UMASS EXTENSION

# Vegetable Notes

For Vegetable Farmers in Massachusetts

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## CROP CONDITIONS

This past week saw some reasonable temperatures but generally dry conditions across the state. Much to my dismay, the rain that was promised last weekend never arrived. Some spots saw rain on Thursday (8/24) but irrigation is the norm for the forseeable future. The cooler conditions are slowing summer squash and zucchini, but all other crops appear to be thriving. Tomatoes are finally in and there was excellent participation at the Massachusetts Tomato Contest held in Boston this week. Fall items, led by pumpkins, are being harvested and are appearing at farm stands and farmer's markets. Not to copy some other tradition, but I saw my shadow this morning and I predict 6 more weeks of great growing weather.

*--R. Bonnano*

*** In Worcester and Middlesex counties, cucumber mosaic virus has been identified in late season cucurbits. This virus causes mottling on leaves and fruits, creates raised lesions on the fruit skin, and can also stunt plants, reducing yeilds. If you have late fields of cucurbits, watch for high aphid populations - a known vector of the virust to your crops. Approved checmical controls include Lannate, Sevin, and Provado**

## CUCURBIT EXPERIMENTS IN 2005

Perimeter trap cropping is a systems approach to pest control. Border defenses are established by planting a more attractive trap crop to completely encircle the main crop, resulting in reduced infestation and reduced need for insecticides in the main crop. This USDA-funded research, conducted by Dr. Lynn Adler and Ruth Hazzard, combines research and extension to evaluate several perimeter trap crops for reducing pesticide use in cucurbit crops and increasing yield via herbivore resistance and pollinator attraction.

**Perimeter Trap Cropping for Butternut Squash**

This year we are testing 4 PTC cultivars and a control in experimental plots for potential to increase yield through reduced damage and increased pollination. This research will further the goals of IPM by providing growers with several PTC options to reduce pesticide use and increase pollination services.

*--Lynn Adler, Ruth Hazzard and Andy Cavanagh, UMass Extensions*

**Cucurbit Variety Trials: Attractiveness to Pollinators and Cucumber Beetles.**

Perimeter trap cropping is a systems approach to pest control. Border defenses are established by planting a more attractive trap crop to completely encircle the main

*Bees and other pollinators are most active in the early morning*

crop, resulting in reduced infestation and reduced need for insecticides in the main crop. The ideal perimeter trap crop in cucurbits is highly attractive to striped cucumber beetle adults, has fast germination and strong seedling growth, has relatively low susceptibility to bacterial wilt so that it does not serve as a reservoir for infection of the main crop, and produces marketable fruit. We are screening 20 cucurbit species and cultivars for potential as effective trap crops by determining their attractiveness to both beetle pests and to pollinators. This field trial will be linked with a greenhouse trial identifying floral and chemical traits that may determine pest resistance and pollinator attraction.

*--Lynn Adler, Ruth Hazzard and Andy Cavanagh, UMass Extensions*

**Cucumber Beetle, Root and Leaf Herbivory**

In the natural world, plants have to defend themselves in a complex environment. Root and leaf herbivory can have different effects on a plant. Squash plants are damaged aboveground by cucumber beetle adults, and belowground by their larvae. This year, research conducted by graduate student Kristen Hladun in the Plant Biology program and advised by Dr. Lynn Adler, examines the combined impacts

of above and belowground damage on squash pollination and yield. Kristen is adding cucumber beetles to plants aboveground, and beetle eggs to soil belowground. She will then measure how damage affects plant traits, pollination, and yield.

*--Kristen Hladun and Lynn Adler, UMass Extensions*

## SWEET CORN UPDATE

Corn earworm trap counts have risen this week. This tells us there is still a high potential for infestations. Each female CEW has the ability to lay as many as 1000 eggs. Eggs are usually laid on the silks and can hatch in 2-6 days depending on temperature. Once the eggs hatch they will travel down the silk channel and feed on the kernels. Once they get into the ears there is no effective control. Chemical controls work best if you have the right timing and equipment (see table). If you think you are too late to control CEW that has already entered below the silks, do a selective harvest. Because damage is usually found in the tips of the ears you may still be able to salvage infested corn by cutting the tips, depending on your consumer preference. Direct marketers may be able to get away with a little more!

