UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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Crop conditions

The hot and humid temperatures from last week have continued into this week, giving a needed push to crop growth rates and development. Despite the higher temperatures, the average temperatures in Massachusetts are ranging from 0-5 degrees below normal. Since mid-week the cooler, drier weather is back and with it, rain.

In-between harvests growers were busy with side-dressing and insecticide and disease control sprays before the expected rain. Cultivating, weeding, mowing and field monitoring also continued this week.

Growers are reporting good yields on crops. Harvest continues for beans, beets, broccoli, cabbage, cucumbers, herbs, lettuce, onions, peas, potatoes, radishes, scallions, snap beans, summer squash, and greenhouse tomatoes. Customers are anxiously awaiting field tomatoes, which are just coming in throughout the state.

-P. Westgate

Tomato hornworm

Late July is typically the time when we see tomato hornworms. These large caterpillars typically appear in small numbers and 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 quninquemaculata) 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. 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. 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. 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

Tomato Hornworm caterpillar with parasitic wasp cocoons

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, Agree, or Xentari, etc.), indoxycarb (Avaunt), tebufenozide (Confirm 2F), or spinosad (Spin-Tor 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.

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

SKIN CANCER, ANOTHER FARM OCCUPATIONAL HAZARD

Farmers are in the high risk group for skin cancer. While there are no figures related to the occurrence of skin cancer among farm workers, it is estimated that about 700,000 Americans develop skin cancer every year and it has become the most prevalent of all cancers. The principal cause of skin cancer is overexposure to sunlight, especially when it results in sunburn and blistering.

The first line of defense from skin cancer is to avoid the sun, an impractical strategy for farmers, so farmers must take extra care to apply sun blocking lotions and wear proper clothing. Choose a sunscreen with a Sun Protection Factor (SPF number) of at least 15. With an SPF-15, most people are protected, even in summer for about two and a half hours. Apply sunscreen 30 minutes before going outside so that the sunscreen is given time to react with your skin and reapply sunscreen when you are in the sun for long periods of time or if your sunscreen has washed off.

While all farmers are at a high risk for developing skin cancer, those workers with fair skin, light eyes, or who sunburn or freckle easily must take particular care if they are to avoid skin cancer.

Farm workers can protect themselves from skin cancer in a number of ways:

- Using sunscreen year-round: use a product with an SPF of at least 15.
- Covering up. Wear long sleeves and pants, a wide-brimmed hat, and sunglasses with ultraviolet (UV) protection. Look for new clothing material especially designed for blockage of UV rays.
- Protect your ears, lips, the back of your neck, your throat, the backs of your hands and the tops of your feet. (Don't forget any balding spots.)
- Start early with farm kids. Protect your children's delicate skin with sunscreen, shade or protective clothing.
- Watch for the early warning signs of skin cancer. Be aware of any changes in your skin that you can't explain and which last for more than 30 days.
- Know your moles. Look for new moles, and check old ones for any change in size, color, texture, shape or sensation. Call your doctor if any of these warning signs appear.
- Remember: ultraviolet rays reflect off water, cement, sand and snow. They can damage your skin on cloudy days and through tractor windows.
- Some antihistamines, antibiotics and other medicines can increase your sensitivity to the sun. Check the label, or ask your pharmacist or doctor.

-Adapted by Craig Hollingsworth from a publication by the Prince Edward Island Federation of Agriculture http://www.peifa.ca/farmsafety/health/skin.html

FARMERS SOUGHT TO GROW TROUT IN FARM PONDS

Many farm ponds in Massachusetts can be used to grow trout in cage culture. Trout can be marketed to local restaurants, game clubs, used for fee fishing ponds, or for stocking local fishing derbies. Fish cages are simple to build, require limited maintenance and provide an introduction to the possibilities of fish farming.

The Western Massachusetts Center for Sustainable Aquaculture (WMCSA) is looking for farmers to grow trout in their farm ponds in 2005. Growers will receive testing of their pond water, training in trout culture, materials and instructions to build a trout cage, and 100 fingerling trout. Participating growers will attend a winter workshop, pay a small fee and complete a survey at the end of the project. Craig Hollingsworth will coordinate the project, and Keith Wilda, Director of WMCSA, will provide training sessions at the Cranberry Station in Wareham and at the WMCSA in New Marlborough (Berkshires).

