UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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PERIMETER TRAP CROPPING WORKS IN BUTTERNUT SQUASH

The striped cucumber beetle, *Acalymma vittatum*, is the major insect pest on winter squash in New England. Typically, these beetles are managed with full-field pesticide sprays. This can be a costly and time consuming procedure for growers, and effectively timing the sprays is often difficult due to the speed with which beetles can infest a field and damage the young crop. In addition to direct feeding damage, cucumber beetles also vector the bacterium *Erwinia tracheiphila*, which causes bacterial wilt in cucurbits.

Striped Cucumber Beetle

In the spring of 2003, we began looking at the effectiveness of using a perimeter trap cropping (PTC) system for butternut squash. Jude Boucher of the University of Connecticut had already shown that PTC reduced time, expense, and potential hazards and gave higher yields in cucumbers and summer squash with a blue hubbard border. PTC is based on the fact that many insect pests prefer one species or variety of plant over another, due to variations in plant chemistry, shape, or other factors. In a PTC system, the more attractive crop is planted around the outer edge of the main cash crop, surrounding it on all sides. This protects the cash crop from insects entering the field from any direction. Perimeter trap cropping works best against pests that colonize a field from the edges and work inwards. Striped cucumber beetles over-winter in the brushy edges surrounding fields, and move into a crop from the field margins in the early summer. This makes them a good candidate for this method of control.

In 2003 we set up field trials in commercial fields and small plots trials at the UMass Research Farm to test a butternut PTC system. We repeated our experiments in 2004, but this time we tested a systemic insecticide in addition to a spray treatment to the borders. In 2004 we also evaluated other potential trap crops for growers who wanted an alternative to blue hubbard.

Commercial butternut fields, 2003

Six butternut growers planted a blue hubbard border around fields that ranged in size from 2 to 6 acres. These six fields were compared to conventional butternut fields where beetles were controlled with full-field sprays of Sevin or with an Admire drench at planting. Fields were scouted twice weekly until first two leaves, then weekly until flowering. Borders were sprayed at the first arrival of the beetles.

Our first year of field trials got off to a little bit of a shaky start. The spring weather was difficult even by New England standards, some of the borders suffered from tractor blight, planting skips, poor emergence, and other maladies resulting in large gaps in the border. The beetles came out virtually overnight and ate whole sections of some of the hubbard borders right down to the ground, at which point they stopped being 'borders'. Needless to say, the beetles eventually broke through and necessitated full-field sprays in some fields. Even with all these difficulties, it was clear that the system had a great deal of potential. We saw places where there were piles of literally hundreds of dead beetles under the hubbard plants in the border, with a mere fraction of that many beetles in the main crops. We saw fields that held out for a week or more under beetle pressure that would likely have decimated the unsprayed main crop if the beetles hadn't been stopped at the field edge and concentrated in the borders, where they were killed. All in all we were encouraged that the system had potential, and we learned a great deal about how to implement it successfully. Our growers who participated in the

experiment seemed to feel much the same way, and most of them were happy to try it again in 2004.

Research plots, 2003

In our small plot work at the UMass Research farm in 2003, we laid out four replicated treatments – all were 14'x30' blocks of unsprayed butternut squash, surrounded by different kinds of borders:

1. unsprayed butternut
2. butternut sprayed weekly with Sevin until flowering
3. unsprayed Blue Hubbard
4. hubbard sprayed weekly with Sevin until flowering

These blocks were separated by 50' fallow areas. Beetles piled up in blue hubbard, which was about what we expected. On the main crop, somewhat unexpectedly, beetle numbers were low in all treatments. The 'unprotected' butternut with no trap crop and no sprays had the highest number of beetles, though the difference among main crop treatments was not statistically significant (Figure 1).

It seems likely that even with the 50' space between plots, the blue hubbard drew beetles away from butternut plots. Overall, beetle numbers were low compared to the commercial farm fields.

