre in corn. Add this to the approximately 2 gallons of oil it takes to treat 1 acre.

Direct silk application is labor-intensive (approx. 8 hr per acre) but only one treatment is needed per block. The best control will be achieved where the stand is relatively consistent in age and growth stage, has adequate moisture and fertility so it is growing well, and with cultivars that have good tip coverage.

The UMass Extension Vegetable program has an eight-page publication, *Organic Insect Management in Sweet Corn: Scouting, Thresholds and Management Methods for Key Caterpillar Pests in Sweet Corn,* describing the pests, monitoring methods, materials, tools, timing, and how to integrate oil applications with other methods. Information on direct silk treatment for CEW control can also be found in the *Using IPM in the field, Sweet Corn Insect Management Guide* available through the UMass Extension Vegetable Program, Johnny's Selected Seeds, and on line at www.umassvegetable.org. Contact the Vegetable Program office (413-545-3696) to obtain a copy of either of these documents or visit our website to download a copy of your own.

--Amanda Brown, Pam Westgate, and Ruth Hazzard, UMass Extension Vegetable Program

UPCOMING MEETINGS IN NEW HAMPSHIRE & NEW YORK

Mon Aug 20, 6-8PM. Vegetable & Berry Twilight Meeting – Homestead Farm, Walpole, NH. We'll see PYO blueberry and strawberry production, greenhouse tomatoes, mixed vegetables and Christmas trees during this tour, and will also discuss some topics relating to soil health: cover crops for weed suppression, soil testing in the field and high tunnels, and NRCS conservation programs. Contact carl.majewski@unh.edu, 603-352-4550. 1.5 contact hours PAT credits (transferrable to MA).

Tuesday, August 14th- 6 p.m. to 8 p.m.: Summer Twilight Meeting at Altobelli Family Farm, 1202 Old Post Rd., Kinderhook, NY. The CCE Capital District Vegetable and Small Fruit team will be joined by Dr. Andrew Landers, who will discuss sprayers, nozzles, and application issues. We'll also have a general overview of pests and diseases we are seeing in the field, and will tour a tomato variety trial being hosted by John.

Beginning Farmers: Join us at 5pm for a beginner's guide to sprayer information. This topic will be tuned towards hand sprayers, and will be applicable for both organic and conventional growers. Meet the other beginning farmers and bring your questions! If you have questions please contact Crystal at 775-0018 or cls263@cornell.edu.

Tuesday, August 21st – Spotted Winged Drosophila Workshop at the CCE Rensselaer county office, 61 State Street, Troy, NY 12180. – Hands on workshop led by Peter Jentsch of the Hudson Valley lab will help train growers, field scouts and extension personnel in what to look for, how to accurately identify and how to best formulate control strategies. Training is from 1:00 -2:30 pm. CCost is $10/person. You can pay at the door, but please call Laura at 518-746-2562 to register.

MASSACHUSETTS TOMATO CONTEST TO BE HELD AUGUST 20TH

The 28th Annual Massachusetts Tomato Contest will be held at Boston's City Hall Plaza Farmers' Market on Monday, August 20th in conjunction with the City Hall Plaza Farmers' Market and the start of Massachusetts Farmers' Market Week. Tomatoes will be judged by a panel of experts on flavor, firmness/slicing quality, exterior color and shape. Always a lively and fun event, the day is designed to increase awareness of locally grown produce. For the complete details, including contest criteria and a registration form, go to http://www.mass.gov/agr/markets/tomato_contest.htm .

The 28th Annual Tomato Contest is sponsored by the Massachusetts Department of Agricultural Resources, New England Vegetable and Berry Growers Association and Mass Farmers Markets.

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