Farm ponds need to be a minimum of 8 feet deep, minimum of 5000 square feet of surface area (100' x 50'), have vegetation in or around ponds edge, be spring or brook fed year round and meet water quality standards, determined by water testing performed by WMCSA. A questionnaire to help determine whether a farm pond is suitable for trout growth will be sent upon request. Wilda and Hollingsworth hope to receive a grant to help support the project, and are looking for interested farmers to enlist their support on the grant application.

-Email: chollingsworth@umext.umass.edu (preferred) or leave address information at: (413) 545-1055

CHOOSING THE RIGHT COVER CROP

Cover crops can provide multiple valuable benefits to cropping systems. While typically used in the Northeast to protect the soil against winter erosion, or to add biologically fixed nitrogen, other uses include improvement of overall soil quality, weed management, late-season nutrient capture and even enhancement of biological control agents in the system, such as beneficial organisms. A key to successful use of cover crops is to choose the appropriate species to fit the specific goals of their intended use in the cropping system. As such, a grower should first identify a primary goal or use for the cover crop, characterize the conditions under which it will be grown, and then use this information to describe the ideal species before matching the description with the best available cover crop species.

-**Erosion control:** These species need to be able to quickly develop an extensive below - and above-ground biomass, often during cold and inhospitable weather in the fall. In general, cool-season small grains are the best options. Cereal rye (*Secale cereale*) is the best choice for most Northeastern cropping systems because of its ability to germinate and grow late in the fall when other species have effectively shut down growth for the year.

Typical Rooting Depths of Several Cover Crops

Depth (feet)	Crop
5-7	Red Clover, Lupine, Radish, Turnips
3-5	Common Vetch, Mustard, Black Medic, Rape
1-3	White Clover, Hairy Vetch

-Source: Preston Sullivan
Appropriate Technology Transfer for Rural Areas

-**N-fixation:** Legumes used as cover crops have a relationship with a bacteria in their roots that allows them to utilize N from the air and convert it to a plant nutrient. The plants can then be turned into the soil as a "green manure," thus enriching the soil with N for use by the following crop. Typically, legumes used for this purpose are winter annuals, occupying the niche between summer crops. Hairy vetch (*Vicia villosa*) is the most cold-tolerant of the winter annuals and so has been used frequently in Northeastern cropping systems. Growers who are willing to dedicate longer periods to the green manure crop have expanded options, such as Biennial Sweetclover (*Melitotus officianalis*) or the short-lived perennial Red Clover (*Trifolium pratense*).

%N in Legume Tops and Roots

Crop	Tops (%N)	Roots(%N)
Soybean	93	7
Vetch	89	11
Cowpea	84	16
Red Clover	68	32
Alfalfa	58	42

-Source: Preston Sullivan
Appropriate Technology Transfer for Rural Areas

-**Soil Improvement:** Nearly any cover crop will bring about improvement of some soil biological, chemical or physical characteristics. Covers with lower N contents, such as grasses, may lead to longer-term buildup of stable soil organic matter, but legumes can also lead to improved soil conditions, particularly short-term improvement in soil aggregation and water infiltration.

-**Weed Control:** The use of cover crops for weed management involves manipulation of several principles: competition for light, water and nutrients, physical smothering by residues and phytotoxic effects, or allelopathy. Any cover crop that grows vigorously at a time when weed species would otherwise be germinating and emerging can be used to out compete weeds. Those with thick and decay-resistant residue may be able to act as a mulch, which smother germinating seeds. Cool-season grains, particularly Cereal Rye, has been used successfully in the Northeast as a killed surface mulch in no-till vegetable systems for weed suppression. Generally, the grain can be killed by mowing and left in place once it has initiated flowering. Several cover crop species are noted for the release of chemicals during decomposition that may inhibit the germination of small-seed weeds in the surface soils. Cereal Rye has the most notable allelopathic effect, but many members of the Cabbage Family, such as Mustard, Forage Kale and Oilseed Radish have exhibited some effect in this regard. It should be noted that cover crops rarely offer acceptable weed control through allelopathic effects alone.

-**Selection of Cover Crops to Fit the Rotation:** As noted above, most growers in the Northeast prefer to establish cover crops during the fall through spring period when the field is otherwise not utilized by economic crops. Winter annual cover crops, including an array of grasses, legumes and brassicas, can be planted in the fall, but vary in their ability to overwinter in the Northeast. The most cold-tolerant winter annual species include Cereal Rye and Hairy Vetch, but several others, such as Crimson Clover (*T. incarnatum*), Winter Wheat (*Triticum aestivum*) and several forage-type brassicas will fairly consistently overwinter in Hardiness zones 6 and above.