As expected from last week the European corn borer flight has decreased. We are still seeing some feeding damage in the tassels. Fortunately corn plants can deal with high levels of infestation in the tassels; it is when the larvae enter the ears that you have a problem. When you have tassel infestation in over 15% of your fields spray as soon as you can to control the borers before they become a problem in the ears. If you conduct a second scout base your infestation level on live worms found in the tassels. Damage seen could be from a problem you have already solved. Remember that ECB is a year round resident of New England and will over winter as a last instar in corn stalks and other stems of host plants. Make sure to chop stalks in harvested fields and remove the debris to help decrease infestations next year.

Fall armyworm damage may still be out there causing an unsightly mess. However this does not mean the caterpillars are still feeding. As with the borers, on a second count only base your infestation rating on live worms found. FAW seen this week was found curled up in the whorls of pretassel corn. It is easy to spot the frass left by this pest and then find who is causing the damage seen. High infestations of FAW can delay growth and lower overall yield. If you are finding FAW in your late season whorl stage corn, a single drop nozzle can deliver a direct spray down into the whorl for excellent coverage and control.

Late summer infestations are keeping a lot of growers out there on a short interval spray schedule mostly due to CEW pressure. If using chemical controls, try and configure the control method with the stage that will be best to cover all of your pest problems in one spray.

*--A.Duphily*

### SWEET CORN TRAP COUNTS 8-19 TO 8-258

| LOCATION | DATE | ECB Z1 | ECB EII | CEW | FAW |
|---|---|---|---|---|---|
| **Berkshires, W. MA/ Champlain Valley** | | | | | |
| Brandon, VT | 8/24 | - | - | 6 | - |
| Pittsfield, MA | 8/24 | - | - | 2 | - |
| **CT River Valley** | | | | | |
| Old Deerfield | 8/24 | 17 | 12 | 38 | 5 |
| S. Deerfield | 8/24 | 5 | 26 | 25 | 0 |
| Hadley | 8/24 | 44 | 15 | 65* | - |
| N. Hadley | 8/24 | 33 | 11 | 11* | - |
| Feeding Hills | 8/23 | 31 | 19 | 19 | 4 |
| **C.& E. MA** | | | | | |
| Concord | 8/22 | 3 | 16 | 5 | 0 |
| Tyngsboro | 8/22 | 6 | 31 | 6 | 1 |
| Northbridge | 8/24 | 6 | 32 | 1 | 0 |
| Spencer | 8/24 | 3 | 6 | 5 | 0 |
| Still River | 8/24 | 2 | 5 | 38* | - |
| Monson | 8/24 | 3 | 4 | 12 | 1 |
| Dighton | 8/24 | 40 | 2 | 70 | 16 |
| **N.H.** | | | | | |
| Litchfield, NH | 8/24 | - | - | 1 | 5 |
| Hollis, NH | 8/24 | - | - | 10 | 7 |
| Mason, NH | 8/24 | - | - | 9 | 2 |
| **R.I.** | | | | | |
| Coventry | 8/24 | 4 | 7 | 12 | 2 |

**Avg of 2 traps*

### CORN EARWORM THRESHOLDS

| Moths/Night | Moths/Week | Spray Interval |
|---|---|---|
| 0 - 0.2 | 0 - 1.4 | no spray |
| 0.2 -0.5 | 1.4 - 3.5 | 6 days |
| 0.5 - 1 days | 3.5 – 7 | 5 days |
| 1.0 - 13.0 | 7 – 91 | 4 days |
| Over 13 | Over 91 | 3 days |

*--R.Hazzard, A.Duphily, B.Hunsdorfer, J.Mussoni, D.Dumaresq, D.Rose, J.Otto, B.Howden, S. Clegg, T.Gallagher, J.Golonka, W.Kingsley, P.Willard, G.Hamilton*

## HANDLING YOUR FOOD SAFETY RISK

**(Exerpted from Purdue Univerisity Vegetable Crops Hotline #455)**

By now, most growers have heard of GAPs (Good Agricultural Practices), and some, even of GMPs (Good Manufacturing Practices), yet, after a couple of years of

speaking and consulting about GAPs and all of its related topics, I still get some blank stares when I mention GHPs (Good Handling Practices). What that tells me, of course, is that I haven't done a good enough job of providing useful information about GHPs and I hope to rectify that now.

