UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 15, Number 7 June 10, 2004

CROP CONDITIONS

The New England Crop Weather report (http://www.nass.usda.gov/weather/cpcurr/new-eng-crop-weather) of Monday June 6 noted that "hot, dry conditions are needed to aid in crop growth and development" For once, growers got what they needed – albeit very hot and very dry! No problem this week with getting cultivated weeds to dry out and die. By late Wednesday after two days in the nineties, irrigation was needed on dry knolls and on greens and other crops that are sensitive to dry conditions. A welcome rain arrived throughout the state during the night of June 9.
Most crops are growing well. Direct-seeded vine crops are emerging and growing. Transplants that have been in the ground for several weeks are taking off. Newly-set warm-season transplants are adjusting to the field and starting to grow. Earliest field lettuce and greens harvests have begun. Asparagus harvest is nearly done. The very earliest sweet corn started to push some fresh silk – but most early corn is just reaching pretassel stage. European corn borer larval hatch has begun (see sweet corn report). Colorado potato beetles were busy laying eggs this week, though no hatch was noted in early potatoes checked on Tuesday. Cucumber beetles were active in some fields, but had not appeared yet in others. Hot soil surface temperatures (well over 100 degrees F) will kill maggot eggs and eliminate the need for sprays for maggots on newly set brassica transplants.

-Ruth Hazzard

OKRA (*Abelmoschus esculentus*)

This is another in a series of articles this season on crops that the UMass Vegetable Team has evaluated in recent years for the growing ethnic populations in Massachusetts and the region. Information on growing okra along with many other crops is available at www.world-crops.org.

A variety of okra from Brazil for sale at Allandale Farm, Brookline, Mass. (Photo: Frank Mangan)

Okra was cultivated by the Egyptians in the 12th century A.D. and arrived in the US in the 18th century with the slave trade. The immature pods are used in soups, stir fries, and stews. The mucilage in okra acts as a thickening agent in soups, such as gumbo, and condiments such as ketchup. Okra does best in warm weather and will die with frost. Flowering will occur as soon as 45 days after seeding seeding, depending on the variety, and pods are ready for harvest 4 to 5 days after flowering. As pod size increases, tenderness decreases. Most varieties will lose their desired tenderness when they exceed 3 inches in length. For this reason okra plantings must be picked almost every other day. Most varieties have hairs on all parts of the plant that can cause skin irritation, so gloves and long sleeves are recommended for harvest.

An okra pod and flower at Allandale Farm, Brookline, Mass. (Photo: Frank Mangan)

In Brazil, where okra is extremely popular, the dominant variety is a longer, smooth type (see photo) as opposed to the shorter, ridged type that predominates in the US. The Brazilian varieties have a higher content of mucilage, which is highly desired by the market there.
Okra has a high respiration rate and is very sensitive to bruising and rapid desiccation, making wholesale marketing difficult. Okra should be cooled to 50 degrees Fahrenheit after harvest to maintain quality. Plant populations range from 7,000 plants per acre to 15,000, depending on the variety.

-Frank Mangan, Dept. of Plant and Soil Sciences, University of Massachusetts

SPINACH LEAF MINER

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

Spinach leaf miner is the larvae of a fly that burrows between the layers of a leaf eating everything but the epidermis. Early damage is a slender, winding mine but later these expand and become blotches on the leaves (see photo). 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 season. Typically mid-late May, late June and mid August are peak activity periods.

Spinach leaf miner fly and larval damage

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 the growing is slow because of weather conditions, the loss may be great. If you catch it early enough and you think the crop is worth it, spinosad (Spintor 2SC, liquid, or Entrust dry, certified organic; both 1DH) is labeled for spinach leaf miner on beets, swish chard, and spinach. 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. "Spinach" and "beet" leafminers are very similar species in behavior, appearance, and damage.

Spinach leaf miner maggot and damage (epidermis peeled away)

WHAT YOU CAN BARELY SEE MIGHT SUPRISE YOU: SPRINGTAILS

Have you every heard of garden springtails? Have you ever wondered what the tiny, hopping insects you see on early seedlings are – and if they are a pest? This past week we've found two fields – at opposite ends of the state – where these tiny, primitive insects are causing a bit of trouble. Garden springtails need high moisture in order to survive, which may explain their abundance this year. It also may explain why they moved into the base of moist, ready-to-harvest lettuce heads, where they did very little feeding damage but dismayed the customers – and the grower.