Those who choose to keep the cover crop in the field through at least one year will find that Red Clover, White Clover (*T. repens*) and Biennial Sweetclover are all sufficiently hardy to withstand most winters in the Northeast. Other options for cover cropping include some non-traditional time periods, such as Summer Fallow, when heat-tolerant species such as Cowpeas (*Vigna unguiculata*), Buckwheat (*Fagopyron esculentum*), or Sudan Grass hybrids can be grown for weed control and soil improvement. In choosing an appropriate cover crop and its place in the rotation, the ability of the species to grow and survive in the crop environment at the time of seeding, the equipment available for seeding, the cover crop's ability to with-

stand field traffic, the cost of the seed, and the anticipated method for cover crop demise at the end of its functional life cycle, as well as a number of other things, must be taken into account.

-Marianne Sarrantonio, University of Maine

FERTIGATION

Nitrogen (N) is subject to leaching. If the total amount is applied at or before planting heavy rainfall can leach away a great deal of it. This risk can be minimized by applying N in a split application, with a small amount put down at planting and the rest sidedressed several weeks later when the crop demand is high. The other nutrients are normally applied in total at or before planting because they are not subject to leaching. However, on sandy soils with low organic matter, K may be subject to some leaching, and in such situations, a split application is useful. The traditional method of applying additional N (and possibly K) during the growing season is to sideddress or topdress.

A convenient way of applying supplemental nutrients is with fertigation. This is the injection of chemical fertilizer into irrigation water. Most fertigation in Massachusetts is done with trickle irrigation. By using a fertilizer injector, trickle irrigation can be used effectively to apply N and/or K to crops during irrigation. The need for supplemental N can be determined using the preside-dress soil nitrate test (PSNT) as it is with other application methods. If used, samples for the PSNT should be taken from under the plastic. The best way is to use a soil sampler, which will punch a small hole in the plastic and remove a core of soil. Be sure to avoid cutting the irrigation tape when sampling under plastic. For more information on the PSNT, see the June 14, 2001 Vegetable IPM Message.

With conventional topdressing or side-dressing, it is common to apply all the N in one or two applications. With trickle irrigation, it is convenient to apply small amounts of N weekly or even daily, which is desirable from a nitrogen management standpoint. For example, if you would normally sidedress a total of about 50 lbs N per acre, you can inject a little over 7 lbs N per acre per week for seven weeks, or about 1 lb per day if you prefer. Small weekly applications provide for more efficient crop use of N than one or two larger applications. Daily application offers little advantage over weekly application, but may be necessary if the injector cannot inject a week's worth of N during the appropriate irrigation run time. To do this, measure out the desired amount of fertilizer for the area to be covered at one time. For example assume you have two acres and want to apply 7.5 lb N per acre and are using calcium nitrate. Calcium nitrate is about 15% actual N. You want to apply 7.5 lb N per acre or 15 lb for two acres. Divide the total amount you want to apply (15 lb actual N) by the percent N in the fertilizer (15%) and multiply by 100. In this case, you need 100 lb of fertilizer to apply 15 lb of actual N (15 lb divided by 15 % times 100 equals 100). Dissolve it in a bucket or barrel of water. In the example above, dissolve 7.5 lbs of N 50 lb calcium nitreate for each acre to be covered at one time in water. Use enough water so that it will take about 20 to 40 minutes to complete the injection. If injection occurs more rapidly, the application may not be uniform. On the other hand, a longer injection time may result in excess water being applied. To prevent leaching, the irrigation system should not be run longer than necessary to effectively wet the root zone of the crop. This will distribute the material throughout the rooting area. Excess water will leach some of the N below the root zone. If there is not enough time to inject all the fertilizer needed for the week in one injection, then smaller, more frequent injections are preferable. Before injecting fertilizer, the entire system should be filled with water and at full operating pressure. When all the fertilizer has been injected, the system should be run long enough to flush all fertilizer from the lines. If fertilizer is left in the lines, clogging may occur due to chemical precipitates or growth of bacterial slimes.

Application uniformity is affected by field topography. Water gains pressure going down hill and loses it going uphill. There is a gain or loss of 1 lb per square inch for each 2.4 ft of change in elevation. There is also pressure loss due to friction. This loss is greater in small pipes than larger ones. In hilly fields, the system should be set up so that water runs down hill to roughly offset friction loss. It is difficult to achieve even application of water and fertilizer in fields with knolls and dips, but reasonable uniformity can be achieved in most cases.

Back flow preventors must be used so injected materials cannot flow back into the water source if the pump shuts off. The filter should be down stream from the injector so it can remove any undissolved particles.