GHPs are all of those precautions you take from storage through transportation through warehousing to minimize the risk of foodborne illness. Our emphasis on preventing contamination in the GAPs program doesn't stop at the packinghouse. GHPs include chilling, storing and transporting produce (and storage again if you are warehousing). GHPs also overlap with GAPs in the areas of worker health and hygiene and water quality. Training and education in food safety is just as important for workers who are handling produce in storage and in the loading of trucks as it is for those in the fields and in the packing house. Water used post-packing (especially that used for ice) should meet potable standards.

Cleaning, sanitation, and temperature control are the focus for GHPs. In storage facilities, this means developing and implementing cleaning and sanitizing procedures prior to turning on the refrigeration units and filling your storage with produce. I want to emphasize cleaning and sanitizing as two separate activities and two separate procedures. Cleaning is done first to remove debris and organic materials by using a cleanser designed for the job. After rinsing, a sanitizer is then used to inactivate any remaining microorganisms. If you are developing a food safety plan, you would describe in writing your Standard Operating Procedure (SOP) for cleaning including the type of cleanser, the amount to use and how to rinse. An SOP would also then be written separately for the sanitation procedure.

Cleaning and sanitizing is compromised if there are any cracks or crevices in which organic material and therefore microorganisms can hide. Inspect, replace, repair and/or meticulously clean as appropriate the following:

Cracked hoses, damp insulation, hollow framework, rubber seals around doors, poorly-maintained filters, light switches, standing water, cleaning tools, open bearings, trash cans, porous surfaces (e.g. wood), icemakers, condensate; especially walls and pipes over packing lines.

If you are using ice, recognize that you are using a material that is a potential hazard if not handled properly. One microorganism that is well known for causing foodborne illness and is particularly tolerant of cooler temperatures is *Listeria monocytogenes*. This microorganism and others can be present in ice, ready to multiply and grow rapidly when the ice melts and temperatures increase. For this reason, the water and everything used in the manufacture, conveyance and storage of ice must be clean and sanitized. Using potable water is a must. After that, recognize that the ice house itself, and all conveyors and chutes, must be cleaned and sanitized on a regular basis. Porous surfaces such as wood should be replaced with cleanable surfaces wherever the surface comes in contact with the ice.

Maintain your storage temperatures. Keep storage facilities within the recommended temperature range for the produce you are storing. Monitor and document your storage temperatures on a regular schedule, so you can demonstrate that produce is handled safely while under your control. If produce is kept cool up front, microbial growth is minimized and your risk is minimized. Temperature abuse after produce has left your control is less likely to result in cases of foodborne illness if growth is prevented early in on in handling.

Finally, inspect trucks prior to loading to insure cleanliness and proper refrigeration. This is often the last thing a grower can control in their operation. Identify prior loads hauled in the truck. Trucks that have hauled raw animal products should be avoided due to the risk of cross contamination, so specify up front that you don't want trucks that are hauling raw animal products. From my own experience, it is often possible to tell if a truck has been properly cleaned by both appearance and the smell. Know where the closest truck cleaning station is to your operation, so you can direct drivers to it if they come to you too dirty to load. As a part of your food safety program, document truck temperature, cleanliness, state of the product, and required shipping temperature range at time of shipment. Including your recommended temperature range on the bill of lading is a good way to communicate and easily document your expectations for the handling of your produce after its left your control.

A complete food safety program includes GAPs, GMPs (if you have a packing house), and finally, GHPs. Be thorough, be prepared, and you will significantly reduce your risk for microbial contamination of fresh produce. The

Ohio and Indiana Specialty Crop Food Safety Initiative offering growers a variety of tools to address pests and other food safety issues. The Initiative is presented in partnership with the United States Department of Agriculture's Risk Management Agency.Ohio and Indiana fruit and vegetable growers can get help with the development of a food safety program by contacting Mid American Ag and Hort Services by phone at (614) 246-8286, fax at (614) 246-8686, or email at maahs@ofbf.org. More information about the Ohio and Indiana Specialty Crop Food Safety Initiative may be found at <www.midamservices.org> by clicking on "Projects."

