UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

Crops that do well in cool temperatures – lettuce, brassicas, sweet corn, potato – have been growing well this past week. Potatoes are all planted and Labor Day sweet corn is in the ground. The earliest plastic corn has emerging tassels. Soil moisture is good and crop emergence is steady. For warm-weather transplants, the cold nights and drying winds have been harsh. Temperatures were in the high thirties over the weekend, in Massachusetts; it seems that frosts were limited to areas north of Mass. The drying winds of last weekend made some tender transplants – whether tomato, cucurbit, eggplant or pepper – look 'burned' with dry sections on tips and margins and some injury to stems. Stems can also be whipped and cut by winds. Mostly, these transplants have been toughing it out, not growing much, but surviving until warm weather comes.

First flight of European corn borer has started in the CT River Valley. At the South Deerfield Farm, 22 moths were captured this week (18 E, 4 Z).

LIGHTNING SAFETY

We've had interesting weather the last few weeks with plenty of thunder and lightning! It's our turn: lightning strikes the earth about 8 million times a day. But it is nothing to mess with: lightning is the leading cause of weather related deaths, causing more deaths and injuries than hurricanes, tornadoes and floods. Here are a few reminders about lightning safety.

-Plan Ahead!

- If thunderstorms are predicted in your area, don't be caught where you can't take shelter on short notice.
- Watch for signs of rapid thunderstorm growth. Cut clouds don't have to be directly overhead for lightning to strike, it can arc out from the thunderstorm.
- If it will take a while to reach shelter – give yourself time to reach the safe place before lightning is an immediate threat.

-Don't be the Tallest Object!

- Don't stand in an open area such as a crop field or golf course.
- Don't ride in open vehicles (such as ATVs, open tractors, etc.) or on horseback.
- If caught outdoors, don't lie flat on the ground. If you feel your hair stand on end, lightning may be about to strike; crouch on the balls of your feet with your head down (create as little surface area as possible).

-Avoid Dangerous Lightning Situations!

- Stay away from trees, poles, and other isolated tall objects
- Avoid operating agricultural equipment, especially tillage implements.
- Stay in your car or tractor cab. Cars and enclosed tractor cabs are excellent lightning shelters as long as you don't touch the metal frame. Lightning will flash around the vehicle; it is a myth that rubber tires have anything to do with the safety of a vehicle.
- Go inside a sturdy building or in the enclosed cab of a vehicle that has a solid metal top. Do not be in contact with any metal on the building or vehicle.
- Don't touch anything that could conduct electricity. Stay off the telephone and out of the bathtub/shower (electricity can travel through wires and plumbing). Stay away from wire fences and water (these can transmit current from a distant lightning strike)

-How Far Away is it? To determine the number of miles between your location and a lightning strike, count the number of seconds between the lightning flash and the sound of thunder and divide by five (sound travels one mile in five seconds). For example: you hear thunder 10 seconds after you see lightning, divide 10 by 5 to determine that the lightning strike was 2 miles from your location. Keep in mind, though, that the average distance from one flash to the next in the same storm may be two or three miles – 10 to 15 seconds flash-to-bang.

-Adapted by Craig Hollingsworth

MANAGING COLORADO POTATO BEETLE

Colorado potato beetles (CPB) are moving into potato fields and will soon be laying eggs. Adult beetles overwinter in the fields where the larvae completed development in the fall, or in the undisturbed habitats adjacent to these fields, generally in the soils below tree foliage up to a

Colorado Potato Beetle

depth of 12 inches below the soil surface. The leaf litter and snow provide insulation from freezing. In mid to late spring the beetles develop their reproductive systems and flight muscles prior to migrating to crop plants. If beetles do not find host plants via walking they will engage in migratory flight. Once host plants are found they begin to feed and lay eggs. The beetles will have mated the previous fall or late summer; hence they have no need to mate in the spring to produce viable eggs.

The single most important tactic for CPB management is to rotate field to be planted at least 100 yards from previous year's fields—rotated fields are colonized later in the season and at lower densities of adult beetles, producing fewer larvae to control, and makes summer generation beetles emerge after the induction of diapause (after August 1st), hence fewer summer generation larvae to control.

