UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

Planting continues with succession crops – cucumbers, beans, brassicas, lettuce, sweet corn, summer squash – and the last of long season crops such as pumpkins and winter squash. Harvest started for early summer squash, zucchini, peas and strawberries, and continues for radishes, beets, lettuce, Chinese cabbage, broccoli and brassica greens. Rain was slight this week and after several days of heat, irrigation is needed in some places. Earliest sweet corn reached first silk. Cutworms are being reported in various locations attacking cucurbits, brassicas, and corn (see article). Potato leafhopper has arrived.

Farmstands are busy and pick-your-own strawberry operations are up and running. In the past two weeks, most Community Supported Agriculture farms (CSA's) have opened their doors to shareholders. For a list of CSA farms in Massachusetts, visit the new section on CSA's on the UMass ExtensionVegetable Program website (www.umass-vegetable.org). More and more of the over 100 farmers markets in the state are opening. The start dates range from the beginning of May to the beginning of July. You can find a complete list of Massachusetts farmers markets including times and dates of operation at the website for the Federation of Massachusetts Farmers Markets:

http://www.massfarmersmarkets.org/markets/allmarkets/allmarkets.htm

TWILIGHT MEETING REMINDER:

WEDNESDAY, JUNE 23

Dumas Farm, Oxford, MA
Wednesday, June 23, 2004
6:00-8:00 p.m. Contact Frank Mangan at
(413)-545-1178 or (978)-422-6374

Joe Dumas is a producer of hydroponic greenhouse tomatoes. We will visit his small but sophisticated operation, which includes a computer-driven fertilizer injection system. Topics being discussed will be pest management strategies and marketing challenges. Also featured on this tour will be blueberries. Joe Dumas has been a blueberry producer for 16 years and runs a pick-your-own operation. We will discuss fertility and pest management strategies. Sonia Schloemann, of the Small Fruit Specialist of the UMass Extension Fruit Program will be on hand to speak specifically about issues related to blueberry maggot. Refreshments will be served at 5-5:30 courtesy of MARS. Pesticide re-certification credits: 1 hour.

DIRECTIONS FROM RI: I-195W toward Rt-79/Providence R.I./Rt..-138/Somerset. Merge onto I-95N toward Boston. Merge onto RI-146N via exit number 23 toward Woonsocket. Take the Central Tpk exit toward Oxford. Turn left onto Central Turnpike. Central Tpk becomes Sutton Ave. Turn right onto Lovett Rd.

FROM SPRINGFIELD: Takeonto I-90East/Massachusetts Turnpike via exit number 7 toward Ludlow/Boston. Take exit 10 toward I-395/Auburn/I-290/Worcester. Bear left after the tolls and then bear right/I-395 (Oxford/Webster). Take the exit 4A Sutton Ave. Take a left onto Lovett Rd.

LOWELL/WORCESTER AREA: I-495 South then I-290W (exit 25B through Worcester. Merge onto I-395S. Merge onto Sutton Ave via exit number 4A towards Sutton. Turn left onto Lovett Rd.

FROM LOVETT RD. At fork, bear left onto Brown Rd. Follow for ½ mile. Farm will be on your left.

TANK MIXING HERBICIDES

Based on a few problems encountered over the last month or so, here are a few suggestions regarding tank mixes. Some labels will list specific tank mixes that are registered. These have generally been tried and proven and the label will list precautions or special instructions that apply. If the label does not specifically preclude a tank mix, the applicator has the option of tank mixing.

Extension recommendations and other publications are not allowed to suggest or recommend these possible mixes. In these cases, it makes sense to try them on a small scale first to see if the pesticides and other additives are compatible and to see if the tank mix causes any crop injury. The proper mixing order of the chemicals is as follows: First fill the spray tank ½ full of water and adjust pH if needed. Start agitation and add chemicals in the following order:

1. Wettable powders go in first and must be mixed thor-

oughly. A slurry can be made and added to the spray tank to help dissolve the powder.

