

# CROP TALK



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## New England Tree Fruit Pest Management Guide Coming Soon

New England tree fruit growers will soon have a pest management guide which will include all tree fruits (apples, pears, stone fruits). The New England fruit specialists have a new arrangement with our colleagues at Cornell University. Cornell shared their latest version of the Cornell Tree Fruit Production Guide and the New England specialists have reviewed and adapted it for our region. In particular, all pesticide recommendations have been carefully reviewed because there are some differences in pesticide registrations that occur between New York and New England. Many Extension folks from the New England states and New York were involved in this new endeavor. We expect copies to arrive in April, but the final cost has not yet been determined. Copies will be available from the UConn Communications and Information Technology office; U-4035; 1376 Storrs Rd.; Storrs, CT 06269 or (860) 486-3336. We will let you know when this new guide becomes available.

## Sweet Corn European Corn Borer/Fall Armyworm Reduced-Risk Insecticide Trials

*Jude Boucher, University of Connecticut*

In 2005 and 2006, twelve sweet corn growers from all around Connecticut participated in a four-state project funded by the EPA and the New England Vegetable & Berry Growers’ Association. The goals of the project were to promote field scouting as a means of determining the timing of insecticide applications for European corn borer (ECB) and fall armyworm (FAW), and to allow growers to try some new reduced-risk insecticides for pest management in sweet corn.

Years ago, IPM programs helped growers transition from using highly toxic insecticides for caterpillar control on sweet corn to synthetic pyrethroids (e.g. Ambush, Asana, Baythroid, Capture, Lambda-T, Mustang, Pounce, Proaxis, Warrior) and other low toxicity products (e.g. Dipel). However, synthetic pyrethroids are hard on natural enemies and carry other environmental and human health/applcator risks. Unfortunately, years ago there were few products in different insecticide families available for growers to choose from so that they could rotate between modes of action for resistance management purposes. There are now several different groups of low-toxicity products available for caterpillar control on sweet corn, such as Avaunt (group 26), SpinTor/Entrust (group 5), and Intrepid (group 18). The idea of this project was to supply growers with newer microbial or low-risk/low-toxicity materials that spare most beneficial insects, and allow them to see how well the new products work compared with synthetic pyrethroids (group 3A).

In 2005, seven growers were asked to scout at least 50 plants in each of two blocks of pre-tassel stage sweet corn for ECB injury. If more than 15% of the plants were infested with larvae, they were asked to record the degree of infestation in each block, and to spray one block with their usual insecticide, and the other with the new product that we supplied. The growers were supplied with either the microbial product SpinTor or Avaunt (which is not a synthetic pyrethroid) to trial against their usual product. They applied the SpinTor at 4 ounces per acre, the Avaunt at 3.5 dry ounces per acre and their usual insecticide at the normal rate. As it turned out, all seven growers in the trial normally used Warrior or Lambda-T for ECB control in their corn. Lambda-T contains the same active ingredient as Warrior, and both synthetic pyrethroids were used at around 3.5 ounces per acre. They treated a total of 21 acres of sweet corn in the

*(Continued on page 2)*



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## Sweet Corn Reduced-Risk Insecticide Trials

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experiment. At harvest, the growers opened 100 ears from each block and recorded the number damaged by ECB. Later in the season four of the growers used some of the extra SpinTor or Avaunt that was supplied against infestations of FAW, which tends to be a tougher pest to control than the ECB.

The four growers who trialed Avaunt alongside Warrior found that an average of 36-38% of their pre-tassel stage corn was infested prior to spraying the two test blocks. They had 100% clean corn at harvest in both blocks. The three growers who trialed SpinTor alongside Warrior found 36-37% of their corn infested before spraying, and at harvest had 100% worm-free corn in the Spintor blocks and 99% undamaged corn in the Warrior blocks. These results showed that all products in the experiment provided excellent control of ECB. The four growers who used up the remainder of their Avaunt or SpinTor bottle on FAW later in the season also found that they had great results with the new products on this pest, although results were not quantified.

In 2006, five different growers were asked to repeat the study, but were allowed to decide whether they wanted to test the new product against ECB or FAW. Three chose to trial one of the new products against FAW, while two tested one or the other insecticide against ECB. A total of 16 acres of corn were treated in the experiment. One of the three growers who tested Avaunt against FAW reduced his damage at harvest from 10% using Proaxis to 5% using Avaunt, while the other two growers had equal control (2% damage) in both blocks. The two growers who tested Avaunt and SpinTor against ECB averaged 32-40% infestation prior to spraying and had no damage at harvest in either block. The low-risk products provided equal or better control than the growers' traditional products.

Here are some of the comments the growers had about the new products and scouting at the end of the study:

- "Scouting, you can catch the ECB or FAW earlier so it doesn't get to the ear"
- "Scouting helped us to know when to spray better, rather than guessing"
- "Results were excellent"
- "Just as effective as Warrior"
- "As good, if not better than harsher products"
- "Similar level of control as Warrior"
- "With Avaunt I sprayed fewer times because it did the job the first time"
- "Worm-free at harvest"
- "Less toxic to me and the environment"
- "Felt much safer handling it"
- "Non-restricted"
- "Can spray without pesticide license"
- "Zero infestation in a block that had over 90% earlier"
- "Cleaner at the time of harvest – no infestation"
- "I used less chemical"
- "Better kill of FAW compared with Warrior"
- "Not that much more expensive than Warrior + sticker"
- "Different mode of action for resistance management"
- "Better to alternate between products for resistance management"

## Controlling Plant Height without Chemicals

Douglas Cox, University of Massachusetts

The height of greenhouse plants can be controlled by a number of non-chemical cultural methods. Interest in these techniques has grown because of the tighter controls placed on the use of agricultural chemicals and the public's negative perception of chemicals in general. The Worker Protection Standards recently developed by the EPA control the use of plant growth regulators (PGRs), and limits have been set on how soon workers may reenter greenhouse areas treated with PGRs. Reentry intervals (REIs) for PGRs range from 12 to 48 hours. What follows is an outline of other methods for controlling plant growth which may be effective alone or in combination with low levels of PGRs.