After the 2003 growing season a number of our growers expressed an interest in using the systemic insecticide imidacloprid (Admire) as a border treatment instead of foliar sprays of Sevin. This made a lot of sense, because they could apply it in the same operation as planting –saving a trip to the field – and plants would be protected from emergence, reducing the chance that borders would be decimated and overrun because a spray was delayed. To that end, we modified our experiments in 2004 to include Admire treated blue hubbard borders in both the field trials and the small plot work. Some growers also wanted to know if there was anything other than blue hubbard that they could use as a trap crop – after all, how much hubbard do you need? So we set up variety trials at the research farm to test the relative attractiveness of other winter squash and pumpkins.

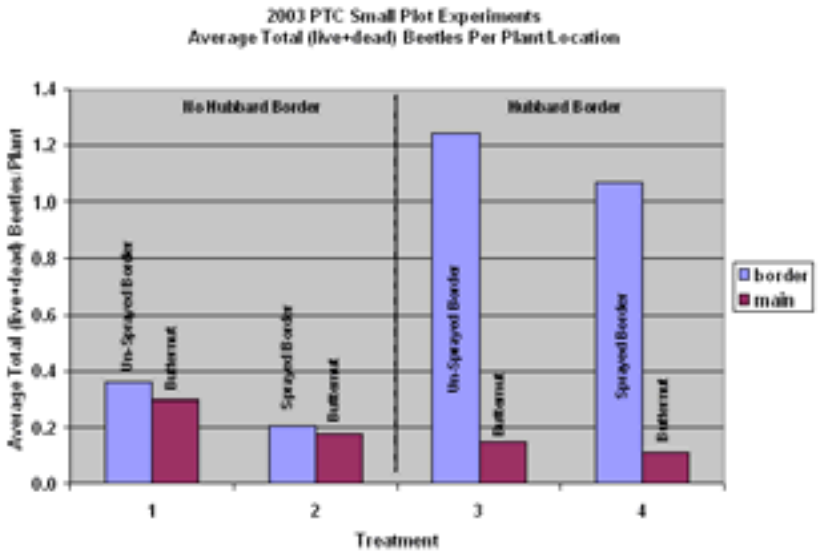

Figure 1. Results of 2003 PTC trials. Seasonal average of beetles (live + dead) per plant on borders and main crop of plots with and without blue hubbard border, with and without sprays on the border. Main crops were unsprayed. Hubbard borders had significantly greater numbers of beetles than butternut borders or main crops. There was no significant difference between main crops.

Commercial butternut fields, 2004

Our 2004 trials went remarkably well. Borders were planted just right, everything came up when it was supposed to, and even the beetles cooperated. The borders held up throughout the season in all of the PTC fields and none of the main crops required a spray. The Admire drench worked as well as Sevin sprays on the borders. One grower was able to spray the border of his 3-acre field with a single tankfull in his backpack sprayer – thus avoiding the need to drive a sprayer to the field. The number of beetles and the damage in all of the PTC main crops was equal to the damage and beetle numbers in the control fields (where growers used their standard practices) – even though the control fields were sprayed (some of them several times) and the PTC butternut was never sprayed. Not having to spray over 90% of your field obviously saves a great deal of time and money. The beetles, as expected, piled up in the blue hubbard – we found more beetles in the hubbard than we did in any of the butternut.

We also noticed that during the critical initial colonization of the field – in other words, when the beetles first find the field and begin to spread out through it – the relative distribution of the beetles was different in the PTC fields from the conventional fields. In the conventional fields the beetles spread out through the field almost immediately. Beetle numbers were the same in field edges as in the center. In the PTC fields, most of the beetles stayed in the borders – on the hubbard. This means that during the time when the plants are the most sensitive, at the young seedling stage, there were fewer beetles on the butternut protected by a PTC system than there were on the conventional butternut. After the conventional fields were sprayed, the beetle numbers between the PTC butternut and the regular butternut evened out, but that initial protection can be critical not only for direct damage but also for infection with wilt. (Figure 2)