2. Dry Flowables or water-dispersible granules.

3. Water-dispersible liquids.

4. Emulsifiable concentrates.

5. Water-soluble liquids. Agitate well after each addition and before adding the next chemical. Finish filling the spray tank with water.

I agree that it may not always be easy to tell what the formulation is; just ask the dealer or Extension specialist for clarification. A specific case recently involved the use of Sandea, Strategy, and Gramoxone. Sandea is a dry flowable, Strategy is an emulsifiable concentrate, and Gramoxone is a soluble formulation. Based on the above, the proper mixing order for this tank mix is Sandea, Strategy, and then Gramoxone. A surfactant can be added last.

-Rich Bonanno, UMass Extension

PROTECT YOUR HEARING

Farmworkers are often exposed to the loud noises of farm machinery for prolonged periods of time. This can eventually lead to hearing damage. In fact, hearing loss is considered a major occupational health issue for farmers. Prolonged exposure to any noise, from the intensity of a shotgun blast to a properly muffled tractor pulling a baler, can lead to permanent hearing loss.

To give some perspective on sounds and their noise levels, refer to the chart below. Noise that is 85 decibels or greater can affect your hearing if you work around it more than 8 hours a day.

Decibel (Noise) Level / Sound Source

15 /Threshold of hearing

50-60 / Normal conversation, background music

75-80 / Road traffic, vacuum cleaner

80-85 / Average interior of modern tractor cab

90+ / Danger level

90-100 /ATVs, tractors, combines with no soundproof cabs

115-120 / Chain saw, squealing pigs, loud rock music

Ironically, noise-induced hearing loss starts silently. By the time those around you notice you can't hear as well, the damage may be irreversible. There are two actions you can take to avoid damaging your hearing: (1) try to control the sound around you, and (2) reduce your exposure to sounds.

Controlling the Sound Environment
Make sure that machine parts are well lubricated. Repair or replace worn, loose, or unbalanced chains, belts, and other parts. Replace faulty mufflers, using replacements that meet or exceed the manufacturer's recommendations. Whenever possible, use machines that have cabs and keep the cab windows closed.

Reducing Exposure to Sounds
Earmuffs and earplugs block dangerous sounds but still allow you to hear. Whichever form of hearing protection you choose, look for a noise reduction rating of 25 or higher. Also, read the label and be sure to follow the directions for proper use.

How can you tell if the noise you are exposed to is hurting you? You may have a problem if you hear ringing or other noises in your ears, if you cannot hear high-pitched or soft sounds, or if you have difficulty hearing people when they talk to you. If you experience any of these problems, have your hearing tested.

-Adapted from University of California, Davis

ORGANIC CONTROLS FOR POTATO LEAFHOPPER

Last year at Hampshire College we tried some organic insecticides against potato leafhopper (PLH) in our CSA potatoes. Even though these were very preliminary tests (mainly seeking materials for future use in experiments), we found that some products had dramatic effects, especially those with pyrethrins.

We tried PyGanic EC 5.0, Diatect V, and a mixture of Surround + BioNEEM, all compared to unsprayed controls. PyGanic contains pyrethrins (www.pyganic.com) and Diatect is a mixture of pyrethrins and diatomaceous earth (www.diatect.com). Surround is made of kaolin clay (www.surround.engelhard.com) and BioNEEM is derived from the neem tree (www.victorpest.com ; sold also at local garden supply stores).

All sprays were applied with backpack sprayers to 9 small (4 rows x 6m) plots for each insecticide; we had 15 unsprayed control plots, for a total of 42 plots in this experiment. Adult PLH were counted in 10 sweeps with an insect net in each small plot; nymphs were counted by examining 10 compound leaves in each plot.

We just sprayed once, and it was late (20 July) and PLH numbers were already high (on average more than 12 adults and 3 nymphs per plot sample; well above economic thresholds) and all products were used at the highest labeled rates (PyGanic at 18oz/ac, Diatect at 6lbs/ac, Surround at 1/2lb/ac mixed with BioNeem at 3oz/gal).