*-Shari L. Plimpton, Purdue University Cooperative Extension*

## GET READY FOR FALL COVER CROPS

As your fields finish up with crops, be prepared to turn under crop residues and sow a cover crop as soon as you can. This will help improve soil quality by adding organic matter, reducing erosion, and even avoiding compac-

tion from the force of raindrops, which can be significant. Cover crops will also help suppress weeds. Options include crops that will winter-kill and be and to work in next spring such as annual ryegrass or oats. If you want to grow some of your own nitrogen sow 20 pounds per acre of hairy vetch around the end of August, mixed with a bushel of rye or oats. Let this grow until mid- to late-May next spring to get the most N out of it.

For ideas on a variety of cover cropping options, including permanent beds, intercrops, no-till and spaders, order the video called Farmers and their Innovative Cover Cropping Techniques at: *www.uvm.edu/vtvegandberry/Videos/videos.html* or call: **(802) 656-5459** for more info on how

*Fields lacking ground cover are subject to irreplacable topsoil erosion*

to obtain the video.

**Order cover crop seed right away if you haven't already.** Here is some information about some of the more common cover crop choices for Massachusetts:

**•Non-Legumes**

**Winter rye** is easily the most common cover crop used by growers in Massachusetts, and for good reason. It is inexpensive, easy to get and establish, and can be seeded fairly late into the fall and still take. It consistently overwinters here and will continue to grow in the spring producing lots of organic matter. Some growers find it difficult to incorporate in the spring if it is left to grow into May. Seeding rate: 90 – 120 lbs./acre.

**Oats** can be seeded in the fall and will come up quickly, similar to winter rye. Unlike winter rye, oats will winterkill here in Massachusetts and will not regrow in the spring. For this reason, some growers prefer it over winter rye since it is easier to manage in the spring. It might have to be lightly incorporated into the soil in order to germinate. Enough growth is required in the fall to give adequate cover through the winter and early spring. Try to seed by September 1. Growers along the coast can plant later.

*Some cover crops will establish late into fall, but it is important to seed them as soon as possible*

Make sure the oats have not been cooked (used as an animal feed). Seeding rate: 100 lbs./acre.

**Ryegrass** is used by some growers because of its thick root system that is thought to mop up more nitrogen than winter rye or oat. There are two types: annual and perennial. Despite their names, the annual ryegrass may overwinter and the perennial ryegrass may winterkill depending on when you seed them. If you have not seeded them before and would like to evaluate them, I would recommend that you seed a little of each in order to see their growth habits. I have only used these cover crops in the early spring. The seed is small and light, so specialized equipment will be needed if seeding a large area. Seeding rate: 30 – 40 lbs./acre.

**•Legumes**

**Clovers** are used by some growers as a nitrogen source. There are several types available. Clovers can be seeded as an early spring cover crop, or in late summer. A clover will have approximately 2.5% nitrogen whereas hairy vetch (see below) averages around 3.5% (this compares to winter rye that is usually below 1%). Sweet clover and red clover (especially mammoth red clover) produce heavy growth in spring after overwintering. Red clover, sweet clover and white clover are all sufficiently hardy to withstand most winters in the Northeast. Clovers are a very small-seeded cover crop that need specialized equipment to establish. They can be seeded by hand in a small area, but if you want to do several acres, you will need specialized equipment. Seeding rate: 10 – 20 lbs./acre.

**Hairy Vetch** is an excellent cover crop for Massachusetts. It can be seeded up to mid September and will survive the winter. Growers near the coast or on the cape and islands can seed vetch up till October or even later. When left to grow long enough in the spring, hairy vetch has supplied over 100 lbs./acre of nitrogen.

It is very important that the appropriate rhizobia species is used for hairy vetch (the rhizobia for hairy vetch will work for all vetches and peas). Without the rhizobia the vetch will not give the desired effects.