Calcium nitrate is the most popular source of N for injection. However, it is important to use the greenhouse grade, which dissolves readily, or buy the material already in the liquid form. Field grade granular calcium nitrate is usually coated with wax to reduce caking in the bag. It is difficult to dissolve in water and may clog emitters

There is a potential for certain fertilizer materials to react with chemicals in irrigation water. If the water pH is below 7.0, there is little potential for problems, but at pH 8.0 and above, the risk is high. At levels above 40 to 50 ppm, calcium and magnesium are likely to react with phosphorus, if present in the fertilizer, causing precipitation of phosphates. If fertilizer-containing calcium is added to water with concentrations of bicarbonates above 2 meq/liter, calcium carbonate may precipitate. Sulfates in fertilizers can react with calcium in the water resulting in the precipitation of

gypsum. These precipitates can clog emitters. Phosphorus- and sulfate-containing fertilizers, if needed should be applied before planting because there is no concern about these leaching. Nitrogen (and someimes potassium) is the element that is most appropriate for injection into trickle irrigation water. Calcium nitrate has the potential to cause clogging if the water pH and bicarbonate levels are high as noted above. If calcium nitrate causes clogging, potassium nitrate, ammonium nitrate or urea can be used as an alternative N source. Urea converts to ammonium in the soil. High amounts of ammonium can inhibit calcium uptake, causing certain physiological disorders such as blossom end rot of fruits and tip burn of leafy crops. It seems likely that weekly application of small amounts of urea would not result in high levels of ammonium at any one time, but there is little data to confirm this. Water testing labs can analyze water for pH, calcium, magnesium and bicarbonates. You can also perform a simple test: Mix fertilizer into a container of irrigation water at the same concentration it will be after injection into the trickle system. Cover the mixture to exclude dust and let it sit for at least the length of time it will be in the system before it reaches the soil. If the water becomes cloudy or a precipitate collects on the bottom of the container, you can expect this to happen in the irrigation system with the likelihood of clogging. If it is necessary to lower the water pH, acid can be injected into the irrigation water. This requires special handling precautions and special injection equipment. Be sure to carefully follow directions to avoid personal injury or damage to crops or equipment.

--John Howell

BLUE MOLD OF TOBACCO

Blue mold was confirmed in the Connecticut River Valley on shade tobacco in Hadley, Massachusetts on August 3, 2004. While the disease was not widespread within the field and was only confirmed on a single plant, there were two generations of lesions, indicating that infection likely occurred in mid to late July. It is possible that the disease resulted from long-distance exposure from Kentucky on July 16 or from Pennsylvania at some time during the last two weeks. Be on the lookout for early developing blue mold symptoms. Please notify the Experiment Station of new infestations. All growers in the Valley should now consider their fields potentially exposed.

-Jim LaMondia, CT Agricultural Exp Station, Windsor CT

PERIMETER TRAP CROPPING

As many of you know, for the past two years we have been experimenting with a perimeter trap cropping system for butternut squash. The system involves planting a perimeter of Blue Hubbard squash around the butternut field, encircling it like castle walls. When the striped cucumber beetles come out of their overwintering sites looking for a meal, they hit the Blue Hubbard first. They like the Blue Hubbard much more than they like butternut, so they pile up in the border for a while instead of spreading out through the main crop like they normally would. This gives you a nice window of opportunity to kill the buggers before they can get into your butternut, saving damage to your main crop and drastically reducing the amount of spray you need. This year we also had a few growers experimenting with an Admire treated border. You all know how much Admire costs, so you can imagine how much money you could save if you only had to treat the borders of your fields! We're still looking at the data but so far it looks like all of our PTC systems were very successful this year. Here are the preliminary results from one grower using Admire this year:

- At the peak of beetle pressure, we found 6.4 times as many beetles in the 25 plants we scouted in the border than in the 25 plants we scouted in the center (109 in the border, 17 in the main crop).
- During the same week in an un-bordered admire treated field of the same size and age with similar beetle pressure, there were actually more beetles in the main crop than in the border (71 in the border, 78 in the center).
- In the PTC field the highest number of beetles counted in the main crop was 33 beetles on 25 plants.
- In the un-bordered admire treated field, the highest number of beetles counted in the main crop was 78 beetles on 25 plants – more than three times the highest number we found in the PTC field.
- The cost of the Admire used on the PTC field was roughly ~$25.
- The cost of the Admire used in the conventional field was ~$250.
- On an eight acre field, using an admire treated Blue Hubbard border was 10 times more cost efficient than treating the entire field with admire and resulted lower pressure on the main crop.