PyGanic really suppressed PLH, often much more than the other products, though they also showed reductions. In counts on the day after spraying, PyGanic had reduced the

number of adult PLH by 96% compared to unsprayed plots (an average of 11.5 adults per unsprayed plot vs. 0.4 adults in the PyGanic plots), while Diatect reduced adult PLH by 82% and Surround+BioNEEM by 37%.

When we counted PLH nymphs 3 days after spraying, Pyganic and Diatect both showed strong effects, with nymphs reduced by 95% compared to the controls, while Surround+BioNEEM had reduced the nymphs by only 18%.

We counted adults and nymphs again 9 days after spraying, and PyGanic showed the longest lasting effects on PLH adults, with numbers that were still 48% lower than the unsprayed plots. Diatect plots now had essentially the same number of adult PLH as unsprayed plots (1% more actually); Surround+BioNEEM adult PLH numbers were only 11% lower than in unsprayed plots. Nymphs, however were also still almost as low in Diatect plots (39% lower than unsprayed) as in the PyGanic plots (35% lower than unsprayed).

In short, PyGanic had the greatest and longest lasting effects on PLH adults, while PyGanic and Diatect both had similarly large effects on nymphs. Surround and BioNEEM together were a relatively distant third (we would also note that the clay makes Surround more messy to use, at least in small sprayers; even tiny spills evaporate to leave residues that are hard to clean up).

Of course, these products need to be tried at different doses over the whole season (they also differ in cost), but even these preliminary comparisons show that the pyrethrin products can have large effects

-Brian Schulz, Hampshire College, Amherst, MA

POTATO, BEANS: SCOUT FOR POTATO LEAFHOPPER

Potato leafhoppers migrate each year from the South and are now appearing in potatoes and other crops. These pests can cause significant damage – often before many growers realize they have a problem.

Scouting- Now is the time to scout beans and potatoes. Walk out into the crop and brush the leaves with your hand. If you see small white things darting around, you've got potato leafhopper adults. Once you see them, look closely at several leaves. You may see small, elongated light green insects scurrying to hide from you- these are potato leafhopper nymphs. Adults are about 1/4 inch long, light yellow-green, and fly up from foliage when it is disturbed or shaken. They can also be monitored with sweep nets. Nymphs are found on the underside of leaves, light green, wedge-shaped and very fast-moving.

Potato leaf hopper feeding

Damage- 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 interferes with the vascular system of the plant and causes yellowing, browning, and curling of leaves. In potato, leaf margins turn brown and brittle first, followed by death of entire leaves. In beans, the leaf turns mottled brown as if infected with a disease before dying completely. Both adults and nymphs cause damage. Plant injury and yield loss can be significant, especially if leafhoppers arrive when plants are young.

Varietal resistance- Later-maturing potato varieties including Katahdin, Elba, Green Mountain, Kennebec, and Blossom have some resistance, and may tolerate PLH infestations with less yield loss. Yukon Gold, Red Norland, and most other varieties, are very susceptible. Snap bean variety Labrador is expected to be more tolerant

Thresholds- A threshold of 1 adult per sweep of the net, or 1 nymph per 10 leaves, is used to determine if a spray is needed in potato. Check 25 compound leaves throughout the field to determine numbers per leaf. Beans are more susceptible when they are young than at later stages; threshold is one nymph per two trifoliate leaflet during pre-bloom. University of Connecticut has established a threshold of 1.5 leafhopper per leaf in eggplant. Although eggplant is not a favorite host, damage can occur if PLH numbers build up to high levels.

Controls- In potato and snap beans, there are several synthetic pyrethroids, carbamates, and neonicotinoids that are labeled for control of PLH (*See 2004-2005 New England Vegetable Management Guide*).

PLH controls are not often used on organic farms, perhaps because growers don't realize how much yield loss this pest can cause. Pyganic EC, an approved organic pyrethrin product, has been shown to be effective against PLH especially at higher rates (see report above. Two to three sprays of Pyganic, 7-10 days apart, as soon as you find significant numbers of adults in your planting, should halt their damage and prevent a buildup of nymphs.