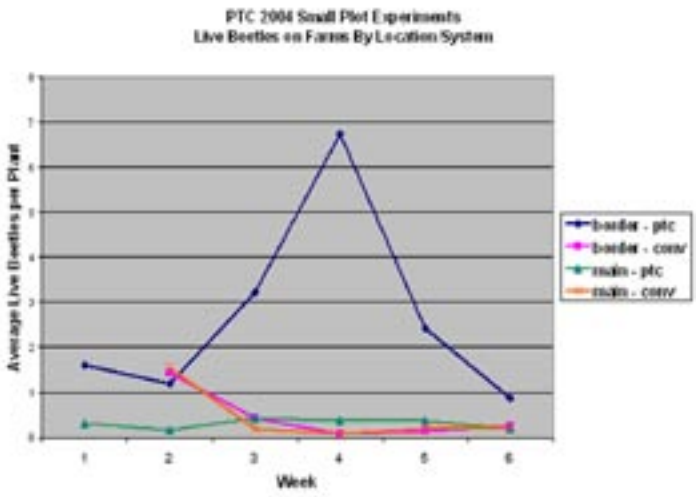

Figure 2
- *Red Circle: initial colonization of the field by beetles*
- *In the PTC fields, the pressure was initially much higher in the border than in the center.*
- *In the conventional fields, the pressure in the border and in the center was roughly equal.*
- *Beetle numbers were as low in the main crop of PTC as in conventional fields, even though no insecticides were applied to the main crop.*

Research plots, 2004

The small plots were much the same as the previous year. There were more beetles in the hubbard than anywhere else and no differences between the main crops, regardless of whether or not the border was treated with Admire, sprayed with Sevin, or just left alone. (Figure 3) Again, this could be either because of a lack of beetles or because the hubbard drew them away from butternut plots.

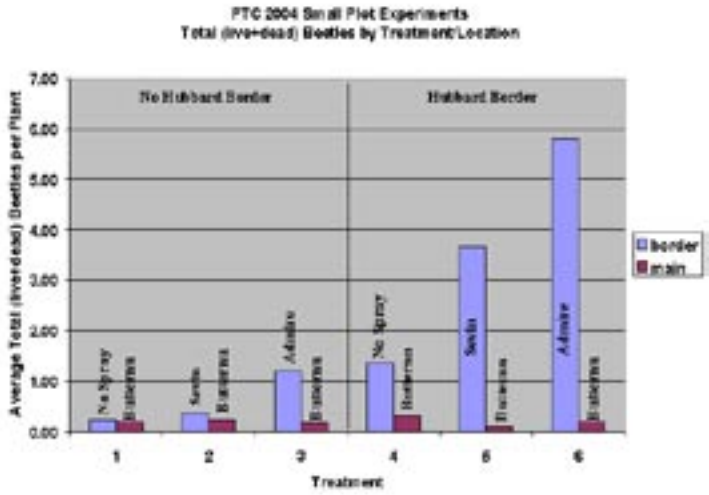

Figure 3 ***Results of 2004 PTC trials****. Seasonal average of beetles (live + dead) per plant in borders and main crop of plots with and without blue hubbard border, with and without pesticide treatments on the border. Main crops were unsprayed. Hubbard borders had significantly greater numbers of beetles than butternut borders or main crops. There was no significant difference between main crops.*

Borders beyond hubbard?

We planted out two trials, each of them with eight different crops or cultivars, spanning three species of *Cucurbitacae*. The goal of these experiments was to evaluate some other potential trap crop/ main crop combinations. Trial one focused mostly on pumpkin types, and trial two focused mostly on winter squash types (Tables 1 and 2). Both trials included blue hubbard, as that has so far been our standard trap crop.

Variety Trial I: Pumpkins

Cultivar	Type	Species
Prizewinner	giant pumpkin	*Cucurbita maxima*
Valenciano	white pumpkin	*Cucurbita maxima*
Speckled Swan gourd	large gourd	*Lageneria siceraria*
Blue Hubbard	hubbard	*Cucurbita maxima*
Rocket	mid-sized pumpkin	*Cucurbita pepo*
Cinderella	specialty pumpkin	*Cucurbita maxima*
Big Max	giant pumpkin	*Cucurbita maxima*
Magic Lantern	mid to large sized pumpkin	*Cucurbita pepo*

Variety Trial II: Winter Squash

Variety	Type	Species
Red Kuri	hubbard	*Cucurbita maxima*
Blue Hubbard	hubbard	*Cucurbita maxima*
Ambercup	buttercup	*Cucurbita maxima*
Waltham Butternut	butternut	*Cucurbita moschata*
Table Ace	acorn	*Cucurbita pepo*
Delicata	delicata	*Cucurbita pepo*
Calabaza	Latino pumpkin	*Cucurbita moschata*
Gourd	standard gourd	*Cucurbita pepo*

