



UMASS
EXTENSION



Vegetable Notes

For Vegetable Farmers in Massachusetts

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IN THIS ISSUE:

- Crop Conditions
- Cover Crops for Early Summer
- Possible Low Supplies of Some Pesticides
- Corn Report
- Maximizing Weed Control With Strategy in Pumpkins
- Mexican Bean Beetle Biocontrol
- Spinach Leaf Miner on Chard, Beets, & Spinach
- Conservation Approaches to Agricultural Water Use
- Powdery Mildew Resistance Evolving

CROP CONDITIONS

With danger of frost expected to be over, growers have been setting out their main blocks of frost-sensitive crops such as tomatoes, peppers, eggplant, and squash. The first direct-seeded winter squash and pumpkins emerged this week and are slightly ahead of the striped cucumber beetle, which will very likely show up in larger numbers during the next week. Potato fields are emerging. A steady output of succession-planted crops such as sweet corn, lettuce and greens, cabbage and other Brassicas is filling up more field space. Lush green cover crops are getting plowed under, and will help provide for the fertility needs of many crops. For fields that will be fallow for a few weeks, take advantage of this great growing window to seed summer cover crops and 'grow your own' organic matter and nitrogen.

The harvest list is expanding in all markets and includes scallions, lettuce, fast-growing Brassicas such as pak choi, radishes and salad mix, rhubarb, the first peas, and the latter part of the asparagus harvest. Many asparagus fields have finished. The first strawberry harvest will begin this week, especially for early varieties and fields that have been under row cover. Community Supported Agriculture farms across the state opened their doors to members for their first share distribution in the past week. Traffic at farmers markets and farmstands has been very good.

Dry soils combined with relatively cool temperatures have slowed germination and growth of crops. The dust-bowl nature of fields throughout the state has eased a bit with a very welcome, steady rainfall on June 4 as well as thunderstorms on the last night of May. Because of cool temperatures, insect activity such as the start of European corn borer flight has been slightly delayed compared to last season. However, be prepared for the usual explosion of June insect pests such as Colorado potato beetle and striped cucumber beetle.

COVER CROPS FOR EARLY SUMMER - BUCKWHEAT AND SUDANGRASS

Summer may seem an odd time to use cover crops, because that is the time when the real crops are growing. But summer may be the right opportunity to improve fields with a cover crop. If the soil is wearing out, summer is when a soil-building crop can do a lot more work. Also, if the rotation leaves an opening in the summer, a short cycle cover crop will be much better than leaving the field open, to suffer erosion from rain and have weeds to go to seed. Buckwheat sown in late May or early June can be used before vegetables such as pumpkins, broccoli, late cucumbers. There is another opportunity for summer cover crops after lettuce, peas, early beans, spinach or small grains.

For planting in June, there are really only two choices. One is sudangrass, or sorghum-sudangrass, and the other is buckwheat. Both grow rapidly in the summer warmth.

Making the choice

The two cover crops have different properties, so the management goal and field condition will determine which is the

right one.

Sudangrass is often chosen for improving soil organic matter. It produces a strong root system and lots of biomass. The deep root system is helpful for reducing subsurface hardness. It is also a good choice for reducing root-knot nematode pressure.

Buckwheat is best known for weed suppression and mellowing the soil.

If weed suppression is the main purpose, buckwheat is preferred. It covers the ground earlier than sudangrass, especially in early June, and outcompetes weeds that may establish in sudangrass. Sudangrass requires a higher seeding rate for effective weed suppression.

The amount of time until the fall crop is to be planted is a significant decision factor. Buckwheat is in the ground for 35 to 40 days when used as a cover crop. It can be sown as early as May 20th. Sudangrass needs 60 to 70 days to be effective, and is best planted once June has become thoroughly warm. Both of these cover crops should be mowed after about 40 days. That is the end of the season for buckwheat, but the beginning of major root growth for sudangrass. Sudangrass needs a final flail mowing and immediate incorporation to suppress nematodes.

The condition of the field will determine which crop is suitable. If the soil is hard, or the field is prone to standing water, sudangrass is a good choice, while buckwheat will do poorly. However, if the field is low in nitrogen and phosphorous, buckwheat will do well without additional fertilizer, while sudangrass needs about 40 lb of N to give satisfactory performance.