If the field to be planted can not be rotated away from the previous year's field it may be possible to plant a row of potatoes treated with a systemic insecticide (for example, Admire) between overwintering sites and fields to be planted to potato, tomato, or eggplant; this trap crop will kill many of the colonizing beetles. The larvae can then be controlled using a Bacillus thuringiensis-based insecticide (such as Novodor-Cry3Atoxin). This approach will reduce beetle exposure and resistance development to Admire.

-**Scouting:** Walk your fields and look for CPB adults and eggs. Except for field edges in non-rotated fields, adult beetles do not usually cause enough direct damage to early potatoes to require control. The economic threshold for adult beetles in potato is 1 beetle per 2 plants (or per 2 stalks, in midseason). Look on the undersides of leaves for the orange-yellow egg masses. The fresher the eggs, the brighter orange the eggs will appear. If you want to know when the earliest eggs are hatching, you can flag the earliest egg masses you find with bright tape or flags, and then keep an eye on the hatch. Hatched larvae go through four stages before they become adults. In the first stage, the larvae are about the same size as the eggs and second stage, they are about an eighth of an inch long. As the larvae get bigger, they do more feeding. The fourth, or largest, stage does 85% of the feeding damage.

-**Spray timing and thresholds:** If you are using Bt's (Novodor), you want to make the first application when 20-30% of the eggs have hatched. If you are using spinosad (Spintor 2SC or Entrust, the organic formulation) or a broad-spectrum insecticide, you can wait till more larvae (grubs) are hatched, when the oldest larvae reach the beginning of the fourth stage (instar), when they are about 1/3 inch long. Applications made at this time with Spintor, Provado, AgriMek, or synthetic pyrethroids will kill all the larvae that have hatched up to this point. The threshold for small larvae is 4 per plant; for large larvae, 1.5 per plant (or per stalk in midseason), based on a count of 50 plants or stalks.

Colorado potato beetles rapidly develop resistance to insecticides. This happens on a field by field basis, which means that you have control over how resistant "your" beetles become to any given product. Management strategies for CPB should use crop rotation and alternate classes of insecticides in each generation of the beetle. Resistance to imidacloprid (Admire) in some non-rotated potato fields in the Connecticut Valley has reached 300-fold compared to susceptible beetles. There is a correlation of resistance between Admire and Platinum (thiamethoxam), although resistance levels are not nearly so high. The cost of resistance is high – in higher rates required, or additional sprays of other materials.

To prevent resistance, alternate among classes of insecticides in each generation, and throughout the season. If you used Admire at planting, do not use foliar applications of Provado. Classes (different modes of action) include synthetic pyrethroid (Asana, Pounce, Baythroid or Ambush), carbamates (Thionex, Vydate), neonicotinoids (Admire, Platinum, Provado), spinosad, (Spintor, Entrust), Bacillus thuringiensis (Novodor), and abamectin (AgriMek). This provides a lot of choices! One low-risk strategy would be to use a material such as spinosad, which controls adults and all larval stages for the first spray, followed by a Bt to kill emerging young larvae.

Spinosad (SpinTor 2SC or Entrust, organic formulation) gives excellent control of all stages of CPB at the 3.5 to 4.5 fl oz rate. For a heavy population, two applications about 10 days apart, with the initial application when third instars occur, will control the first generation. Spintor has the advantage that it will control adult CPB and also European corn borer if a grower has that pest on early potatoes.

Abamectin (AgriMek 0.15EC) is mainly a contact material which controls larvae. It may be best used early in the season, when good coverage is easier to obtain. Rates of 5-6 fl oz rate per acre gave effective control in commercial fields in trials on Long Island. The lowest labeled rate is 8 fl oz.

Bt tenbrionis (Novodor FC) controls small larvae, through the third instar. Time applications to begin when 30 percent of the eggs have hatched. Where fields are densely populated and eggs are hatching continuously, reapply every 5 to 7 days. To check whether Bt tenebrionis products are approved for organic use, check with the MASS organic certification program (MICI, 978-297-3644) for more details.