– R Hazzard, adapted from Brian Caldwell, Farm Education Coordinator , Northeast Organic Farming Association of New York

Cutworms on transplants

We have had numerous reports of cutworm damage in transplants and seedlings of brassicas, cucurbits and other crops. Typical damage includes clipped stems as well as leaf feeding, indicating that these cutworms are climbing up into foliage. If the soil near the plant is searched during the day, one or more cutworms can be found curled up in the soil.

The cutworm is a caterpillar that lives buried in the soil during the day and comes out to feed at night. The moths fly in and lay eggs on plants. Some species arrive very early in the spring, others arrive in the summer or fall and overwinter. In both cases weeds swell the problem because they provide a great egg laying site for the moths. Growers notice the problem in the spring mostly because we have just cleared the fields of most of the food for the cutworms

Black cutworm on soil

(by tilling or plowing) and planted only a small bit to replace it, i.e., our transplants or newly emerged seedlings.

There are many species of cutworms that attack vegetables; the most common in this region are black cutworm (Agrotis ipsilon) and variegated cutworm (Peridroma saucia). Others may include dingy, spotted, dark-sided, or glassy cutworm. Both black and variegated cutworms climb onto foliage. Variegated cutworm has some pale yellow markings on its back, while black cutworm is nearly uniform gray to black with a greasy, rough appearance. Samples coming in to our lab at UMass appear to be black cutworm.

Black cutworm migrates northward annually, with the first moths arriving in early spring. The females deposit eggs in areas such as low, waterlogged or flooded spots in fields, and in sites overgrown with grasses or winter annual weeds. Weeds that are attractive to egg-laying moths include chickweed, shepherd's purse, peppergrass, and mustards such as yellow rocket. Winter wheat and alfalfa are also likely hosts; other cover crops may also be hosts. Eggs hatch in 5-7 days. Small larvae feed on plant leaves, so early cutworm feeding shows up as small irregular holes in the leaves. The larvae feed above ground for about the first quarter of their lives, or until they are approximately half an inch long. Black cutworms do not begin to cut plants until they reach the 4th instar. Larval development takes about a month (28-34 days). Pupation takes place in the soil; the complete life cycle from egg to adult moths requires about 45 days.

Monitoring- Scout weed borders before plantings go in. Check newly transplanted or emerged crops to assess presence and severity of cutworms before the damage is severe. Estimate % stand loss to determine need for a spray.

Adult moths of the black or variegated cutworm can be monitored with bucket traps (the Unitrap or Multipher trap, baited with the appropriate lure, with a vaporstrip to kill moths) placed in fields or weedy areas near the field. This would indicate high levels of moth activity, help predict egg laying, and warn of future problems. Trap sources: Great lakes IPM (800-235-0285) or Gemplers (800-382-8473).

Cultural Management- Weedy land harbors the most cutworms, as the adult moths seem to prefer dense plant cover for egg laying. Crop residues may also attract higher populations. Therefore, crops that follow weedy crops, alfalfa, or no-till crops are more likely to be damaged by cutworms. Plant early transplants into fields that had low weed pressure the previous year, or where crop residue was tilled under in the fall. Plow fields in spring and keep weed free for at least two weeks before planting to starve young larvae and reduce egg-laying. Avoid planting susceptible crops close to sod, alfalfa or fallow areas. Summer plowing or discing disturbs eggs and larvae and raises them to the soil surface where they are more vulnerable to predation and dessication. Plan rotations to avoid row or hill crops following a grassy sod, and plow sod fields in later summer or early fall.

We would all like to know more about the relationship between cover crop systems and cutworms. Outbreaks seems to be unpredictable and it is not clear if they are related to particular cover crops. I would welcome any observations or research information on this topic.

Another suggestion is to plant a thick "trap crop" of sunflower, a favored host, around the perimeter of the field, then find and kill cutworms in this crop.