If the crop to follow needs a fine seedbed, that will be easier to produce after buckwheat. It mellows the soil for easy working, and decomposes quickly after incorporation. Sudangrass crowns take some time to break down, so the following crop needs to be one that can be sown in a somewhat lumpy field.

The main production risks with buckwheat are a failed stand and letting it go to seed. The failed stand usually follows a heavy rain around emergence. It will be obvious two weeks after planting. If the seedlings are not doing well then, till them in and plant again. To avoid volunteer buckwheat seed, kill the crop before there are filled green seeds on the plant. That takes about 40 days from a July planting or 50 days from a June planting.

The main production risk with sudangrass is that the crop gets too big to mow, or to incorporate after frost has killed it. This crop grows very fast, so keep an eye on it. Mow the first time at about 3 feet and the second time while the flail mower can still chop it well. If sudangrass gets too big to control, it will be killed by frost and make a nice winter mulch. However the biofumigant effect will be lost.

Seed sources

Buckwheat is available from some local farm seed retailers. The variety does not matter, and many suppliers don't identify any variety. A short crop in 2006 has raised the seed cost for this season, with prices ranging from \$15 to \$25 per 50 lb bag. A bag is enough to seed an acre.

Sorghum and sorghum-sudangrass are widely available. Varieties suitable for cover crops must be selected carefully. Grain types are inappropriate and some new forage varieties, described as sweet or with brown midrib are low in dhurrin, which is the biofumigant in sudangrass. Piper sudangrass is readily available, and has a similar composition to Trudan 8, the classic sudangrass for biofumigation. Sorghum-sudangrass hybrids are more vigorous, and will produce more biomass than sudangrass, but the seed is also more expensive. Appropriate varieties that are available locally include Sordan 79, Green Grazer and Special Effort. Weed suppression requires 50 lb/ac. -By Thomas Bjorkman, New York State Agricultural Experiment Station, Geneva, New York.

Source: Cover Crop Guide (<http://www.nysaes.cornell.edu/hort/faculty/bjorkman/covercrops/earlysummer.html>)

PREPARE FOR LOW SUPPLY OF SOME PESTICIDES:

Supplies of some pesticides are reported to be low this year for several reasons, including problems at some production plants and increased pesticide use internationally as well as nationally due to increased production and value of corn. It is

prudent to check with distributors now about availability of products you anticipate you will need this season. Consider purchasing products in advance that you know you will need that are in tight supply. Products reportedly in very tight supply include Bravo (and likely other products with chlorothalonil), Dithane (penncozeb), Kumulus (sulfur), Pristine, and Spintor. Those in tight supply include Assail, Captan, Champ (copper), phosphates, and Ranman.

- From the Long Island Fruit & Vegetable update

CORN REPORT

The first significant flight of European corn borer has been captured in a few locations throughout the state this week. Captures in the Pioneer Valley were the highest (Hadley at 14) while the southeastern part of the state was not far behind (Rehoboth at 9). We are just starting the rising curve of emerging adults and egg laying. If warmer weather arrives in the coming



Releasing *Trichogramma* on a rainy day

week – especially with night temperatures above 55 degrees F – moths will become active at night and start laying eggs. Where row cover was just removed, corn that was well protected from ECB will now be very attractive for egg laying. Fields started under plastic will also be very attractive to egg-laying moths because the plants are larger than those in bare ground fields.

Releases of the biological control *Trichogramma ostriniae* were made this week for ECB control. Release rates of 60,000 wasps per acre were used. With cards that hold 30,000 wasps each, this meant placing two cards per acre in corn that was 6-14 inches tall. Although it may seem early to be thinking about ECB control with the lower temperatures and trap counts, using this wasp requires thinking about when eggs are going to be present. If we wait till eggs have hatched, it will be too late. Releasing of the wasps will continue over the next three weeks to ensure that

Location	Z1	EII	Total ECB
Bershires/Champlain Valley	-	-	-
Pittsfield	-	-	-
CT Valley	-	-	-
South Deerfield	1	6	7
Sunderland (1)	-	-	-
Sunderland (2)	0	3	3
Whatley	4	5	9
Hadley (1)	0	14	14
Hadley (2)	0	3	3
Amherst (1)	0	4	4
Amherst (2)	0	0	0
Granby	1	0	1
Easthampton	4	1	5
Nantucket County	-	-	-
Nantucket	0	0	0
Central & Eastern MA	-	-	-
Dracut	-	-	-
Rehoboth	0	9	9
Still River	-	-	-
Concord	-	-	-
Leicester/Spencer	-	-	-
Northbridge	-	-	-
Tyngsboro	-	-	-
Lancaster	0	0	0
NH	-	-	-
Litchfield, NH	-	-	-
Hollis, NH	-	-	-
Mason, NH	-	-	-

timing coincides with the beginning, peak and end of the ECB flight. For more information about *Trichogramma ostrinae* and release protocols call the Vegetable IPM lab at 413-577-3976 or visit our website at www.umassvegetable.org.