Springtails feed mostly on dead plant tissue and on fungi, usually underground. They are common everywhere. Rarely, they cause injury to young seedlings in the form of small holes that resemble flea beetle feeding. Only if numbers are very high is this more than cosmetic. We found them feeding on butternut cotyledons.

Springtails are generally less than 1/8 inch long and are gray or brown in color. There are two body types: 'globular' (round) and 'elongated'. They may be distinguished from other tiny insects by a projection or "tail" that they lock under their abdomen and release to "spring." For an insect that does not have wings, this springing motion is a boon to survival.

Soil high in organic matter is reported to support high numbers of springtails. Because they also feed on plant pathogenetic fungi, springtails can also serve a beneficial role is suppressing fungi that affect plant roots.

-Ruth Hazzard

SUMMER COVER CROPS

I know this is not the usual time to be thinking about cover crops, but it should be any time of the year you have bare ground for an extended period of time. This could be land that you were not able to put a cover crop on last fall or land that might be coming out of production with spring crops like lettuce. If you do not plan on double cropping you should think about putting down a cover crop. Many growers are in the habit of leaving fallow land until September when they will seed it with winter rye. Seeding a cover crop now will produce lots of organic matter; add soil nitrogen (if you use a legume) and help to keep weeds from going to seed.

Here are some options:

Oat - This is a very useful cover crop for us in Massachusetts. Unlike winter rye, oat will grow very vigorously and straight up when seeded in the spring or summer. We frequently seed this cover crop during the summer months at the Research Farm in S. Deerfield on land that is not in production. It is readily available, but beware that you do not get oats that have been cooked (used for animal feed). Oat seeded this early will probably produce viable seed before frost. For this reason you might want to incorporate it (or simply mow it) before it goes to seed. Seeding rate is 100 lbs/acre.

Sorghum x sudangrass - As the name implies this cover crop is a cross between sudangrass and forage sorghum. Different companies use different trade names ('sudex' being one). One nice characteristic of this cover crop is that it produces a sterile seed so there is no concern of it re-seeding. This plant is frost sensitive, so it can be seeded any time now. If you have land that you are trying to 'build up' this is a good choice since it produces a tremendous amount of organic matter. When seeded in mid June it can get eight feet high by the fall. We did some work at the UMass Research Farm demonstrating that the addition of a small amount of nitrogen at planting can produce a much bigger plant. I would not apply more than 50 lbs/acre. Sorghum X sudangrass does not grow well at low pH. Do not plant after July since it will die with a frost and not grow enough to justify the cost of the seed. There has been some concern about how to manage sorghum x sundangrass in the fall. My experience with this cover crop was that it was not difficult to manage, however you may want to seed a little of it the first time in order to get some experience with it. It will die with a hard frost. You can either leave it until the following spring or incorporate it after a frost and seed rye. After a hard frost I let the plant residue dry down and then mowed it with a brush hog and then disked it in to seed winter rye Seeding rate: 40 - 50 lbs/acre.

Hairy Vetch - Hairy vetch is a cover crop that is being used by a lot of growers in the late summer and fall. This crop can also be planted in the spring and early summer and will do well. When vetch is seeded this early it will not usually survive the winter (whereas it will survive the winter when seeded in late August or September). The following spring the nitrogen from the dead vetch will become available, so this is when we want the cash crop in the ground to be able to take up the available nitrogen. It can be seeded alone or in combination with oat. Seeding rates: 25-30 lbs/acre (using a grain drill); 35-40 lbs/acre (broadcast); 40 lbs/acre of oat when seeded with vetch.

Buckwheat - This is another cover crop that growers will seed in the summer months. It is frost sensitive so it can be planted any time now. It is used by some growers to suppress weeds since it grows very quickly, however it will not add much organic matter. Be sure to mow or incorporate before it goes to seed. Seeding rates: 60 - 70 lbs/acre.

All of the cover crops mentioned above will perform much better if they are seeded with a grain drill. The grain drill we use in S. Deerfield is at least 50 years old (it was designed to be pulled by a horse!). It is extremely accurate and easy to use. I'm told that old grain drills like this one are easy to find at auctions around the area. Keep an eye out for them- they are well worth it.