### Scheduling and Cultivars

Plants started too soon often need to be "held back" by PGRs. Some growers start plants early to spread out transplanting to match the availability of labor and space or cutting production from stock plants. The quality of the earliest plants may suffer from efforts made to hold them back, or the plants may be past maturity at marketing time. Buying in cuttings or plugs rather than trying to grow your own may help keep crop production on the proper schedule.

Cultivar selection is also important. Some bedding plants are available in tall, medium, and short types which look very similar except for height. Unless customers are fussy about height, using smaller cultivars is an easy way to "control" height.

A review of the basic cultural recommendations and schedules for a crop may be a useful and "eye-opening" exercise. For example, the PGR requirements for most of today's poinsettias are rather minimal, assuming the proper crop timing, light, and temperature requirements are met. But when the cuttings are potted and pinched early or if the plants are crowded, the number of PGR applications generally increases.

### Light Intensity

One of the easiest ways to reduce height and the need for PGR treatment is to maximize the amount of light plants receive to reduce "stretch." This means adequate spacing, clean glass, and fresh plastic covering. For some plants supplemental HID lighting may be feasible. One of the most common reasons for frequent use of PGRs is that the grower is not taking full advantage of all the available natural light.

### DIF Temperature Control

By now most growers have heard of the DIF technique of temperature control developed by Dr. Royal Heins and colleagues at Michigan State University. In fact, some growers in our area are using some form of DIF on a regular basis. DIF is defined as the difference between day temperature (DT) and night temperature (NT). Stem elongation is promoted by warmer days than nights (positive DIF) and inhibited by warmer nights than days (negative DIF). Plants become taller as DIF becomes more positive and plants become shorter as DIF becomes smaller or more negative.

Significant height control and reduction in PGR use is possible by reducing the difference between DT and NT as much as possible. Another approach to using DIF is the "cool morning pulse." A cool morning pulse is created by reducing the

greenhouse temperature 5-10°F lower than the NT for 2- 3 hours at dawn. This approach reduces plant height as much as a negative DIF and may be the easiest DIF treatment to make.

DIF seems to be effective on most greenhouse plants, but research continues with many different species (see Table 1). DIF, like a PGR, has its greatest effect on height during the period of most rapid stem elongation. DIF does not have to be applied continuously throughout a crop cycle to be effective, but rather only during the period of most active vegetative growth.

A note of caution: DIF treatments affect the *rate of crop development* as well as stem elongation. Growers using DIF should determine the effect of their DIF treatment on the average daily temperature. A DIF treatment raising average daily temperature would speed crop development, while a treatment lowering average daily temperature would slow crop development.

Table 1. Response of some plants to DIF

<b>Plants with large response to DIF</b>	Asiatic lilies, Celosia, Chrysanthemum, Dianthus, Easter lily, Fuchsia, Geranium, Gerbera, Hypoestes, Impatiens, Oriental lilies, Petunia, Poinsettia, Portulaca, Rose, Salvia, Snap bean, Snapdragon, Sweet corn, Tomato, Watermelon
<b>Plants with little or no response to DIF</b>	Aster, French marigold, Hyacinth, Narcissus, Platycodon, Squash, Tulip

**Fertilization**

One of the oldest and most common ways of attempting to prevent stretching is to withhold fertilizer or water. Some growers try to hold back plants using low temperature in combination with nutrient and/or water stress. Low fertility or mild water stress can be successful if carefully controlled. However, there are risks: too much growth inhibition, development of nutrient deficiency symptoms which are unsightly and hard to correct, or damage to the plants from water stress.

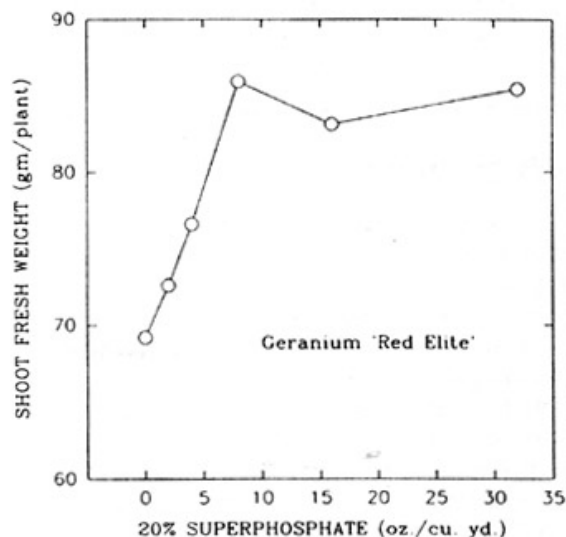
The nutrients which have the most effect on the size of greenhouse plants are nitrogen (N) and phosphorus (P). The biggest effect of withholding a water-soluble fertilizer is N deficiency. Unfortunately if N deficiency conditions go on too long the plants will be too small and also very yellowed. A P deficiency is somewhat more difficult to create than an N deficiency, but if carefully managed a mild to moderate P deficiency will result in a desirable reduction in growth and no foliar symptoms. In fact, a mild P deficiency actually makes many plants appear greener! A well-known fertilizer company promotes the "P-starvation" technique for growth control and markets two water-soluble fertilizers, 20-1-20 and 20-2-20, for this purpose. Routine use of these fertilizer supposedly results in shorter, stockier plants than fertilizers with higher P analysis, like 15-16-17, 20-10-20. Growers should be warned that low P is said to reduce bract diameter of poinsettias, so low P fertilizers should not be used on this crop.