We have been recommending you mix the vetch with either winter rye or oat. There are several reasons for this:

1. Both oat and winter rye are very efficient in taking up nitrogen from the soil (remember, the vetch is getting most of its nitrogen from the atmosphere, so it does not need much from the soil). By taking up more nitrogen in the late summer and fall we are reducing the risk of contaminating surface or ground water and the nitrogen is recycled so that it can be used by next years cash crop.

2. The oat and rye can produce tremendous amounts of valuable organic matter if allowed to grow long enough.

3. Both of these cover crops will give better erosion control than vetch alone since they emerge and establish themselves more quickly than vetch. This is especially important when vetch is seeded after Sept. 1.

We have been recommending 40 lbs./acre of oat or rye with 30-40 lbs./acre of hairy vetch. If you are using a grain drill then you can use seeding rates as low as 30 lbs./acre of vetch. If you are spinning the cover crop on and lightly disking it in then a rate of 35 - 40 lbs./acre is suggested.

Many growers prefer the use of oat rather than rye because of the tremendous growth of rye that occurs in the spring. This can be desirable if you are looking for increased organic matter in your soils, however some growers find the amount of biomass created by these two cover crops too much to handle. In addition, we have found that we get much more growth of the vetch in the spring when seeded with oat than when seeded with rye. The rye will compete with the vetch in the spring.

**Cover crops for no till**

If you plan to use a no-till system, select your fields and plant your cover crops accordingly. Rye should be seeded at higher rates for a no-till system, such as 3 bushels (168 pounds) per acre. This gives a thicker, more weed-suppressive cover and should be allowed to grow to at least 30 inches to produce enough biomass for weed control.

-**Hairy vetch** is another option for no till which has worked well in more southern areas but also shows promise in New England. The dense mat of vines gives a thick cover of organic matter which can last throughout the season. Vetch also provides nitrogen to the crop. It may be best for use with transplants. We have observed good success this season in on-farm trials with pumpkin transplanted into a vetch cover. It is difficult to plant direct-seeded crops through hairy vetch without specialized no-till equipment that can cut through the viney matt. In spring, hairy vetch can be killed using glyphosate or by mowing at the flowering stage.

*-Adapted from articles by Vern Grubinger, University of Vermont and Frank Mangan, University of Massachusetts, and the Pumpkin Production Guide* ( Dale Riggs, editor, published by NRAES). See also article in August 5 Vegetable Notes by Marianne Serantonio (see archives at www.umassvegetable.org)*

***Pumpkin Production Guide**
**-This guide is a comprehensive resource on pumpkin production – cultural practices, varieties, insect, disease and weed management, wildlife, economics, harvest,and marketing. Excellent photographs. Edited by Dale Riggs with contributions from pumpkin experts throughout the Northeast region. Published by Natural Resource, Agriculture, and Engineering Service(NRAES)**
**www.nraes.org (607)-255-8770**

## MASSACHUSETTS EVALUATION OF EDAMAME

Edamame or vegetable soybean is a specialty soybean harvested as a vegetable when the seeds are immature and have expanded to fill 80-90 percent of the pod width. The seeds of vegetable soybeans are larger, sweeter and more tender than grain soybeans. Because of its excellent nutrition and slightly sweet, mild flavor and nutty texture, with less objectionable beany taste, it is preferred over conventional grain soybeans as a fresh green bean (pea).

In commercial production for fresh bean seeds vegetable soybean is harvested at the R6 stage of development (fully developed green bean). Typically, they are either shelled prior to cooking, or are cooked in the pod in salted water as a snack food, and shelled by the consumer during eating. In the United States the average consumer is not familiar with vegetable soybean.

In 2003 and 2004 we screened 18 varieties or seed lines, with varying seed size and seed color, for adaptability of the varieties (lines) with different origins and sources to conditions in Massachusetts. We also investigated one American variety (Vinton) at five densities planted June 16, 2003 at Agronomy Research Farm to examine the general response of seed yield to plant density at a late planting date.

For the variety, or line trials, selected lines were planted by hand in late May in 2003 and 2004. Each variety or line was planted in a 5 meter-long row 25 cm apart. The five densities for the late planting were: 100,000, 200,000, 300,000, 400,000 and 500,000 plants/ha or 45,000 to 230,000 plants/acre. Plot size was 3 meter X 0.75 m, three rows in each plot with three replications. Weeds were controlled manually during the growing season.