-Frank Mangan, Dept. of Plant and Soil Sciences, University of Massachusetts

Cucurbits

Vine crops are growing well. This week's heat encouraged many new seedlings to pop up – butternut, pumpkin, cucumber, various winter squashes. Zucchini and summer squash are growing well. Striped cucumber beetle is very active in some fields and is taking its time to show up in others. Be sure to scout your vine crops this week, because the week of June 10-17 is, historically, prime time for the arrival of cucumber beetles, and they can show up seemingly overnight.

Perimeter trap crops update: blue hubbard squash, planted as a perimeter trap crop around butternut, invariably comes up as fast or faster than butternut, with large and vigorous cotlydons and first leaves. This is ideal for a trap crop – to have it up and growing, and bigger in size than the main crop. Where beetles are active in trap cropped fields, we are seeing very high numbers in the borders and low numbers in the main crop. Some growers are testing an Admire treatment in the border only. This would be a significant

Blue Hubbard squash- two row perimeter trap crop to lure cucumber beetles away from a butternut squash field

cost savings compared to full field treatments. (see photo)

-Ruth Hazzard

POTATOES AND EGGPLANTS

Colorado potato beetle eggs have been piling up this week in potato and eggplant, as warm temperatures pushed adults to mate, feed and lay eggs at a steady pace. Eggs hatch within 5 to 12 days, depending upon temperatures. At 60 degrees F (constant temperature.) eggs hatch in 12 days; while at 75 degrees F, hatch occurs in just 5 days. Of course, the average daily field temperatures vary widely from day to day; these numbers simply give you a ballpark estimate of when to expect eggs to hatch under the range of temperatures we see in New England in June.

All insecticides are most effective on very young larvae. Eggs and pupae are not susceptible to chemical control and adults can be difficult to control. Targeting application toward young larvae helps prevent damaging populations and allows resistant adult beetles to mate with susceptible beetles keeping selection pressure for insecticides resistance low. If sprays are targeted against overwintering adults, the only survivors will be resistant individuals. When resistant individuals mate, their offspring are resistant thus fixing the resistance gene in the population. Once resistance has become fixed in a population, reversion to susceptibility occurs only after many generations of non-exposure and may never revert to pre-exposure levels

CPB is the king (queen?) of insecticide resistance. This beetle has developed resistance to every insecticide that has been used to control it. The neo-nicotinoids (imidacloprid -- Admire, Provado; and thimethoxam -- Platinum, Actara) are no exception. In western Mass where Admire was used every year in non-rotated fields, resistance levels are at 300 times the original susceptible populations. But resistance is not limited to the CT Valley; it is being reported in other parts of the state as well. Platinum works well for now, but since this is the same class of insecticides, resistance is sure to come soon. Try to use other chemistries wherever possible! Spintor and Entrust work against both adults and larvae. Novodor (Bt) will be very effective when used against young larvae up to the third instar. UMass studies showed that Bt alone can be used for effective control when timed carefully. Given the level of resistance, its worth making the effort to rotate materials. Foliar materials are best applied between 15 and 30% egg hatch for optimum control.

A second foliar application may be necessary if egg laying continues over an extended period. You can predict 15-30% egg hatch by flagging egg masses in the field and checking them daily. Alternatively, insecticide application could begin when egg hatch has occurred on 5-10% of the plants. Waiting to spray until beetles are in the late 3rd and early 4th instar is not a wise strategy. Large larvae are difficult to control and since the 4th instar larvae are responsible as much as 75% of the feeding damage, earlier treatment is usually necessary to prevent economic damage. Determining if a beetle population is large enough to treat is not easy. Potatoes can tolerate up to 30% defoliation prior to flowering but only 10% defoliation at the onset of tuber initiation. Failure to control the first generation larvae may translate into large numbers of summer adults that emerge and feed during the critical tuber initiation and tuber bulking stage.

-Adapted from D. Ragsdale and E. Radcliffe, Department of Entomology, University of Minnesota. See June 3 issue for more on scouting and thresholds.