This past spring I began research on the potential of nutrition to control growth with support of the Massachusetts Flower Growers Association and the New England Greenhouse Conference. The main impetus for this project is that growers have no recommendations to follow if they try to use low fertility as a growth control method. The objective is to develop methods which reduce plant height while avoiding too much stunting, deficiency symptoms, and undesirable delays in crop development. There are many different practical approaches which could be

tried, but I have had a chance to try only a couple.

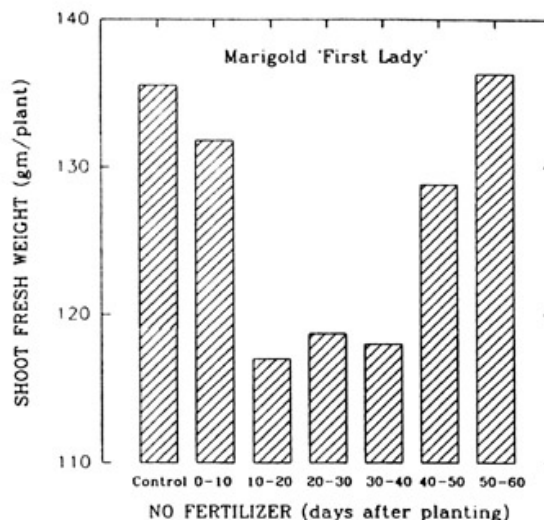
In one experiment I grew 'Red Elite' geranium in a commercial mix amended with 20% superphosphate in a range of 0 to 32 oz/yd<sup>3</sup>. The fresh weight of the tops at the end of the experiment followed a typical fertilizer rate response pattern (Fig. 1). Plants grown with no superphosphate or 2 and 4 oz/yd<sup>3</sup> were darker green in color, but only slightly shorter than the higher P treatments. Perhaps more growth control did not occur because there was enough P in the starter charge to carry the plants during the early, active stage of growth.

Figure 1. Effect of withholding fertilizer on growth of geranium



In another experiment I grew 'First Lady' marigold and withheld fertilizer for 10 days from different groups of plants periodically as the plants grew. The biggest effect on growth measured at the end of the experiment occurred when fertilizer was withheld during periods 10-20, 20-30, or 30-40 days after transplanting the seedlings (Fig. 2). The effects of no fertilizer during these periods was apparent mainly in leaf size, stem thickness, and branch development rather than height. These two experiments demonstrate that using mild or moderate nutrient deficiency to control growth is not as straightforward as might be expected. I plan more trials beginning this fall.

Figure 2. Effect of superphosphate level on growth of marigold



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## To Grow or Not to Grow Bt Sweet Corn

Jude Boucher, University of Connecticut

One new option for managing damage from sweet corn caterpillar pests is the use of Attribute® Insect Protected varieties that express the protein toxin of the bacteria *Bacillus thuringiensis*. These varieties are gaining popularity with growers nationwide, especially large wholesale producers and those growing corn for processing. About 5% of the sweet corn acreage currently produced is Bt sweet corn.

Many wholesale fresh-market growers in the Northeast have tried at least one variety of Bt sweet corn (i.e. TripleSweet® BC0805) in the last couple of years. BC0805 is an 82-day bicolor, synergistic variety, composed of 75% sugar enhanced (SE) and 25% supersweet (SH2) kernels. It is similar to 'Providence' and the ear quality is widely accepted in the marketplace. The Bt protein is expressed in the SE kernels, the fresh silk, stalk, leaves and tassel. Attribute varieties were created by moving genes from Bt bacteria into field corn and then moving these genes to sweet corn through traditional breeding programs. These varieties are considered genetically-modified (GM) crops.

Like all new technology, GM technology comes with a list of advantages and disadvantages and has been surrounded by controversy since GM food crops were first introduced. To make an informed decision about whether GM technology, and in particular Bt sweet corn, is right for your business, you will need to understand both the risks of using these products and the benefits of using them. My purpose in writing this article is not to dissuade you from or persuade you into using Bt sweet corn, but merely to get you to think about both sides of the debate.

### Potential Risks/Costs

Some risks/costs are obvious, such as increased cost of seed (\$36-79/acre), and the potential of hastening resistance to a very useful insecticide with a novel mode of action (Bt) through constant exposure of the active ingredient to the pest population. Based on the current costs for insecticide applications and the price difference between Bt corn and Providence, you will have to save 3 to 5 sprays per field to make Bt corn cost-effective. It may not be cost-effective to use Bt sweet corn for early plantings when pest pressure is low and only a couple of sprays are required. In addition, resistance to Bt has already occurred for other caterpillars, such as the diamondback moth, so it is a safe bet that it will also occur for sweet corn caterpillars. There are strict resistance management strategies (which have their own costs) that the company insists you comply with if you plant the new Bt seed. However, there are no guarantees these strategies will be employed by the growers who purchase the seed, or that they will hold off resistance for very long.

Some of the risks are not immediately obvious. They include risks such as a possible consumer backlash from customers fearful of eating corn with an insecticide in it, possible allergic reactions, secondary pest outbreaks (i.e. sap beetles), and liability and non-target effects from GM pollen drift.

Pollen from older varieties of Bt field corn was shown to

have lethal and sub-lethal effects on monarch butterfly larvae. There was some concern that pollen drift from Bt corn could reduce the population of butterfly larvae on milkweed plants in and around corn fields. Additional research eventually showed that even potent strains of Bt could only reduce the population of caterpillars exposed in this way by less than 1% over time. However, this incidence certainly raises the question of what other organisms may be harmed by insecticide-laced pollen. Also, what if Bt pollen drifts into organic fields? Is the crop still organic? Who is liable for contamination? Associate Professor Yi Li at UConn has developed some new technology called a "GM-gene-deletor" which may eventually reduce risks currently associated with pollen drift. The new technology blocks the transfer of GM genes into pollen or seeds, without rendering the seeds sterile. So, progress is being made all the time to help make GM technology safer, but some of these solutions are still many years away from reaching the market.