- R Hazzard,and D Ferro.

STRIPED CUCUMBER BEETLE DUE TO ARRIVE SHORTLY

Striped cucumber beetle numbers are likely to jump rapidly in the next week. They are, so to speak, 'waiting in the wings' for the return of warm, sunny weather. Direct-seeded pumpkin, winter squash, melons and cucumbers that are just emerging, as well as cucurbit transplants that are still young are highly susceptible to both feeding damage and transmission of bacterial wilt, which is vectored by the cucumber beetle. The cotyledon up to the five-leaf stage is most susceptible.

Beetles are very mobile and can build up rapidly, so fields should be scouted at least twice a week. Activity tends to be highest during warm sunny weather – so

Striped cucumber beetle damage on cotlydon

a change to warmer weather is likely to bring them out. Rotation makes a difference! Numbers will be higher and infestation earlier in non-rotated fields or fields adjacent to last year's crop.

We are seeing many growers trying perimeter trap crops in cucurbits. In a mixed field of various winter squash varieties, we are suggesting that growers plant the most attractive varieties at the edge – blue hubbard squash is known to be highly attractive and reliable as a trap crop, but other Cucubita maxima may also serve well as trap crops (e.g. buttercup squash). For more on PTC refer to the March 30 Vegetable Notes (archived at http://www.umassvegetable.org/newsletters/archive/index.html)

-**Scouting:** Look for signs of feeding on the underside of leaves, especially the cotyledons. Cotyledons are gouged on the underside, while older leaves show feeding holes across the leaf. Beetles are often found underneath leaves or in cracks in the soil. Mating pairs are common. Check sets of 5 plants in at least five areas of the field (25 plants total), noting damage and counting number of beetles on or near the plant. This can be done in about 15 minutes. Check field edges for hot spots. Beetles move in from field edges and numbers will be higher in the first rows near a woods or fallow area where they spent the winter. Border treatments may help reduce infestation of the whole field. Where you have planted perimeter trap crops, check the border frequently and spray as soon as beetles arrive. DO NOT WAIT for the beetle numbers to reach a threshold. You want to kill the beetles while they are feeding on the attractive plants in the border -- BEFORE they move or 'bleed' into the main crop.

-**When to Spray:** Controlling cucumber beetles in the cotyledon to 5 leaf stage is the only way to preventing bacterial wilt. For wilt-susceptible crops such as cucumber, summer squash and zucchini, muskmelon, gourds, and some winter squashes and pumpkins, lower thresholds are needed. We recommend that growers do not allow numbers to exceed 1 beetle per two plants. Some states recommend a higher threshold of 1 beetle per plant even in susceptible crops. The time between first arrival of beetles and that threshold can be short, so keep an eye on fields once you see any beetles and spray within 24 hours of reaching threshold. For less wilt-susceptible crops (eg watermelon, calabaza), 1-2 beetles per plant can be tolerated without economic injury.

-**Organic Controls:** Cucumber beetle can be a serious problem for organic growers. Row covers are very effective in excluding beetles while promoting faster growth. Hoops are recommend for vine crops to prevent injury from wind blowing the fabric against the leaves. Make sure to remove covers at flowering to allow pollination. Using transplants instead of direct seeding gives plants a head start – not only over the weeds, but also over the beetle. It also allows later planting, possibly into late June, past the peak of cucumber beetle activity. Pyrethrin (Pyganic Crop Spray 5.0 EC) sprays provide moderate control. Use moderate to high rates. One way to enhance the effectiveness of this material while reducing the overall cost would be to combine it with perimeter trap cropping (PTC), so that

Striped cucumber beetle, Photo: David N. Ferro

sprays can be concentrated on the border only. See above for more on PTC.