In both trials, the *Cucurbita maxima* species had the most beetles and the worst defoliation, significantly more than either *C. pepo* or *C. moshchata*. There was some variation in terms of beetle counts within the maxima species – Red Kuri being the highest and Blue Hubbard being the lowest – but overall the beetles liked the *C. maxima* species much better than any of the species. None of the maxima cultivars we looked at were any more or less susceptible to wilt than blue hubbard, which is good because you don't want to plant a disease reservoir around your main crop. This means that any of the varieties of *Cucurbita maxima* that we tested – Prizewinner, Big Max, Valenciano, Cinderella pumpkins, Blue Hubbard, Red Kuri, or Ambercup winter squash - could be used as trap crops around any of the other varieties we tested. It should also be possible to use a mixed planting of different maxima cultivars around

a planting of one or more of the other species.

Other crops in commercial fields

In addition to these formal experiments, we had one grower who used PTC around his pumpkins, with Prize-winner as the trap crop in 2003 and blue hubbard in 2004. Both worked equally well, but he found the hubbard easier to sell at his farmstand.

In 2004 a cucumber grower came to us with the following problem: His cucumber plantings were large and his fields were far apart, so getting them sprayed at the right time was expensive and difficult. Using Admire at planting would be simpler, but his cucumbers were so closely spaced (30 inches between rows) that the cost was prohibitive. We suggested that he try using a blue hubbard PTC system with admire treated borders, so he would only have to treat a small portion of his field. Beetle pressure was relatively low in his field and they piled up in the hubbard and were killed there. He plans to expand his use of PTC to more fields in 2005.

One organic farmer also tested the blue hubbard/butternut PTC system, without using any border sprays. In 2003, beetles were concentrated in the border, and populations were low enough that this provided sufficient control. In 2004, he used a reverse leaf blower to suction beetles off the trap crop on a weekly basis. This also provided satisfactory control.

What do the growers say?

We surveyed our MA growers, along with some folks in CT who had been using the Blue Hubbard/ butternut PTC system and this is what they had to say:

- 100% of surveyed growers found the PTC system and training to be good or excellent overall.
- Eight out of ten said that using PTC saved them money. The other two said it cost about the same.
- Eight out of the ten growers we surveyed were very satisfied or thrilled with the way PTC worked for them. The remaining two growers were satisfied and would continue using PTC.
- 100% said using PTC took less or the same amount of time as using conventional methods.
- 100% said they used less pesticide.
- Seven growers said that using PTC was simpler or much simpler than conventional pest control strategies. One thought it was about even. The other two found it a little more complex.
- Nine out of ten growers said they will certainly use PTC again. The tenth grower said that he probably would as well.

If you would like to try PTC in 2005…

In the 2005 growing season, we will continue to advise and train growers who want to use PTC systems as part of their pest management strategy. The PTC system also works in other crops, including brassicas, peppers and eggplant, as well as in other cucurbits such as summer squash and cantaloupe. If anyone would like more information about what PTC can do for them please contact Andy Cavanagh at (413) 577-3976 email: *acavanagh@psis.umass.edu*; or Ruth Hazzard at (413) 545-3696.

--Andy Cavanagh and Ruth Hazzard, Department of Plant Soil and Insect Science, University of Massachusetts Amherst

BUYING AND SELLING FRESH PRODUCE AT CHELSEA MARKET

The New England Produce Center and the Boston Market Terminal, together referred to by many as "Chelsea Market", play an important role for many farming operations in the state and region. For generations local farmers sold their fresh produce to wholesale markets based in Faneuil Hall and South Boston. Many farms in the area still sell wholesale to Chelsea Market, but in the last generation

Display at one of the companies in the New England Produce Center. (Photo by Susan Han)

many local growers began to buy fresh produce from the Chelsea Market to augment their own produce sold at their farmstands.