Finally, while Bt corn eliminates the need for pre-silk European corn borer sprays and most whorl and pre-tassel sprays for fall armyworm, it does not control certain pests, such as flea beetles, cutworms and aphids. So it will still be necessary to scout, monitor and spray for these pests at different times during the season. It also does not eliminate the need for all corn earworm silk sprays. Although Bt corn controls low to moderate levels of corn earworm, protection breaks down at higher population levels, when the plant is under stress, and as the silk begins to die/dry, which stops the production of the toxin.

### Potential Benefits

There are also many potential benefits of adopting GM-technology for sweet corn. They include a reduction of time, energy, and expense involved with pest control. Risk associated with applicator/worker insecticide exposure, spray drift, and ground and surface water contamination should be reduced. Also, there should be less soil compaction, less wear and tear on machinery, and reduced use of broad-spectrum insecticides (i.e. Warrior). Such insecticides kill beneficial insects which are spared by Bt (as well as several other selective insecticides), and these natural enemies can help reduce pest problems later in the season on sweet corn and on other nearby crops.

Corn earworm resistance to synthetic pyrethroids is becoming a critical problem in sweet corn production in the Midwest. Bt sweet corn could be used one year and synthetic pyrethroids used the next year, which would provide an effective resistant management technique. Ultimately, it may be resistance problems with corn earworms and synthetic pyrethroids that drive growers to this new technology if resistance management techniques are not employed.

Perhaps the single biggest potential benefit may be how Bt sweet corn simplifies pest management. Currently, it requires a considerable degree of management skill and a substantial investment of time to produce clean sweet corn consistently. In the near future, the use of several marketable Bt varieties, such as TripleSweet BC0805, will make it easier to achieve consistent sweet corn quality, without the occasional "worm" problem. Consistent quality may translate to higher yields and higher net profits. Imagine how easy it will be to grow good early corn when Seminis releases Roundup-Ready, Bt, 'Temptation' in 2009.

No weed, insect or cold soil problems - even a child will be able to grow great early-season sweet corn! Of course, this is a double-edged sword, and could also lead to overproduction and lower corn prices. However, having no weed, insect or cold soil problems in early season sweet corn sounds pretty nice and may be worth a few extra dollars!

Notice how all the benefits of Bt corn depend upon reducing insecticide use aimed at controlling caterpillar pests. The problem is that reaping those benefits by reducing caterpillar sprays is not as simple or straightforward as it seems, due to the incomplete control of corn earworm. Some CT growers have told me that although they know that their single variety of Bt sweet corn probably doesn't need spraying at low earworm levels, they apply the spray anyway because they are already out with the sprayer for the other non-Bt varieties in the same planting, and they just want to err on the "safe" side. To state the problem simply, growers bear the costs of GM technology as soon as they order and plant the Bt seed. However, in order to reap the benefit of the new technology they must reduce insecticide use. For this to occur, new action thresholds for Bt corn must be constructed so that growers know if and when the GM sweet corn needs additional protection. We are working on these thresholds, but we'll leave that discussion for another time.

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## "New" Insecticides & Miticides for Apples

Alan Eaton, University of New Hampshire

Reprinted from the NH Integrated Pest Management Newsletter, Vol. 13, No. 1, with minor modifications by Lorraine Los

This year I spent quite a bit of time in December and January trying to figure out what insecticides were registered in New Hampshire (and other New England states) since the last time we put out a printed New England Apple Pest Management Guide. It turns out that there are a LOT of new names, but many are just new brands of familiar chemicals. I'll try to include as many as I can.

**ABBA** and **Epi-mek** have abamectin, the same active ingredient in Agri-mek (or Avid, for you greenhouse people). Some guides consider abamectin (also called avermectin) an antibiotic. We now have a very similar chemical, an analog, called Emamectin benzoate. The trade name for this new material, from Syngenta, is **Proclaim**. Most of the target pests for apple are caterpillars: leafrollers, leafminers, etc. For some pests, the label uses the term "suppresses," rather than "controls."

**Acramite** is a miticide from Crompton Uniroyal. The active ingredient is bifenazate, and it is registered on quite a few vegetables, strawberries, pome fruit, stone fruit (nectarines, peaches, plums, prunes), and nuts. It is also registered on some non-bearing crops including berries, apricots and cherries. Greenhouse growers know this active ingredient as Floramite.

**Adjourn** is a pyrethroid chemical, esfenvalerate. The same chemical is in Asana, so you should be familiar with its range of target pests.

**Assail** is a relatively new chemical, acetamiprid, with a spectrum of activity that includes leafminers, codling moth, lesser

appleworm and others.

**Battalion** is deltamethrin, a pyrethroid from Arysta. Deltamethrin has been registered in Canada for a while, under the name **Decis** (Bayer Crop Science). Both products are now registered here on pome fruits. They have a broad range of targets, including tarnished plant bug, plum curculio, European apple sawfly, apple maggot, and leafrollers.

**Baythroid** and **Tombstone** are both cyfluthrin, a pyrethroid insecticide that is labeled for a wide range of insects on apples, pears, stone fruit and grapes.

**Clutch** is an insecticide with clothianidin as the active ingredient. Arvesta is the company, and plum curculio, leafminers, leafhoppers, codling moth, apple maggot and aphids are among the targets. This one is in activity group 4A, which means it has the same mode of action as imidacloprid. Besides these targets it is registered to control psylla on pears.