It has been interesting to see the changes growers have made to accommodate early markets across the state this year. More growers are using transplants than ever before. Transplants should not be allowed to become pot-bound, as the tap root will not recover. Three weeks seems to be the maximum age for transplanting corn. In some places transplanted, plastic or row-covered corn is over 12 inches tall, while neighboring bare ground fields are just starting to emerge from the soil. Plant growth appears to be extremely variable depending on location. Keep an eye on trap captures over the weekend as they are expected to climb. Be prepared to do a scout within the next two weeks or earlier. With day time temperatures forecasted to be around 90 and nightly temperatures around 65 this weekend, we can expect lots of plant growth as well as insect development. Plants will be better able to take up nutrients as the soil warms up. Better soil moisture will also help with plant growth.

-Amanda Brown and R. Hazzard, UMass Extension

HOW TO MAXIMIZE WEED CONTROL WITH STRATEGY IN PUMPKIN

Weeds, in particular common lambsquarters, were not adequately controlled in some pumpkin fields in 2007. This likely reflects timing of the application of herbicide relative to when the field was prepared for planting and rain or irrigation occurred. Unless the soil is extremely dry, weeds will germinate and start to grow during the time from when the field is prepared until Strategy is activated by water. These weeds will not be controlled by this herbicide. The shorter the time

after applying Strategy, rather than relying on rain, to ensure proper timing and quantity of water (1/2 inch). More water and shallow physical incorporation can result in crop injury, and physical incorporation is not as effective as water. The highest labeled rate for each soil type is recommended especially where weed control was poor in 2007. Also note that residues and cloddy soil conditions may interfere with performance of Strategy. Keep in mind that every soil surface applied herbicide must be adequately activated by water to be effective. Check herbicide labels to see suggested activation requirements for each herbicide.

- Adapted by Rich Bonanno from *Long Island Fruit and Vegetable Update*, Margaret McGrath and Andrew Senesac

MEXICAN BEAN BEETLE: PLAN AHEAD FOR EFFECTIVE BIOLOGICAL CONTROL

Snap beans are hardly planted yet, but it is not too soon to plan for your management of Mexican bean beetles. If they have historically been a problem on your farm, you will very likely see them again this year. They may be pests on snap beans, soybeans, and lima beans. While they are not a pest on every farm, some farms report significant damage from these pests and have to take action to prevent crop loss. Using biological control can replace the need for insecticides.



Pediobius foveolatus adult

from <http://www.state.nj.us/agriculture/divisions/pi/prog/beneficialinsect.html>

Mexican bean beetle (MBB) adults are coppery brown with black spots. They look very much like large ladybeetles and in fact are closely related – but they feed on leaves, not other insects. Adults lay yellow-orange egg masses on the underside of bean leaves. These hatch into bright yellow, spiny oval larvae, which feed, molt several times as they grow, and pupate on the underside of leaves. Feeding damage from adults and larvae can reduce yield and injure pods if numbers are high. There are several generations per season, often increasing in numbers.

Pediobius foveolatus is a commercially available biological control agent for Mexican bean beetle control and has a good track record in the mid-Atlantic states and among New England growers who have tried it. (*Pediobius* is pronounced “pee-dee-OH-bee-us”). It is mass-reared and sold by the New Jersey Dept of Agriculture and is also available from other beneficial insect suppliers. This small (1-3 mm), non-stinging parasitic wasp lays its eggs in

Mexican bean beetle larvae. Wasp larvae feed inside the MBB larva, kill it, and pupate inside it, forming a brownish case or 'mummy'. About twenty five adult wasps emerge from one mummy. Control continues and in fact gets better as the season progresses and successive generations of the wasp emerge and search out new bean beetle larvae. This makes it well suited to our succession-planted snap bean crops. After a release in the first plants, it is advisable to leave that planting intact for a while, until the new generation of wasps has emerged from their mummies.