You can see that this system has a lot of potential, and not just for winter squash. This system can be modified for use on most cucurbit crops; we are also developing systems for tomatoes, eggplant, cabbage, and peppers. We are also working out different trap crop varieties for the cucurbits in case you don't have any use for Blue Hubbard and don't want to just till in your perimeter after the beetles pressure drops.

-If you're interested in finding out more about what Perimeter Trap Cropping can do for you, please contact **Ruth Hazzard** at (413) 545-3696, or **Andy Cavanagh** at (413) 577-3976 or email at acavanagh@pssci.umass.edu.

-A. Cavanagh, University of Massachusetts Extension

ECB IN PEPPERS

The second generation of European corn borers has emerged in southern New England and is active in pepper and sweet corn fields! ECB trap captures have been above threshold in some parts of the state. If you haven't begun to apply insecticides for ECB control in your peppers now is the time! Thresholds for ECB in pepper are 7 moths per trap per week. Once thresholds have been reached insecticide applications should be made one week after. This week delay allows for mating, egg-laying and egg hatch to occur before the larvae can enter the fruit.

We can expect egg-laying and new hatch of larvae for the next 2 weeks or so. Eggs are laid on the undersides of leaves and the young larvae enter the fruit by burrowing under the fruit cap. Signs of ECB infestation include darkened tissue, frass or small white larvae under and around the calyx. Choosing less toxic or microbial products to control ECB is recommended to preserve beneficial predators in the field. SpinTor 2SC and Entrust (both spinosad formulations) have proven to be good products to use for ECB control. They have low toxicity to mammals and are considered reduced risk materials. Both have the advantage of conserving beneficial insects such as ladybeetles which feed on aphids which can be a problem later in the season. Both products also have a one-day pre-harvest interval and a four-hour re-entry interval which make them particularly useful for farm stands and small plantings which are picked frequently. *Bacillus thuringiensis kustaki* (BT) can also be used on a 3-to-4 day scheduled throughout the 2nd generation. For other conventional methods of ECB control in peppers refer to the 2004-2005 **New England Vegetable Management Guide**.

- A.Duphily, University of Massachusetts Extension

SWEET CORN UPDATE

For those of you with late season corn it is not time to put away those sprayers yet! Corn earworm trap counts are still rising across the state and the warm temperatures we have been having are favorable for fast earworm development. This is the time to control the larvae before they enter the ears. Growers (especially near the coast) should be spraying silking corn on a three day schedule where numbers are higher than 13 moths per week. Short intervals between sprays should continue until silk is dry and brown or until trap counts fall below thresholds (see table below). Don't forget about European corn borers, the second generation is also in southern New England laying eggs! Fall armyworm numbers are also up across the state. Late season corn in whorl stage should be scouted for armyworm damage and controlled when damage exceeds 15%.

For some organic control methods of these pests refer to the sweet corn fact sheets at the link below.

http://www.umass.edu/umext/ipm

- A.Duphily, University of Massachusetts Extension

SWEET CORN TRAP COUNTS 7/29 - 8/4

Town	Date	ECB Z1	ECB E2	Total ECB	CEW	FAW	%PT
Berkshires/ Champlain Valley							
Sheffield	8/3	0	5	5	10	0	0
Westminster, VT	8/4	4	7	11	11	1	0
CT River Valley							
S. Deerfield	8/4	20	21	41	83	48	0
Sunderland	8/4	16	18	0	0	0	0
Hatfield	8/4	19	27	46	45	0	0
Hadley (pepp.)	8/4	16	4	20	0	0	0
Feeding Hills	8/3	11	5	16	29	4	0
C.&E. MA							
Dracut	8/2	0	0	0	0	0	0
Dighton	8/3	4	1	5	176	4	0
Still River	8/2	3	1	4	109	0	0
N. Andover	7/29	0	2	2	20	2	0
Concord	8/2	0	1	1	44	20	0
Ipswich	7/30	0	0	0	3	22	0
Leicester/ Spencer	8/4	3	2	5	20	2	0
Northbridge	8/4	3	4	7	24	16	0
Tyngsboro	8/2	1	0	1	7	20	0
Seekonk	8/3	2	11	13	198	0	0
Sharon	8/3	7	30	37	262	15	0

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

Vegetable Notes, Ruth Hazzard, editor and Ben Hunsdorfer, Assistant Editor. *Vegetable Notes* 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.

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