We've had imidacloprid for fruit pests for several years, first as Provado, then Admire. Now added to the list are **Couraze, Imida, Nuprid and Pasada**. Leafminers, leafhoppers and San Jose scale are among the targets. There are some differences in the spectrum of targets between the various imidacloprid products.

**Govern, Nufos, Warhawk, and Whirlwind** are all new names to me, but the active ingredient is chlorpyrifos, which we've used for years as Lorsban. The products have limited insect targets registered for apples, and they vary a bit from product to product.

**Kanemite** is a new miticide directed at European red mite & twospotted spider mite. It has a 14-day pre-harvest interval on pears and apples and is also registered on strawberries (1 day to harvest).

**Lambda-T** has l-cyhalothrin as the active ingredient. Helena is the manufacturer. It is registered for a wide range of insects and crops, including pome fruit and stone fruit. **Silencer** (Makhteshim) and **Warrior** (Syngenta) are made of the same stuff, a "fourth generation" pyrethroid. We also have gamma cyhalothrin now. It is different enough from the lambda isomer that it gets a different registration and different name, **Proaxis** (Loveland Products). It is registered on LOTS of crops, and the list of pests on apple is a bit different than the l-cyhalothrin products.

**Nexter** is relatively new and replaces Pyramite. It is registered for apples, pears, stone fruit and grapes. Sanmite (registered in greenhouses) has the same active ingredient, called pyridaben. It is a contact miticide, with some effects on a few insects, including aphids, whiteflies, leafhoppers and pear psylla.

**Perm-up** is a new name (to me) for an older chemical: permethrin.

**Rimon** is an insect growth regulator, with novaluron as the active ingredient. The apple pests listed are caterpillars: codling moth, leafrollers, leafminers, oriental fruit moth. The label says it suppresses populations of young white apple leafhoppers.

**Zeal** is a new miticide. Etoxazole is the active ingredient. It is registered for pome fruit, grapes, strawberries, and non-bearing fruit trees.

## Pesticide Label Changes for Fruit Crops

Lorraine Los, University of Connecticut

### Changes to Existing Labels

#### **Guthion (azinphosmethyl)**

The use of Guthion/azinphosmethyl products is no longer permitted on peaches, nectarines, caneberries, cranberries, potatoes and cotton. The only remaining fruit uses include apples, pears and cherries, which are supposed to remain on the label until 2012. The current Guthion Solupak 50% label for 2007 allows a maximum of 8 lb formulation per acre per year for apples; 6 lb formulation per acre per year for pears; and 3 lb formulation per acre per year for cherries. These maximum per acre amounts will be reduced in future years. New labels will also indicate that there is a 60 ft buffer required from permanent bodies of water and occupied buildings. There are also various "Pick-Your-Own" restrictions depending on the crop. Be sure to read these labels closely. Also note that Guthion is no longer being marketed by Bayer Crop Science. It is now being distributed by Makhteshim Agan of North America (MANA).

#### **Imidan 70-W (phosmet)**

The new Imidan 70-W label that came out in 2006 includes changes in the restricted entry interval (REI) for a number of fruit crops. The REI on the old label was 24 hours for all crops. On the new label there is a 3 day REI for apples, apricots, cherries, nectarines, peaches, pears, plums, and prunes. The REI for highbush blueberries remains at 24 hours; however, it is 3 days for low-bush blueberries. On grapes, the REI has changed to 14 days. There was an additional change for tree fruits related to "Pick-Your-Own" operations. Any person who is not covered by the Worker Protection Standard, such as members of the general public involved in "Pick-Your-Own" operations, cannot enter the treated area for 14 days after application.

More changes will occur on Imidan labels in 2008. On January 19, 2007, the U.S. Environmental Protection Agency (EPA) announced its decision to reregister Imidan. As part of the decision, EPA has indicated certain label changes that will occur including increasing reentry intervals for farm workers, increasing reentry intervals for the public for "Pick-Your-Own" sites, reducing seasonal per acre use, requiring buffer zones between application sites and houses or other occupied structures, etc. These new changes will be included on product labels sold or distributed after June 2008. We do not have to worry about these changes until next year.

#### **Indar fungicide (fenbuconazole)**

There are now two different formulations of Indar fungicide for use in fruit crops. The new formulation is Indar 2F and includes the following fruit crops on the label: apple, blueberry, plum, prune, and stone fruits (apricot, cherries, nectarine, and peach). The older label is Indar 75WSP, which only lists stone fruits (apricot, cherries, nectarine, peach) on the main label. Recently, supplemental labels for Indar 75WSP were issued for apple, blueberry, plum and prune. If you use the 75WSP for these additional crops, you must have a copy of the supplemental label in your possession at the time of application. The supplemental labels for the 75WSP and the new 2F label also include restrictions regarding "plant-back intervals" for crops

without primary label uses (such as rotational crops). See label for specific details. You can download a copy of the supplemental labels for Indar 75WSP from <http://www.cdms.net>.

The following are the diseases listed for each crop on the new Indar 2F and the 75WSP supplemental labels:

- Blueberry—mummy berry, *alternaria*, anthracnose, leaf spot and blotch, *phomopsis* twig blight and fruit rot, powdery mildew and rusts.
- Apple—flyspeck, powdery mildew, rusts, scab, sooty blotch
- Plum and prune—blossom blight, fruit brown rot

### New(er) Pesticides

#### **Centaur (buprofezin)**

Centaur is a new insect growth regulator from Nichino America. It is registered for leafhoppers and scale in apples, mealybugs and scale in peaches, and pear psylla and scale in pears. For scale insects, treatments should be made when peak crawler emergence occurs. The REI is 12 hours and the Preharvest Interval (PHI) is 14 days for these crops.

#### **Envidor 2 SC (spiroadiclofen)**

Envidor is a relatively new miticide from Bayer Crop Science that is registered for use on grapes, pome and stone fruits. The pests include European red mite, twospotted spider mites, and pear rust mite. Only one application can be used per season on these crops. It should be effective on eggs, immature mites and adult females.