Biological management- Several predators and parasites have been identified, however none have been commercialized for release against these pests. At Iowa State University, a new virus has been isolated from black cutworm which is highly active and has potential as an alternative to chemical control. Work is ongoing to evaluate this unique strain of baculovirus and the most effective

way to use it in the field. Soil applications of nematodes have been evaluated with mixed success. Daily search and destroy missions -- by hand -- are a time-honored "biological" management for small plantings!

Chemical management- Directed applications (banded or directed to foliage and soil surface) of insecticides will control cutworms. For best results apply in the evening just prior to active feeding. Check New England Vegetable Management Guide for specific materials and follow label instructions for the target crop (crop registrations do vary!).

This is a tough pest for organic growers as no effective broad-spectrum products are available. Strategies such as cardboard or tinfoil collars work but are impractical on a commercial scale. Eric Sideman, technical advisor for Maine Organic Farming and Gardening Association (MOFGA) reports that insecticidal baits have been effective. He recommends a recipe using a very concentrated solution of Bt, mixed with bran and a bit of molasses. It can be sprinkled on the ground near the crops or made into patties that are placed along the rows. Bt sprays (*ie, Bt aizawi or kurstaki*) directed at plant stems and foliage) are another possible control, especially for cutworms that are foliar feeding. Apply the spray in the evening when the cutworm activity is greatest. The main challenge if you have large cutworms is to get them to ingest a big enough dose of BT to stop feeding and die before they destroy the seedling.

--R. Hazzard with input from Brian Caldwel, NOFA-NY, Eric Sideman, MOFGA, & Vern Grnbinge, Univ. of VT Extension

Sweet corn update

European corn borer trap captures are decreasing at some sites, but numbers remain high (see table) . Earliest corn that reaches silk stage in the next week or two should be sprayed on a weekly basis to prevent entry of newly hatched larvae directly into the ear. Pretassel corn scouted this week varied in infestation – some was over threshold, some not. Scout each block as it reaches pre-tassel stage and spray if infestation is >15% of plants. Scout after spraying and spray again in 5-7 days if needed.

For farms with corn reaching silk stage, it's a good idea to get CEW traps up soon. Early scattered flights do occasionally reach the state in late June or July and suprises at harvest time are not fun. And, if the trap is up, you can be more confident in deciding when sprays are NOT needed.

Sources of traps and lures:

--*Great Lakes IPM*
(1-989-268-5693, 1-800-235-0285; www.greatlakesipm.com)
--*Gemplers*
(1-800-382-8473; www.gemplers.com)

Recommended traps and lures:
Corn earworm (CEW): Heliothis Scentry trap (white net trap) baited with Hercon lure for corn earworm (Helicoverpa zea) Place in freshly silking corn with base at ear height.

Europearn corn borer (ECB): Heliothis Scentry trap (white net trap) baited with Trece lure for Ostrinia nubilalis; set up one for ECB I (E strain) and one for ECB II (Z strain). Placed in weeds at field edge with base at weed height.

Town	Date	ECB Z1	ECB E2	TOTAL ECB
Conn. River Valley				
N. Hadley	6/16/04	39	46	85
South Deerfield	6/16/04	2	4	6
Hatfield	6/16/04	114	78	192
Hadley	6/16/04	147	9	156
Eastern MA				
Sharon	6/16/04	78	193	271
Dighton	6/14/04	11	16	27

Brassicas

Flea beetles are still active in brassicas. If you are using row cover, be sure to seal edges after seeding, transplanting or weeding. This week we observed a plot of bok choi that was invaded by flea beetles though a one-foot wide opening where the cover was not fully sealed with soil – just resting on the soil. These beetles are able to detect the presence of plants through the cover, and find a small opening to get inside!

Watch for arrival of caterpillars such as diamondback moth and imported cabbageworm by scouting the underside of leaves to look for feeding damage or caterpillars.

Soil surface temperatures have been very high, high enough to kill any new eggs of cabbage maggot. However, plants infested earlier in the season may now be showing wilt and death as a result of maggot feeding.

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, 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.

-**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).

-**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 withstand 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

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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