TOMATOES AND PEPPERS

Bacterial canker and speck can be problems on tomato foliage and fruit in wet seasons. Bacterial spot can affect both tomatoes and peppers. Canker is systemic in the plant causing curling and marginal leaf burn. Speck and spot cause small black, slightly raised lesions on foliage. If you have had a history of bacterial disease on your farm, it can make a difference to apply copper plus mancozeb (tomatoes) or copper plus maneb (peppers) within a week or two after transplanting. If you observe the disease in your plantings, a weekly application is recommended. Are you not sure if what you see is a bacterial disease? Contact Rob Wick at the UMass Disease Diagnostic Lab, 413-545-1045.

In Massachusetts tomatoes, bacterial canker has been the most common bacterial disease, but we have observed all of these diseases on Massachusetts farms in past years. Cultural practices also make a difference: don't prune or handle the plants when they're wet to avoid spreading disease. We've seen it spread down a row, presumably during pruning or tying. It's also spread by wind-blown rain, and by airblast sprayers.

-- adapted by R Hazzard from OWYS Weekly Vegetable Update, Cornell Cooperative Extension, 6/09/2004, C.R. MacNeil & Julie Kikkert

PRE-SIDEDRESS NITRATE TEST: NOW IS THE TIME FOR SAMPLING

Many crops have reached or will soon reach the stage when it's time to decide whether, and how much nitrogen to apply as a side dress or top dress. You may be wondering how much nitrogen has been leached by the heavy rains of recent weeks. The pre-sidedress nitrate test (PSNT) (also known as the June Nitrate Test) can help you to determine the current level of nitrogen in the soil. If you have a soil probe, the sampling takes about 20 minutes per field. (Probes are available from many ag suppliers for $40 to $75.) The amount of nitrate-N (reported as parts per mil-

lion N03-N) in the soil is a good indicator of whether more N will be needed to complete crop growth.

To take a sample for nitrate testing, take 15 to 20 subsamples or cores from the field. Sample slices or cores should be taken to a depth of twelve inches if possible. Avoid sampling fertilizer bands or other areas, which have high concentrations of N fertilizer. Generally the best place to sample is between the rows. If plastic mulch is used, samples should be taken from under the plastic. With a soil probe you can just sample through the plastic, leaving small holes that cause no problem. Be sure to avoid any trickle irrigation tape under the plastic. Mix all the samples together and submit about one cupful to the UMass Soil Testing Lab, West Experiment Station, University of Massachusetts, Amherst MA 01003. You may contact the soil testing lab 413- 545-2311 or consult their website at http://www.umass.edu/plsoils/soiltest

Cloth bags are ideal for sending PSNT samples to the Soil Testing Laboratory. These bags are more convenient to use because it is not necessary to dry the samples, as long as the laboratory receives them within four days. With plastic bags you should dry the samples unless you can deliver them within 24 hours. The lab will do the PSNT within one working day of receipt and inform you of the results. The charge for this test is $6.00 (include a check made out to the University of Massachusetts). Be sure to request a Nitrate (PSNT) test. Frank Mangan (978-422-6374) and John Howell (413-259-1203) are available to consult with growers about the test results.

The PSNT is a tool growers can use to optimize N application. Research conducted for several years at UMass, along with several years of on-farm experience, indicates that an appropriate threshold for peppers and winter squash is about 30 ppm nitrate-N. Above this level, sidedressing or topdressing supplemental N would be of no value and will likely decrease yield of butternut squash and peppers. Research in Connecticut has shown similar results in pumpkins. There is increasing agreement that a threshold of 30 ppm is appropriate for most vegetables except for sweet corn, for which the threshold is 25 ppm. Using the PSNT can save money and time, improve crop yield, and reduce the likelihood of N leaching and water contamination. Barring unusual weather conditions, PSNT levels in a field tend to be fairly consistent from year to year. Once these values are known for a field, a grower probably does not need to test every year. As a tool, the PSNT should be used along with a grower's experience and knowledge of fields. Interpretation of PSNT results should be made with regard to weather conditions such as leaching rains or soil temperatures.

-John Howell, Frank Mangan, and Ruth Hazzard, University of Massachusetts

SWEET CORN UPDATES

European corn borer flights are increasing. Weekly moth captures were 144 moths (98 E II, 48 Z I) in Hadley and 20 moths/week at the South Deerfield Research Farm. Female moths are laying eggs, and egg hatch has begun in early corn. We have found small borer larvae in emerging tassels this week, and can expect hatching to increase in the coming week.