Kaolin Clay (Surround WP) is another option. Here are some tips on using kaolin:

- Surround WP acts as a repellent and anti-feedent so must be present before damage is done; apply before beetles arrive. If you are using transplants, apply before setting them out. This saves time and materials. With direct-seeded crops, apply as soon as seedlings emerge if beetles are active.
- Ensure good coverage of the foliage including, if possible, the undersides of leaves (not easy when cotyledons are close to the ground). Leaves will look likethey were sprayed with white latex paint; despite this, there is no loss is photosynthesis and leaf growth. Reapply after a heavy rain.

When mixing, add the powder to water and allow it to settle slowly. Once the powder is fully wet, agitate gently. This reduces clumping. One approach is to mix a more concentrated slurry in a bucket and then add the slurry to the tank, as the dry powder could cake if added directly to the tank mix. Continuous or frequent agitation is needed in the sprayer

Although kaolin is safe in terms of skin exposure or ingestion, handlers should take precautions to avoid breathing the powder. Wear a respirator or mask when mixing and spraying. Rotenone used to be used by some organic growers. Available Rotenone products have lost approval under the National Organic Program.

-Ruth Hazzard

DEALING WITH PHYTOPHTHORA BLIGHT

Phytophthora blight is the most destructive disease of cucurbits and peppers in the Northeast. The pathogen, Phytophthora capsici is soil-borne and will remain in the soil for years, perhaps indefinitely. It is important to keep track of sites that are contaminated with Phytophthora. Do not rent land for susceptible crops without investigating the history of disease problems (there are other important soil-borne pathogens as well). Phytophthora blight is particularly important during wet weather or after long irrigations. Phytophthora can move through the air during windy storms and hurricanes but it would be difficult to estimate how far it can move. It is better suited to moving in water than air. It can also move on clods of soil on tractors.

Phytophthora capsici does not appear spontaneously, but it can sometimes be difficult to identify the source of contamination on particular fields. Since it is not efficiently wind disseminated it tends to be "locally important" on specific fields or farms. Once a site becomes contaminated it will remain so but the fields across the way may remain free of the pathogen as long as farm machinery does not bring it in. If contaminated fields drain into an irrigation pond, then irrigation can easily disperse it throughout the crop or onto another field.

The pathogen is very dependent on water to initiate disease and to move it from plant to plant. It produces spores that can swim to susceptible hosts (very short distances) and splashing rain and irrigation water can easily move spores from plant to plant. Its dependence on soil moisture is obvious in fields that have low spots or areas that do not drain readily. The disease will always begin in these areas first. Anything that can be done to improve drainage in the field will help prevent the disease from getting started.

-Recommendations for Management: Wherever possible, avoid planting susceptible crops in contaminated soil. This disease cannot be effectively controlled when conditions favor infection.

-For Sites that have a History of Phytophthora:

- Practice long rotations.
- Do not grow cucurbits, peppers, eggplant or tomato for at least five years after infections occur. Use a chisel plow to break up any hard pans and to improve drainage.
- After preparing the land, remove any earthen dams at the end of rows so that water can drain off of the field.
- Avoid planting in low areas or areas with poor drainage. (Better a small loss in yield than a total loss of the crop.)
- Subsoil between rows after planting.
- Keep irrigation to a minimum, and avoid leaks in the irrigation system that result in puddles. Avoid moving soil from contaminated land to and area of land that does not have the problem. Use a power washer to remove soil from tillage and planting equipment and tractor tires.
- If you suspect Phytophthora is present, get a positive identification. There are other diseases with similar symptoms but that would be managed very differently. Use the UMass Disease Diagnostic Lab (413-545-1045) to be sure what disease you have.

-If disease occurs in the field: disc the plants under. This

will not eliminate the pathogen but will help reduce movement to new plants. Fungicides have not been very effective against this disease. Aliette has activity against Phytophthora but cannot be expected to provide control once the disease becomes established.

-**Additional considerations for peppers:** Form domed shaped raised beds at least 9 inches high and cover with black plastic. Consider the resistant cultivar Paladin. If planting on bare ground, apply Ridomil Gold 4E at 1 pt/A. in a 12" band. See label for specific instructions. If planting on plastic, apply Ridomil Gold 4E through drip lines. Repeat applications according to the label.