#### **FujiMite 5EC (fenpyroximate)**

This miticide/insecticide from Nichino America is registered for use on pome fruits, grapes, and nonbearing deciduous fruit and nut trees and vines. The targeted pests include leafhoppers, mealybugs, pear psylla and mites including European red mites and twospotted spider mites. Two applications are allowed per season; however to avoid resistance, do not make more than one application per season. Avoid using products with the same mode of action in successive applications. The pyridaben miticides (Pyramite/Nexter) are in the same class as FujiMite.

#### **Gem and Gem 500 SC (trifloxystrobin)**

This fungicide contains the same active ingredient as Flint. Gem is labeled for stone fruits, including apricots, cherries, nectarines, peaches, plums, plumcots, and prunes. It is labeled for control of cherry leaf spot, powdery mildew and scab. Stone fruits are no longer on the Flint label.

### Update on Section 24(c) (Special Local Need) Label

#### **Captan (captan)**

Connecticut no longer has a 24(c) label for Microflo Captan 50 Wettable Powder for disease control on raspberries and blackberries. This should not be an issue because there are several other captan formulations that are available for these crops. Drexel Captan 4L, Microflo Captan 80 WDG, Drexel Captan 80W and Microflo Captec 4L are all labeled for both raspberries and blackberries. At the time we did the original 24(c) paperwork, none of these other options were available.

Most pesticide labels can be downloaded from <http://www.cdms.net>.

## What's killing the honey bees?

Lisa Duchene, Penn State University

Reprinted from the Research/Penn State Magazine

Far away from the rising snowdrifts outside our windows, spring is unfolding in California as the almond trees begin to bloom. Missing from the party are millions of honey bees typically trucked in to pollinate the \$2-\$3 billion crop. Since last fall, beekeepers in more than 20 states including Pennsylvania have lost tens of thousands of honey bee colonies—an estimated 30 to 35 percent of the nation's pollinator stock. Nobody knows why.

Almonds are the first crop jeopardized by the die-off. "We haven't really seen the panic set in yet. It's just starting now," says Zac Browning, co-owner of Browning's Honey Co. and VP of the American Beekeeping Federation in Jesup, Georgia. But apple trees in the Pacific Northwest, Pennsylvania, and other Northeast states, along with cucumber, melon, cherry and berry crops, will all soon need pollination. In all, honey bees annually pollinate about \$14 billion worth of food crops, or one third of the nation's produce.

Apiculture experts are scrambling to figure out the cause of the massive die-off they've named Colony Collapse Disorder. The ecological detectives include Penn State honey bee expert Maryann Frazier, a senior Extension associate in entomology, and entomology professor Diana Lynn Cox-Foster. So far, says Frazier, there are several possible suspects. The varroa mite, a parasite that sucks the blood of both adult and larval bees, is a well-known nemesis that can weaken a hive and set the stage for viral devastation. But another mysterious factor is at work. "Something's causing the bees to be particularly weak and that then allows the mites and the viruses to do their job," says Frazier, who has worked with honey bees for 28 years. There may be a pathogen not previously observed—"perhaps a fungal disease," she adds. Cox-Foster and David Geiser, professors of Plant Pathology are working on this angle. The third suspect is environmental contaminants. A number of new pesticides are toxic to honey bees, and could be negatively impacting the colonies in several ways, Frazier explains.

Whatever the cause, last fall beekeepers began reporting dramatic die-offs. One beekeeper in Lewisburg, Pennsylvania who overwinters his hives in Florida lost three-quarters of his bees within a two-week period in November, says Frazier. We don't yet know the impact on Pennsylvania's migratory bee population. But the die-off may actually have started earlier, as beekeepers have sustained higher than normal losses for the last several years. Trying to explain their disappearance, Frazier notes, "We have never seen a die-off of this magnitude with this weird symptomology. We've seen bees disappear over time and dwindle away, but not die off so quickly."

The die-off is primarily affecting large, commercial beekeeping operations. Besides honey bees, introduced to North America by the Puritan colonists, there are some 700 other kinds of bees in the Northeast, but Frazier does not expect them to be affected. Pesticide use in large, single-crop farms wipes out many other sources of pollination, so many farmers resort to "hives for hire," and rent hives of honey bees while the plants are blooming. The average hive earns \$50 to \$100 annually in rent, \$125 to \$150 in the case of California's almond crop. Beekeepers, already losing hundreds of thousands of dollars in pollination revenue, are

importing bees from Australia to rebuild their hives by the summertime, according to the American Beekeeping Federation.

Here in the Northeast, more losses are expected when the cold weather breaks and beekeepers check their hives for the first time. As Frazier, Cox-Foster and others search for answers, the future of the American beekeeping industry may hang in the balance.

*Note: The CT Agricultural Experiment Station has just begun inspections of honey bee hives in CT and has already discovered a number of hives displaying characteristic symptoms of Colony Collapse Disorder.*

## Using In-Row Pollenizers for Seedless Watermelon Production

J.H. Freeman and S.M. Olson, University of Florida

Reprinted from the Proceedings of the 2006 Great Lakes Fruit, Vegetable and Farm Market Expo

Over the last decade the popularity of seedless watermelon has increased. During peak watermelon production in the U.S. market in 2005 and 2006, seeded watermelons only comprised 22% of the market and averaged four to five cents less per pound. When growers transfer acreage to seedless watermelon production, they must take into account that seedless watermelon plants do not produce enough viable pollen to pollinate themselves. Another source of pollen must be available to achieve acceptable levels of fruit set in the seedless crop. To achieve optimal yields, 25% to 33% of the plants in the field should be seeded. This is generally accomplished by inter-planting a seeded variety of watermelon in the same field to serve as a pollenizer; traditionally this has been done by using dedicated pollenizer rows. Every third or fourth row was planted with a seeded variety. Generally the seeded and seedless watermelons were harvested separately unless rind patterns of the two were easily distinguishable.