Plant height, pod and seed numbers, and number of branches responded to population density, particularly from density of 100,000 plants/ha to 300,000 plants/ha. Plant height increased with higher density, while all others parameters declined significantly except for seed size

which remained almost constant. This indicated that seed size was more strongly under genetic control than any other components. The highest yield was obtained from the higher density. Plants at this density had close to 50 pods which is probably sufficient for direct marketing of podded edamame for fresh markets. Further, the general proportion of seed number per pod did not change as much as pod number with change in density.

Significant differences were found among varieties and lines tested. The newly bred line had much larger seed size than the American check variety. The American check variety had a relatively small dry seed size of only 181 mg, whereas lowest dry seed size from the tested lines was 212 mg with highest at 395 mg. Also, these lines vary in mature and some in fresh bean color. Mature seed colors were black, purple, green and yellow. Maturity also varied from early to late maturity types. Taste and texture of the introduced lines was judged superior to the American check variety.

| Lines | Height cm | 1 seed pod | 2 seed pod | 3 seed pod | total pod # | total seed # | seed size (mg) | seed yield (g) |
|---|---|---|---|---|---|---|---|---|
| 1 | 33 | 10.2 | 31.2 | 4/6 | 48.3 | 86.4 | 375 | 32.4 |
| 2 | 43.2 | 21.4 | 53.0 | 5.8 | 80.2 | 144.8 | 294 | 42.5 |
| 3 | 46.5 | 36.0 | 84.5 | 15.5 | 236 | 251.5 | 296 | 74.4 |
| 4 | 46 | 17.6 | 41.8 | 3.6 | 63.0 | 112.0 | 292 | 32.8 |
| 5 | 29.6 | 17.2 | 34.2 | 6.0 | 57.4 | 103.6 | 335 | 34.7 |
| 6 | 29.6 | 15.2 | 30.4 | 5.2 | 50.8 | 91.6 | 333 | 30.5 |
| 7 | 20.7 | 13.0 | 18.7 | 3.7 | 35.3 | 61.5 | 259 | 15.9 |
| 8 | 43 | 2.0 | 30.0 | 2.4 | 56.0 | 134 | 254 | 34.1 |
| 9 | 31 | 8.9 | 15.0 | 7.0 | 30.9 | 59.9 | 342 | 20.5 |
| 10 | 22 | 12.0 | 31.0 | 2.0 | 45.0 | 80.0 | 281 | 22.5 |
| 11 | 22.4 | 3.5 | 43.0 | 4.0 | 30.5 | 102 | 395 | 40.3 |
| 12 | 34.4 | 13.1 | 19.6 | 1.6 | 34.3 | 57.1 | 305 | 17.4 |
| 13 | 24.1 | 11.0 | 27.4 | 6.3 | 44.7 | 84.7 | 286 | 24.2 |
| 14 | 33 | 14.4 | 28. | 2.0 | 44.7 | 77.0 | 273 | 21.0 |
| 15 | 20.6 | 12.6 | 26.2 | 4.4 | 43.2 | 78.2 | 212 | 16.6 |
| 16 | 30.4 | 10.0 | 21.3 | 4.3 | 35.6 | 65.5 | 302 | 19.8 |
| 17 | 27 | 19.0 | 37.0 | 10.0 | 66.0 | 123 | 369 | 45.4 |
| 18 | 34.7 | 9.0 | 15.4 | 4.4 | 28.9 | 53 | 266 | 14.1 |
| check | 45.2 | 3.6 | 26.9 | 8.6 | 39.7 | 83.2 | 181 | 15.1 |
| mean | 30.6 | 13.7 | 31.6 | 6.4 | 51.3 | 97.3 | 297 | 30.0 |

*--Stephen Herbert, Dept. of Plant, Soil and Insect Sciences, University of Massachusetts, Amherst*

*Vegetable Notes, Ruth Hazzard, editor and Ben Hunsdorfer, Assistant Editor. Vegetable Notes is published weekly from May to September and at intervals during the off-season, 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 and photographer is R. Hazzard if none is cited.*

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