--Rob Wick, Dept. of Microbiology, UMass

NITROGEN SIDEDRESSING

If we continue to have heavy rains this spring nitrogen may leach from fertilizer and organic residues below the active root zone of crops. Vegetable crops may need an additional 25 to 40 lbs/A of nitrogen to make up for those losses. Common sidedressing materials include urea, ammonium nitrate, calcium nitrate and N solutions. Anhydrous ammonia is used only sparingly in vegetables. A question often asked is what the best material to use is. Urea may be a cheaper form of N but some growers worry that it is only slowly available to plants. This is just not true. Within hours of application, urea releases ammonium, which over the next few days is converted to nitrate. Both the ammonium and nitrate form are absorbed by roots and used by plants. Urea, however, should only be used if you have the ability to incorporate the material at least a couple of inches. If left on the soil surface, anywhere from 10 to 30% of the N could be lost to the atmosphere. You can actually smell the nitrogen being lost in the form of ammonia. Nitrate forms (like calcium, potassium or even ammonium nitrate) will not volatize and can be placed on the soil surface where rainfall or irrigation can move it into the ground. Some growers are using calcium nitrate for sidedressing. This is more expensive than other forms but in certain situations may be warranted.

Calcium nitrate is most useful for high value, fruiting crops like tomatoes and peppers where the calcium balances the nitrate and may reduce potential blossom-end rot. Cabbage or lettuce may benefit where it could reduce tipburn. Other crops would not justify the additional cost of calcium nitrate. In most cases, choose materials based on price per pound of N. For example, on a per pound basis, the nitrogen in calcium nitrate may cost 3 to 4 times that in urea.

C.R. MacNeil & Julie Kikkert,
Ontario, Wayne, Yates, & Steuben Counties Weekly Vegetable Update, Cornell Cooperative Extension- 6/02/2004

GET YOUR COMPOST ANALYZED!

Many growers have access to organic waste materials such as manure, horse bedding, lawn clippings, or leaves and are producing compost on their own farm. Others are purchasing compost from off-farm. If you are applying compost to your fields, you should know its composition – just as you need to know the composition of a fertilizer. Also, it is important to know if the decomposition process is complete – if your compost is "finished".

Many farmers are more knowledgeable about how to make compost than they are about the nutrient availability from compost in production agriculture. In most cases, finished compost is classified as a soil conditioner rather than a fertilizer due to the relatively low levels of nitrogen, potassium, and phosphorus. Finished compost adds these elements, and others, but releases them over a longer period of time than chemical fertilizers.

A compost is considered mature (i.e. finished) when the energy and nutrient-containing materials have been combined into a stable organic mass. The composting process results in a dark-brown material in which the initial constituents are no longer recognizable and further degradation is not noticeable. The length of the time needed to achieve finished compost will vary with many factors and can take anywhere from a couple of weeks to over a year.

Making sure that a compost is finished before adding it to the soil is very important. Application of an unfinished, carbonaceous compost could adversely affect plant growth since the compost may have its own demand for nutrients as the breakdown to maturity continues in the soil. In addition, immature composts made from nitrogen-rich feedstocks are often high in ammonium, which can be toxic to plant growth. Because of the risks with use of immature composts, farmers would be wise to allow a period of at least a week between application of any compost to land and planting or seeding of crops.

Finished compost is a dilute fertilizer, having an analysis of about 1-1-1 (N-P2O5-K2O), but varying with regard to the original materials that were incorporated into the pile and how they were composted.

-**Compost Analysis:** In response to the increased interest and use of composts by farmers, the UMass Soil and Plant Tissue Testing Laboratory offers a compost test. The test will analyze the following: Extractable major and minor nutrients (phosphorus, potassium, calcium, magnesium, zinc, boron, iron, manganese and copper), water content, pH, organic matter, total nitrogen, nitrate, ammonium, carbon: nitrogen ratio, soluble salts, and extractable heavy metals (lead, cadmium, nickel and chromium). The current cost for this test is $25.00. Contact:

UMass Soil and Plant Tissue Testing Laboratory
West Experiment Station
University of Massachusetts
Amherst, MA 01003

(413) 545-2311

-**Making Compost:** If you are interested in learning more about making compost on your farm, you can order hands-on manuals from the Natural Resource, Agriculture, and Engineering Service (NRAES) located at Cornell University. Two manuals available are On-Farm Composting Handbook ($25.00) and Field Guide to On-Farm Composting ($14.00). You can get information on ordering these resources from their webpage (http://www.nraes.org/), or contact them at (607) 255-7654, or NRAES@cornell.edu.