For anyone who has corn entering the silk stage this week, sprays are recommended to prevent entry of those newly hatched larvae directly into the ear. You might not see the damage in the tassel, because tassel growth occurred before egg hatch. So, do not wait to see damage in the tassels, for that may be too late! We did see some silk in the earliest corn plantings on June 9, which is unusually early but not surprising given the hot weather this week. Corn under floating row cover is protected from ECB, but once the cover is removed, this corn will be highly attractive for egg laying. Corn started under plastic is highly susceptible to ECB invasion in the silk stage. Aim to control newly hatched ECB larvae before they enter the young ears.

For corn just reaching pretassel stage, sprays should begin based on scouting for young larvae in the emerging tassel. Bare ground fields should be first scouted for ECB larvae at early tassel emergence. Sprays applied earlier (whorl stage) don't result in improved control when compared with one or two well-timed applications at tassel emergence.

Small European corn borer larva on an emerging sweet corn tassel

The ideal time to spray is just as tassels poke up out of the whorl. Larvae feeding in the whorl are protected from insecticide applications and mortality will not be as high as at tassel emergence, when larvae feeding in the emerging tassel are exposed to the spray. Larvae will leave the tassel as it opens up and no longer provides a moist, protected feeding environment, and move down the plant looking for protected places to feed. Insecticide applications need to be timed to kill larvae before they bore into a new feeding location

Scouting for European corn borer on emerging tassel

where they will be again protected from sprays. In fields with uneven development or where pressure is heavy, two applications may be necessary, one when approximately 25-50% if the tassels have emerged, and again 5-7 days later or after 75-100% of the tassels have emerged, if the field is still over threshold.

The threshold for ECB at tassel emergence is 15% infested plants. To scout, pull out the emerging tassels to look for tiny black-headed white larvae or frass (white to brown material about the size of fine sand). Or, pull back the leaves to search tassels. Before any insecticides have been applied, scouting is fast and easy because any sign of feeding is an almost sure sign of live larvae, so it's not necessary to spend time finding the larvae. After the initial insecticide application, feeding damage may be from a larva that has already been killed, so finding the critter is more important for an accurate estimate of the number of infested plants.

We have seen evidence of armyworms feeding in whorl corn. The signs are ragged feeding holes and frass pellets the texture of coarse sawdust. Damage can appear more serious than it is – it tends to be isolated to patches, and occur early enough that larvae leave the whorl to pupate in the soil before any tassels or ears develop. Use a threshold of 15-30% infestation at the whorl stage.

Organic sweet corn: Use Bt (Dipel DF) or spinosad (Entrust) if corn if over threshold. We are seeing more use of transplants, which provide a means to get an even stand of early sweet corn that is easier to keep weed-free.

Trichogramma are small parasitic wasps that lay their eggs in the egg masses of host insects. Trichogramma larvae feed and pupate inside the egg, killing the egg and preventing hatch. *Trichogramma ostriniae* lays its eggs in ECB egg masses, and is the species that has shown the highest level of ECB control in field trials. It can reduce ECB larval infestations low enough to avoid the need for sprays. While not available commercially in 2004 it is expected to become available in upcoming seasons. A closely related species, *Trichogramma brassicae*, is commercially available and will also suppress ECB. Since Trichogramma control ECB by parasitizing egg masses, they should be released just as ECB moths start to lay eggs, when the corn is in the 4-6 leaf stage. For *Trichogramma brassicae*, three to six releases every 7 days throughout ECB oviposition for a total release of 300,000 per hectare (~121,000/acre) are

Early organic transplanted corn

recommended. This total release is achieved by distributing 50 cards containing 6,000 parasitized eggs each evenly throughout the field. Consult your supplier for more details. A list of U.S. beneficial suppliers can be found at: http://www.ecolivingcenter.com/board/garden/messages/57.html

Two sources of beneficial insects are:

-Beneficial Insectary
14751 Oak Run Road
Oak Run, CA. 96069
(800) 477-3715 (916) 472-3715 FAX: (916) 472-3523

-IPM Laboratories, Inc.
Main Street
Locke, New York 13092-0300
(315) 497-2063 FAX: (315) 497-3129
www.ipmlabs.com

--R Hazzard, Pam Westgate, & Amanda Duphily; with resource information from A. Seamann and J Mishanec, Cornell Cooperative Extension.

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. Author and photographer is R. Hazzard if none is cited.

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