A brief history of the Chelsea Market

The area now called the Faneuil Hall Marketplace in downtown Boston was the main market area for Boston since the founding of the Massachusetts Bay Colony in 1630. This market area was named Fanueil Hall after Peter Faneuil donated the land for the expansion of the site in 1742. He would complain that people consistently mispronounced his family's name which he pronounced "Fan-nel", not "Fan-u-ell". Mayor Josiah Quincy became mayor of Boston in 1823 and he oversaw the expansion of the crowded marketplace. Due to his dedication, many people began to call the market area "Quincy Market", although this name was never officially adopted.

As the population of Boston and the suburbs grew, so did the market. With time it became overcrowded and with the modernization of transportation the market was not as accessible. It became such an eyesore that it was one of the first things Boston mayor Kevin White wanted to address when he was elected in 1968. This led to the departure of the remaining produce vendors from Quincy Market and eventually the opening of the Faneuil Hall Marketplace in 1976 as a shopping area. Many companies that had been based at Quincy Market formed the New England Produce Center and the Boston Market Terminal and moved to a 30-acre site on the Chelsea-Everett line in 1968. (For a history of the market place, see *Quincy's Market* by John Quincy, Jr. 2003.(**Northeastern University Press**)

Dan Tawczynski of Taft Farm in Great Barrington, MA at the New England Produce Center. (Photo by Frank Mangan)

Farmers who buy produce at the market

Dan Tawczynski of Taft Farm in Great Barrington represents a growing trend among vegetable growers in the state who buy fresh produce at the market to augment their own produce that they sell at their farmstands. This has increased tremendously with more farmstands that are open year-round, as is the case with Taft Farm. Dan leaves Great Barrington once or twice per week at 2:30 AM to arrive at the market by 5:00 AM to buy his produce. During the season Dan will sell some produce at the market, but not as much as he had in the past. He prefers to sell the majority of the vegetables and fruits he produces on 85 acres at his farmstand where he can get the retail dollar.

A case of precut vegetables for sale at Garden Fresh in the New England Produce Center. (Photo by Frank Mangan)

Trend on value-added

A strong trend in the fresh produce industry is on value-added, and in particular in what the industry calls "precuts". According to David Yandow, vice president and partner of Fowler & Huntting Co., this trend is being driven by the consumers and the restaurant industry. Fowler & Huntting Co., based in Hartford, is the largest produce distributor in Connecticut with 60 million dollars in annual sales. Mr. Yandow said they buy a lot of produce at the Chelsea market in addition to directly from farmers in New England, including over 30 farmers in Massachusetts. He said this trend in precuts started with precut (baby) carrots, which was a boom to the carrot industry. Carrot production and sales increased dramatically when this started 15 years ago.

The dining facilities at UMass Amherst are a good example of what drives this trend. There are four dining commons at UMass serving 15,000 meals per day. Roberta Potter, manager of one of the four dining commons at UMass, receives a price list on a regular basis for all her fresh produce from Fowler & Huntting Co, who was given the state contract for UMass. She makes her decision on whether to buy whole produce or precuts based on several factors. These include price, quality, availability of her labor to prepare the produce, and how much waste will be created. Ms. Potter used butternut squash and peppers to illustrate how this decision process works. She rarely buys whole butternut squash with the availability of precut squash since it is very labor-intensive to peel. Also, there is a lot of waste created by peeling them – waste of which she has to pay to dispose. She also says that there is no reduction in the quality of butternut squash when it is precut compared to whole butternut squash. With the availability of precut butternut squash, she now serves much more squash than she did when it was only available whole. This means a greater demand for butternut squash, both locally and from other parts of the

Waltham butternut squash, a cultivar developed by UMass at the Field Station in Waltham, MA, imported from Honduras. (Photo by Frank Mangan)

country and world.

In the case of peppers, she prefers to buy them whole since she feels the quality and freshness will be affected by being precut. However, depending on the price and her available labor to process the peppers, she may buy precuts of peppers. Other crops that she buys almost exclusively as precuts are potatoes (for hash browns) and lettuce mixes (for salads). Mr. Yandow expects the trend in offering pre-cuts to expand. He cited the example of beans. Restaurants and other buyers are willing to buy beans that are pre-snipped due to the savings in labor.