Photo Courtesy of New England Vegetable Management Guide

As with any biological control, make releases as soon as the pest is present – not after it has built up to damaging numbers. The New Jersey Dept of Agriculture Beneficial Insect Rearing Laboratory recommends two releases, two weeks in a row, coinciding with the beginning of Mexican bean beetle egg hatch. Wasps will lay their eggs in larvae of any size, but it is best to target the newly-hatched young MBB larvae. This will give control before damage has been done. Thus, timing is important. Watch for eggs and time the shipment for the first hatch of eggs into larvae.

The release rate should be at least 2,000 adult wasps per field for less than an acre, or 3,000 per acre for fields of one acre or more. The 2007 cost from NJDA was \$30 plus shipping for 1,000 adults, or \$15 for 20 mummies (pupal parasites inside dead MBB larvae) from which about 500 adults will emerge (call for current prices). Order adults if you already have MBB larvae in the field. Ship for overnight delivery. Instructions for handling and release will come with the wasps.

Wasps reproduce in the field and will still be around when the second generation of MBB hatches out. Thus, it should not be necessary to make more than two releases. Like beans, *Pediobius* wasps are killed by frost.

Contact information for New Jersey source: Tom Dorsey, 609-530-4192; address; NJDA, Phillip Alampi Insect Lab, State Police Drive, W. Trenton, NJ 08628. You'll also get advice on how to use the wasps from this office (website:<http://www.state.nj.us/agriculture/divisions/pi/prog/beneficialinsect.html>).

Pediobius is also available from the following suppliers: Green Spot Ltd., NH., www.greenmethods.com 603-942-8925; IPM Laboratories, NY 315-497-2063; ARBICO, 800 -827-2847 (AZ), <http://www.arbico.com/>; Network (TN), 615-370-4301, <http://www.biconet.com/>; Rincon Vitova (CA), 800-248-2847, <http://www.rinconvitova.com/>.

--R. Hazzard

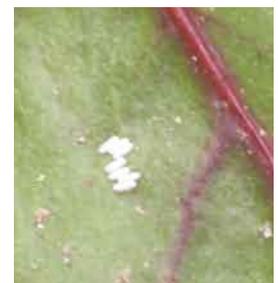
SPINACH LEAF MINER ON CHARD, BEETS OR SPINACH



Spinach Leaf Miner Damage

Spinach leafminer is a fly larva that burrows between the layers of a leaf eating everything but the epidermis. Early damage is a slender, winding 'mine,' a tunnel, but later these expand and become blotches on the leaves. Inside the mine is a pale, white maggot.

The fly overwinters as pupae in the soil and hatches in late April and May. The adult fly then lays eggs on the leaves and the resulting larvae begin their damage. The oblong white eggs, less than 1 mm long, are laid in neat clusters on the underside of the leaves. They are easy to spot if you scout by looking under the leaves. The maggots may migrate from leaf to leaf down a row. They become fully grown in just a few weeks and drop into the soil to pupate. The entire life cycle is 30-40 days. There are three to four generations per



Spinach Leaf Miner



Spinach Leaf Miner Adult

season. Typically mid-late May, late June and mid August are peak activity periods.

In most seasons the damage is minimal and the plants will out grow it leaving only early leaves with cosmetic damage. In other years, or other fields in the same year, the damage may be great and if the plants are hit early and growth is slow because of weather conditions, the loss may be great. Treat when eggs or first tiny mines are noticed. See the New England Vegetable Management Guide for products; there are both conventional and organic products available. An adjuvant is recommended to improve efficacy.

The spinach leaf miner also feeds on beets, chard and many weeds including chickweed, lamb's quarters and nightshade. Weed control and crop rotation are the first line of defense. Row covers can also be used to exclude flies if placed over the crop before flies are active or immediately after planting. "Spinach" and "beet" leafminers are very similar species in behavior, appearance, and damage.

-Adapted by R Hazzard from Eric Sidemann, Maine Organic Farmers and Gardeners Association

CONSERVATION APPROACHES TO AGRICULTURAL WATER USE

As producers throughout the nation grow increasingly concerned about water scarcity, farmers, ranchers and agricultural educators are beginning to explore new, conservation-oriented approaches to water use. They are managing soil to improve filtration, selecting drought-tolerant crops and native forages, and designing innovative runoff collection systems. "Smart Water Use on Your Farm or Ranch," a new 16-page bulletin from the Sustainable Agriculture Network, spotlights innovative, SARE-funded research into a range of conservation options including soil management, such as using compost, conservation tillage and cover crops; plant management, featuring crop rotation, water conserving plants and rangeland drought mitigation; and water management strategies such as low-volume irrigation and water recycling.