It has now become difficult to market seeded watermelons and there are fewer growers that want to have a high percentage of their acreage in seeded watermelons. There are now multiple pollenizer varieties that are designed to be planted in-row (commonly called special pollenizers) with seedless plants. Commercially available pollenizers, their characteristics, and sources are listed below. The primary role of these varieties is pollen production and most are not designed to produce marketable fruit. However 'Jenny,' 'Mickylee,' 'Minipol,' and 'Pinnacle' may be harvested.

At planting time holes are punched and the field is planted solid with seedless plants. Then, another crew goes through the field and plants a pollenizer between every second and third or third and fourth plant. Most pollenizer varieties are recommended to be planted at a 1:3 pollenizer to seedless ratio. This being the case, a pollenizer would be planted between every third and fourth plant within the row. By eliminating dedicated row space in the field for pollenizers, the number of seedless plants and seedless watermelons harvested per acre increases. If a grower previously planted every third row with a pollenizer and then started using in-row pollenizers, their seedless plant population per acre would increase by 33%. This fact must be taken into

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## Using In-Row Pollenizers for Seedless Watermelons

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account when calculating input costs as seedless seed costs about three times more than standard seed.

Research at the University of Florida and Clemson University has been conducted comparing the effectiveness of seven in-row pollenizer varieties. The following varieties performed similarly and could all be expected to produce optimal seedless watermelon yields: 'Jenny,' 'Mickylee,' 'Patron,' 'Pinnacle,' 'Sidekick,' and 'SP-1.' 'Minipol' was not tested but its growth habit is similar to 'Mickylee' and it would be expected to perform comparably. See Table 1 for additional information on varieties.

Table 1. Commercially Available Pollenizer Varieties

Variety	Source	Vine Type	Fruit Type
'Jenny'	Nunhems	Reduced vines, increased branching, thinner foliage,	Round jubilee type stripe
'Mickylee'	Various—Abbott & Cobb, Willhite, etc.	Standard	Round gray
'Minipol'	Hazera	Slightly reduced standard type vines	Round gray
'Patron'	Zeraim Gedera	Reduced vines, increased branching, thinner foliage	Gray with thin green striping
'Pinnacle'	Southwestern Seed	Reduced vines, increased branching, thinner foliage	Jubilee type stripe
'Sidekick'	Harris Moran	Reduced vines, increased branching, thinner foliage	Crimson sweet with dark background, very small size
'SP-1'	Syngenta	Highly branched, thin vines with reduced leaves	Round, light green with thin green striping

There are substantial differences in prices of pollenizers, so this must also be considered when choosing a variety. Of the cultivars recommended most can be easily distinguished from standard seedless watermelons (15-20 lb) by their size, as most pollenizer fruit is small. However, if a grower is producing mini or palm sized seedless watermelons, a pollenizer with a distinctly different rind pattern must be chosen to avoid confusion during harvest. Most companies that produce seedless watermelon seed now have pollenizers also. If the pollenizers have been tested and found to perform well, it may be preferable for a grower to have a pollenizer and a seedless variety from the same company. Even though these pollenizers are effective, if a grower still has a strong market for seeded watermelons there may be no reason to adopt in-row pollenizers.

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## Strawberry Plasticulture Nutrition Research Update

Kathy Demchak, Pennsylvania State University

Reprinted from *Fruit Times*, Vol. 26, No. 2

From 2003 to 2005, research examining various aspects of plasticulture production was carried out on growers' farms in Pennsylvania and at the Penn State Horticulture Research Farm at Rock Springs as part of a project funded by the Pennsylvania Department of Agriculture. Below are some of the questions we were trying to answer, and what we found.

1) How helpful are ion meters (aka petiole sap testers or Cardy meters) for monitoring nutrient status? These easy-to-use field-friendly devices can produce a nearly instant determination of plant sap nitrogen and potassium levels, but how reliable are these readings?

In the spring and early summer of 2003 and 2004, plant nutrient levels were tracked using both ion meters and a complete laboratory analysis for samples collected from six cooperating growers' fields. The bottom line was that the primary value of ion meters appears to be for confirming suspicions that an experienced grower might make based on visual observations of plant color and vigor (i.e. whether nitrogen levels are deficient, adequate, or excessive), or to make this determination for less experienced growers. However, to know the degree to which adjustments should be made to a nutrient program, a complete laboratory nutrient analysis is still needed. When using ion meters, take at least three separate readings from a sample consisting of a minimum of twelve petioles from any one field. Then average the readings, as individual readings can be quite variable.

2) Is a complete lab analysis of strawberry leaves in the spring useful, and is there a preferred time for taking samples then?

From monitoring the samples as described above, it was found that leaf nutrient levels change rapidly in the spring, but are especially unstable before bloom and after the fruit start to enlarge. The greatest period of stability occurred during the period from early bloom to full bloom. By taking samples then, you may be able to correct certain nutritional problems in time to minimize impact on the current year's harvest.

During the course of the project, it was found that leaf samples sent in for nutrient analysis typically still had the petioles

attached, while the values established for interpretation, and instructions for sampling, are for the blades alone. Extra samples of separate petioles and blades were run to determine whether this discrepancy makes a significant difference in sample results. There was a significant difference in the nutrient concentrations in petioles and leaves. So, when sending in leaf samples to the nutrition lab for a complete analysis, be sure to remove the petioles. If the petiole is included as part of the sample, it would be possible for a misdiagnosis to occur.