Snipped green beans at the Garden Fresh Salad Co. at the New England Produce Center. (Photo by Frank Mangan)

Factors to consider when selling to Chelsea Market

Several owners of companies at Chelsea Market were interviewed about recommendations they would give to growers who want to sell wholesale to the market. Here are the most common ones given:

1. **Packaging.** All vendors interviewed emphasized the importance of quality and consistent packaging and that the market has placed a greater emphasis on this in recent years. The market now is much less forgiving of re-used packaging. One owner said that growers end up hurting themselves when they try and save by using recycled boxes for produce. He said the growers end up loosing money because he has to repackage the produce. He pays $20/hour for union labor to do this, probably more than farmers pay their labor, so this higher cost gets passed on to the grower.

Produce being re-packaged at Tavilla in the New England Produce Center. (Photo by Frank Mangan)

2. **New Crops**. Several owners mentioned increases in certain crops for new markets, especially Latino and Asian produce. However, one vendor who buys from many local farmers said that when he is asked by growers about what new crops they could be growing, he always responds to this question with "What crops do you grow well". His point is that there is always a market for quality produce in a quality pack. His concern is that growers might try to grow a new crop that they are not familiar with and their quality will not be up to the market standards.

3. **Familiarize yourself with the market.** If you are not experienced with selling at the market, it is highly recommended to visit with vendors at the market to understand how the system works and how prices work. The USDA interviews vendors at the market daily and puts out a list of all the produce available at the market with the range of quality and prices. This information is available on the web, http://www.ams.usda.gov/fv/mncs/fvwires.htm. One buyer warned to be very suspect of the prices listed by USDA since some vendors will give erroneous prices for several reasons, mainly for reasons of competition.

Here is a partial list of companies at Chelsea Market that buy from local farmers:

- **Greg Dziama, Inc.** 617-889-4411
- **P. Tavilla Co.** 617 884-9100
- **Garden Fresh** 617-889-1580
- **Peter Condakes Company, Inc.** 617 884-5080
- **State Garden** 617-884-1816**J.**
- **Bonefede** 617 884-3131

--Frank Mangan, Dept. Plant, Soil & Insect Sciences

AVOID GREENHOUSE AIR POLLUTION

Air pollutants from a faulty heating system can affect greenhouse plant production by damaging leaves or flowers and reducing plant growth. Although the visible effect on the plants may be quite obvious, the cause may be difficult to find. The most common pollutants are sulfur dioxide, ethylene and fumes from escaping fuel.

Sulfur Dioxide. All fuels contain sulfur, some more than others. During the combustion process, sulfur is converted to sulfur dioxide. If it leaks into the greenhouse and combines with moisture, sulfuric acid is formed. In excess, this can be toxic. At high levels, which might occur when using unvented heaters during a power outage, severe leaf burn can occur. Young leaves seem to be more susceptible. Long term, low levels, which may occur from a cracked firebox or leaky exhaust pipe, may result in flecking and premature leaf drop. Sulfur dioxide concentrations as low

as 0.5 ppm can cause injury. When purchasing fuel, specify sulfur content of less than 0.02% by weight to help avoid this. Ethylene, a clear, odorless gas, is a byproduct of the combustion of fossil fuels. Ethylene can be damaging at levels as low as 0.05 ppm. Even a few hours of exposure can cause devastating effects on the growth and flowering of plants. Injury includes leaf distortion, abortion of flower buds, defoliation and chlorosis. Fuel fumes from leaks of raw fuel can also affect plants. Propane or natural gas at levels of 50 ppm can have damaging effects. Also, a fuel oil, if it volatilizes on a hot surface, can put harmful vapors into the air. Check the piping frequently for leaks. Indicator plants are a good way to monitor for the presence of sulfur dioxide and ethylene in a greenhouse. Tomato seedlings are often used because they germinate quickly and can be grown on a year-round basis. They respond very quickly, in as little as three hours. Following are areas of the heating system that frequently cause pollution problems: Firebox Leaks. Continual expansion and contraction of the metal in the heat exchanger of a furnace can stress the welds, resulting in cracks that are a prime source of pollution, especially in older units. Placing a furnace candle or smoke bomb inside the firebox and observing any escaping smoke can be an effective way to check a furnace. An alternative is to insert a trouble light into the firebox at night and look for light rays in the heat exchanger area. Cutting into the outside of the metal furnace enclosure and welding the split seam can repair some units. In other cases the whole firebox must be replaced.