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CONTROL OF POWDERY MILDEW CHALLENGED BY EVOLVING PATHOGEN: START WITH RESISTANT VARIETIES WHERE POSSIBLE

Additional evidence was obtained in 2007 of pathogen adaptation to fungicides and also to resistant varieties, the main management tools for cucurbit powdery mildew. Fungicide resistance development has been a major concern with powdery mildew for the past few years. This pathogen has clearly shown ability to develop resistance. Control failure with Benlate, Bayleton, and QoI (strobilurin) fungicides was detected in university fungicide evaluations just 1, 2, and 3 years after these were registered in the US. Several fungicides are labeled for powdery mildew control, but due to resistance, Procure (FRAC code 3) and Pristine (FRAC codes 11 + 7) were the main fungicides recommended in 2007, with Quintec (FRAC code 13) recommended for melons only. Remember that the FRAC code indicates a chemical group with similar mode of action. Products in the same FRAC group are likely to exhibit very similar levels of resistance, and should not be used repeatedly.

Products are losing effectiveness. In 2007, there was great concern that the powdery mildew fungus might evolve further and render FRAC code 3 and 7 fungicides ineffective. Procure and Pristine were effective in some university fungicide

evaluations in 2007, but, they were not always as effective as Quintec; also control was variable in some other experiments and commercial fields. Fungicide efficacy experiments conducted at LIHREC have included sole use of fungicides at risk for resistance to assess their contribution to fungicide programs (this is not a labeled use pattern). Control of powdery mildew on lower surfaces of pumpkin leaves with weekly spray intervals was 46%, 88%, and 52-58% with Pristine (14.5-18.5 oz/A) in 2005, 2006, and 2007, respectively. Control was 93%, 34%, and 75-78% with Procure (6-8 fl oz/A) in these years and 88% and 81% with Quintec in 2006 and 2007, respectively. Fungicide monitoring work in 2007 revealed the pathogen population was less sensitive to the active ingredients in Procure and Pristine than in Quintec.

Plant resistance. While attention has been focused on fungicide resistance, powdery mildew may also evolve to overcome host plant resistance. In 2007, there were indications the pathogen had evolved to overcome host plant resistance in melons and squashes. Cantaloupe varieties with resistance to race 1 and 2 of the pathogen have been providing excellent suppression of powdery mildew, plus with good horticultural characteristics, some are in widespread production. However, there were reports of powdery mildew becoming severe on these varieties in some states in 2007. Additionally, squash (*Cucurbita pepo*) varieties with one gene for resistance were more severely affected by powdery mildew than varieties with two resistance genes, in contrast with previous years. This difference in performance had been previously detected in pumpkin (also *C. pepo*). All squash and pumpkin varieties marketed to date have one common main gene for resistance. Hollar Seeds recently announced a new gene.

What you can do now. In 2008, fungicide resistance continues to be a concern. Growing resistant varieties remains an important tool. There are many squash and pumpkin varieties with powdery mildew resistance. Select squash and pumpkin varieties with resistance from both parents when possible. Cantaloupe varieties should have resistance to races 1 and 2. Both summer squash and zucchini have some resistant varieties, and these will be especially important for later plantings. (A good list of resistant varieties can be found online at <http://vegetablemdonline.ppath.cornell.edu/Tables/TableList.htm>) Even if these varieties do not provide complete control, they have been shown to provide the same level of control with longer spray intervals, compared to non-resistant varieties.

While plant resistance is not the whole answer and the pathogen may be overcoming resistance in some instances, this is a tool that you can use right now. The recommended program for managing powdery mildew will involve scouting, rotating among fungicides in different FRAC groups, and other practices. More details on fungicide use will follow, in later issues of Vegetable Notes.

-Adapted by Ruth Hazzard from Margaret Tuttle McGrath, Cornell, Long Island Hort & Research & Extension Center;

VEGETABLE NOTES WOULD LIKE TO THANK THE FOLLOWING COMPANIES FOR THEIR SPONSORSHIP:



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