### 3) How quickly does fertigation affect plant nutrient levels?

In a controlled experiment at Rock Springs in 2003, nitrogen levels in the leaves increased by 9.8% at 48 hours following fertigation, then fell gradually until nitrogen levels were 4.5% higher than in the control at 7 days. Fertilizer applications should be split into small but frequently applied (once per week) amounts. The quick uptake of nutrients means that growers can potentially correct nutrient problems through fertigation quickly.

*Thanks to the following Extension educators and grower cooperators without whom this project would not have been possible: Tim Elkner, Steve Bogash, George Perry, Scott Guiser, Tom Butzler, Harvey and Grace Sauder, Myron Kressman, Reuben Martin, Tim and Marcia Brown, Brad Eberly, and Seth Ulmer. This research was supported in part by agricultural research funds administered by the Pennsylvania Department of Agriculture.*

## New CT FarmLink Program Growing New Opportunities for Farmland Seekers and Owners

Jane Slupecki, CT Department of Agriculture

Do you and your family have a plan for transfer of the farmland you own? Are you a young farmer who is looking for land? Farmland is irreplaceable. There is a new generation of young farmers who want to be tomorrow's stewards of the land, but they do not have land to work.

Public Act 05-228 was landmark legislation that created, among other programs, a FarmLink program to aid in farm transfer. According to state statute, the Connecticut FarmLink program and website is designed to be a clearinghouse for information to help in the transition of farmland from generation to generation, with the goal of keeping farmland in production.

The legislation authorizes the Department of Agriculture to establish a database of farmers and agricultural landowners who intend to sell their farm operations or agricultural land. The Department created a new public website at <http://www.farmlink.uconn.edu> which contains listings of farmland owners and farmland seekers. It helps connect owners of farmland with people who are trying to start an agricultural business or expand an existing agricultural business. Interested parties can take advantage of the free posting service on this site to post listings describing their farm transfer goals or need for farmland.

How do you sign up? Applications are available on the site. Applicants are accepted simply by completing the application and mailing it back to the agency: CT Dept of Agriculture, FarmLink Program, 165 Capitol Avenue, Hartford, CT 06106. After we receive your completed application we will send you a confirmation letter including your assigned case number. The description

you provided in your application will be added to the Connecticut FarmLink website along with your case number, which will serve as your only identification on the site. Published listings will never include your full contact information. Updates to your description are your responsibility and must be submitted in writing to the Department of Agriculture at the address above. Submitted updates will be published on the website a minimum of four times per year.

Only people who have applied to the Program and have a case number are eligible to request full applications of other applicants in the Connecticut FarmLink Program. The department makes reasonable efforts to facilitate contact between parties with similar interests.

The Department of Agriculture also posts educational materials on this website regarding farm transfer and farm succession planning, family farm estate planning, farm leasing, formation of farm partnerships, financing options, and starting a farm business in Connecticut. The website also contains links to regional farmlink and farm apprenticeship programs, as well as listings of grant opportunities, publications and other resources.

Since its inception in January, the program has ten listings for farm seekers and five farmland owners looking for farmers. As the word gets out about this program, we hope to see these numbers increase. The response to those in the program has been positive to date, and we are optimistic that these numbers will increase as more people become aware of the program.

## Update on Fruit and Vegetable Pest Management Publications

### New England Small Fruit Pest Management Guide

The New England Small Fruit Pest Management Guide was updated in 2006 to be used in 2006 and 2007. Copies are available from the UConn Communications and Information Technology office; U-4035; 1376 Storrs Rd.; Storrs, CT 06269 or (860) 486-3336. The cost is \$14 which includes shipping and handling.

### New England Vegetable Management Guide

The New England Vegetable Management guide was updated in 2005 to be used in 2006 and 2007. Copies are available from the UConn Communications and Information Technology office; U-4035; 1376 Storrs Rd.; Storrs, CT 06269 or (860) 486-3336. The cost is \$15 which includes shipping and handling. As of 2006, you can now consult the guide on the web at <http://www.nevegetable.org>.

### Tree Fruit Field Guide to Insect, Mite and Disease Pests & Natural Enemies of Eastern North America

This is a new EXCELLENT field guide. It is an NRAES publication that was edited by entomologists and plant pathologists from Cornell University and Quebec. Copies are available from the UConn Communications and Information Technology office; U-4035; 1376 Storrs Rd.; Storrs, CT 06269 or (860) 486-3336. The cost is \$32 plus \$6 shipping and handling.

## Controlling Plant Height Without Chemicals

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### Future Height Control Techniques

**Mechanical Conditioning**—It has been known for a long time that mechanical stresses such as repeated brushing, shaking, or bending caused by air movement or contact with animate or inanimate objects can reduce plant growth. Recent research conducted by Dr. Joyce Latimer at the University of Georgia has demonstrated the commercial potential of this technique for controlling the height of vegetable transplants, particularly tomato. This work was stimulated, in part, by the fact that B-Nine is no longer registered for use on edible crops. One system of mechanical conditioning adapted to commercial greenhouses involves drawing a bar across the tops of the plants once or twice a day. The bar is set low enough to contact the plants, but not so low that the plants are injured or uprooted. Thirty to forty percent reductions in height have been reported with this system. Other systems involve periodic shaking, blowing air treatments, or water sprays.

**Light filters**—Plant physiologists have found that changing the ratio of red to far-red light can influence stem elongation and branching. Red light inhibits stem elongation compared to far-red

light which promotes stem elongation. Red light also promotes branching by stimulating lateral bud growth. In nature there are daily and seasonal changes in the red:far-red ratio. Natural light in the middle of the day and in the summer has a higher proportion of red than sunrise and sunset and the winter. The shading effect of plant canopies also changes the ratio, increasing the proportion of far-red light. This is an important factor in why plants stretch when they are spaced too closely. Current research is being directed at developing greenhouse coverings which alter the red:far-red balance to control plant height and branching.

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