Chimney connector. The stovepipe or connector pipe should be severely fastened to prevent leaks. On stovepipe, sheet metal screws can be used to fasten the joints. If the sections do not fit tightly, fill the cracks with pipe cement.

Chimney height. To get adequate draft for combustion and to reduce the potential for backdrafts, the top of the chimney must extend above the peak of the greenhouse and any nearby obstructions. Heating codes recommend a height of three feet above the ridge of the greenhouse or two feet above a 10-foot horizontal line to any part of the structure. A cap on the chimney can help to reduce down drafts, a common cause of fumes inside the greenhouse.

Makeup air. Today's tight greenhouses require an outside source of makeup air to feed the combustion process. On a cold night with the heating system operating almost continuously, the oxygen can be depleted in two or three hours in a tight house if no makeup air is provided. Some of the newer furnaces and boilers have a built-in port to connect a pipe to an outside air source. For heating units without this port, outside air can be brought into the area of the burner using PVC drainpipe or galvanized stovepipe. Pipe size should be at least as large as the vent on the furnace. The pipe should extend from the furnace through the side or endwall and up above the expected snow line. Attach the pipe to the greenhouse for support. A cap and screen should be placed on the exterior end to shed water and keep out animals. Take the time to make an inspection. It can improve the efficiency of the heating system and reduce the potential for pollution problems.

--Adapted by Vern Grubiner, Extension Educator in Vermont from an article by John Bartok, UConn Extension, retired

CONSULTING WITH GROWERS

Thanks to funding from the New England Vegetable and Berry Growers Association, John Howell, retired vegetable specialist from UMass Extension, continues to be available for consulting with growers. He will do telephone and email consultation on questions regarding vegetable production, nutrient and soils management and other appropriate areas. Farm visits are also available, but growers will be asked to pay for some of the travel costs. You can call John at: (413) 259-1203 or email him at: *howell@umext.umass.edu*

THE NEW ENGLAND VEGETABLE AND FRUIT CONFERENCE

SCHEDULED FOR DECEMBER 13, 14, 15 2005

In 2003, the New England Vegetable & Berry Conference was held in conjunction with the New England Fruit Meeting for the first time in Manchester New Hampshire. These two conferences have now officially merged into the New England Vegetable and Fruit Conference, which will be held every two years. The conference will be held this December 13, 14, 15 at the Radisson Hotel in Manchester, NH and will include 24 educational sessions over 3 days, covering major vegetable, berry and tree fruit crops as well as various special topics. A Farmer to Farmer meeting after each morning and afternoon session will bring speakers and farmers together for informal, in-depth discussion on certain issues. There will also be an extensive Trade Show with over 100 exhibitors. The steering committee has been actively organizing this meeting and will have more information on the specific sessions and talks available shortly. Check out the conference website, *www.newenglandvfc.org*, for updates.

FARM TO SCHOOL OPPORTUNITIES

Schools in many parts of the state are now actively seeking sales of fresh local produce from Mass. farmers! Some are hoping to buy directly from farmers, others are working through distributors. One distributor, Acme Pre-pak, is supplying the 51 public schools of Worcester and is looking

to buy additional product from berry growers and vegetable growers for the Worcester summer feeding program, as well as into the fall/winter. To reach Acme, please contact Michael Kane at 508-799-4423.

If you might be interested in selling directly to schools, please contact Kelly Erwin, from the MDAR farm-to-school project at kelerwin@localnet.com or 413-253-3844. She can help you evaluate whether a school, k-16, would be

a good customer for your particular farm and help you find schools in the location you desire.

ANNOUNCEMENTS

Mark your calendar for a Vegetable Crops Field Day: **July 12** at the UMass Research Farm in South Deerfield. We've picked the date to catch growers at a slightly less hectic part of the summer. For more details, stay tuned to the Vegetable Notes newsletter and the Vegetable program website, www.umassvegetable.org.

Are you a sweet corn grower? Do you use pheromone traps to monitor flights of corn earworm or other moths? We are looking for growers who would like to contribute weekly trap counts to the state and regional network of sweet corn pest information. Some trapping costs may be covered. Contact Ruth Hazzard at 413-545-3696.

***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 is R. Hazzard if none is cited.*

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