--Frank Mangan (978 422-6374), Allen Barker, & Steven Bodine

REST AND REBUILD THOSE FIELDS

Everyone should know it is not a good idea to plant the same crop in the same field year after year. Everyone should also know the importance of rotating plant families. Something not enough farmers do though is plan a rest and soil building year into their rotation. An often-heard argument against a rest year is the grower does not have enough good land. Resting good land is sometimes a hard sell. Growers say if a field is not in a cash-earning crop than it is money out of his pocket. Years ago, every farm did more with soil building and rotation than they do now. Commercial fertilizers and pesticides have lessened the need (in many people minds) for good soil building practices. On many farms, good soils have lost their tilth (structure), crust over, are poorly drained and have low soil organic matter. Fortunately, it's never too late to rebuild your soils with a little rotational management.

Plan to take at least one of you fields out of production this summer. In Orange County, NY, we did a number of studies on onions where we took fields out of production and employed different rotation crops. We found sudangrass by far the best rotational crop. Sudangrass puts down deep roots to help soil drainage, you receive a lot of organic matter and if plowed down green, it turns into a natural soil fumigant and eliminates soil pathogens. Yields following sudangrass increased from 15% to 40% depending on the soils and years.

Why not try a field or two in sudangrass? If you rotate 20% of your fields, in five years, your whole farm will have had a year's rest and reinvigoration. In upstate New York, wait till after a threat of frost has passed. Plant sudangrass at the 50-lb. rate per acre. You might want to broadcast around 50 lbs. of N before planting. You can drill or broadcast the seed. If you broadcast, gently work the seed in with a light disking. The sudangrass will grow quickly if it has moisture. When the plants reach about three feet in height, you need to mow it down. This will force tillering, that is, where you had one stem, when it re-grows, you will have five or six stems. Root growth will also be increased by at least five fold. Let the sudangrass grow till late August or early September. It is very important to mow or chop the sudangrass and then plow it in before it is hit by frost. The plants become woody if hit by frost. You will never be able to plow down all the organic matter, as your disk will just roll over the stems. When plowed down green, the sudangrass material turns to a natural fumigant. Now you can come in with a rye planting for winter cover.

If you are going to lose a year of production from a field, you want to maximize the benefits to the soil. Sudangrass is one of the best ways to maximize all the good things your soil needs.

-John Mishanec, Area Vegetable IPM Educator, Cornell Cooperative Extension

INVITATION FOR GROWER CONTRIBUTORS

Would you like to put your two cents into the field observations and topics that are reported this newsletter? Are you able to spend a few minutes each week jotting down what's happening on your farm? We are looking for growers who would like to contribute their observations to this newsletter. Your eyes, your expertise –and your questions – will help make this newsletter more timely, more complete, and more relevant to growers in the area. You can be sure that if you are noticing some pest or crop condition on your farm, other growers are too. What better way to have YOUR questions answered! We will send you a reminder via email every Tuesday, with a short list of questions that you can answer in 10 minutes. (FAX is possible, but email is much preferred.) If you would like to be part of a group of grower reporters, please contact Ruth Hazzard and Ben Hunsdorfer at umassvegetable@umext.umass.edu or call 413-545-3696.

Vegetable Notes, Ruth Hazzard, Editor. Ben Hunsdorfer, Assistant Editor. *Vegetable Notes* is published weekly from May to September and includes contributions from the UMass Extension Vegetable Program faculty and staff, growers, and private IPM consultants. Authors of articles are noted; Author is R. Hazzard if none is cited.

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