UNIVERSITY OF CONNECTICUT COOPERATIVE EXTENSION SYSTEM AND DEPARTMENT OF PLANT SCIENCE

CROP TALK

COMMERCIAL VEGETABLE AND FRUIT CROPS NEWSLETTER

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IN THIS ISSUE

Upcoming Events

- **CT Pomological Society Twilight Meetings**

  Thursday, May 24 at 5:00 PM
  At March Farms, 160 Munger Lane, Bethlehem, CT. See the farm's website at www.marchfarms.com.

  Thursday, June 21 at 5:00 PM
  At Woodstock Orchards, 494 Route 169, Woodstock, CT (located 3/4 miles north of Route 171),

- **Vegetable Twilight Meeting**

  Wednesday, May 30 at 6:00 PM
  At Freund's Farm Market and Family Dairy, 324 Norfolk Road, East Canaan, CT. Sponsored by UConn Cooperative Extension. See page 10 for additional details.

- **New England Vegetable and Fruit Conference**

  December 11-13, 2007
  At the Center of NH Radisson Hotel, Manchester, NH. Three days of fruit, vegetable, and flower information, networking, tradeshow, and much more. Visit http://www.nevbc.org for the most up-to-date information.

Are you Putting your Vegetable Transplants at Risk?

Leanne Pundt, University of Connecticut

It is best to use separate greenhouses for vegetable seedlings and for ornamental hanging baskets and bedding plants. Separate greenhouses help to protect vegetable transplants from any insects and mite pests as well as certain diseases that may migrate from ornamentals and any "pet plants" that are held over. Seasonal growers may have less insect and mite pressure than those who grow year round. However, this is provided that the greenhouses are completely weed-free while they are not in crop production.

Aphids, spider mites, broad mites and thrips may easily spread to the tender vegetable seedlings below. In addition to direct feeding damage, both aphids and thrips may vector viruses. Aphids may vector cucumber mosaic virus and thrips may vector tospoviruses.

There are fewer insecticides and miticides labeled for use on vegetable transplants compared to ornamental bedding plants, making management more difficult (for a listing of materials, see the 'Pest Management for Vegetable Bedding Plants' section in the 2006-2007 New England Vegetable Management Guide). Using more selective materials with shorter residuals also helps to prevent spray residues from adversely affecting naturally occurring predators and parasites once the transplants are in the field. Pepper transplants are very prone to aphid outbreaks in the greenhouse. It is important not to use insecticides with a long residual that may adversely affect aphid natural enemies in the field.

Spent flowers dropping onto tender seedlings and transplants below, can promote the spread of *Botrytis* blight. The spent flowers are a food source for this saprophytic fungus. Tender seedlings, such as basil, are especially prone to *Botrytis* stem blight and canker.

Separate, completely weed–free greenhouses also help protect vegetable seedlings (especially tomatoes and peppers) from tospoviruses (impatiens necrotic spot virus and tomato spotted wilt virus). Tospoviruses have an extremely wide host range, including many different ornamentals, vegetables and weeds. Tospovirus-infected vegetables planted into the field will be stunted and will not produce a marketable crop. These viruses are not seed-borne, but are brought into the greenhouse on vegetatively propagated ornamental plants, or on seedlings that have been exposed to the virus. Thrips larvae acquire the virus

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Are you Putting your Transplants at Risk?

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when they feed on infected weeds or crops. Winged adults then spread the virus to susceptible crops or weeds. I have noticed more tospovirus-infected plants this spring, compared to recent years.

With their delicate flowers in many different shades, verbenas are often used as fillers in combination baskets or alone in hanging baskets. While generally disease-free, susceptible varieties can be prone to powdery mildew. Powdery mildews, while they look alike, often have specific host ranges. Some verbena varieties are susceptible to the powdery mildew caused by the fungus *Podosphaera xanthii*. Infected leaves may develop a purplish discoloration that could be confused with a nitrogen deficiency. Look on the underside of leaves for the thin strands of powdery mildew. On upper leaves, look for a powdery white coating. As many growers and researchers have observed, there is wide variation in the susceptibility of verbena cultivars to powdery mildew. Many varieties are far less prone to the disease.

This powdery mildew fungus also infects cucurbit seedlings, including squash, cucumbers and pumpkins. Greenhouse growers who produce cucurbit transplants as well as verbenas should be especially careful to separate these two crops. It is possible that this powdery mildew could affect cucurbit transplants that may not otherwise have become infected until late in the season.

Growing your vegetable seedlings with ornamental hanging baskets above, while making efficient use of limited growing space (always a concern in the spring), puts vegetable crops at risk. For more information, see the references listed below.

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Impatiens necrotic spot virus has a very wide host range and symptoms vary depending upon the crop. For a photo gallery of the various symptoms to look for, two websites may be helpful:

The University of Maryland Tospovirus database: www.agnr.umd.edu/tospo/home.html

The Agdia web site: www.agdia.com.

Considerations in Choosing an Effective Fungicide Program for Vine Crops

Jude Boucher, University of Connecticut

Choosing an effective disease management program for vine (cucurbit) crops is getting more complex every year. There are new diseases, new products and many different factors that need to be considered before you put a fungicide program together. Furthermore, everybody you talk to—whether it is your Extension Agent, a pathologist at a conference, your chemical rep, or your neighbor—seems to have their own idea of what the best program is for your crop. So, what do you have to know to choose an effective fungicide program?

1) You have to understand which diseases you <u>need</u> to control with your fungicides.

There are many common diseases of cucurbits. However, many of them cannot be controlled with fungicides. Other minor diseases will be controlled if you choose the right products for the important pathogens. So, what are the important diseases in our area that require fungicides to help minimize crop damage? In my opinion there are four: *Plectosporium* blight, powdery mildew, black rot, and downy mildew. These are all important annual threats to your crop.

Plectosporium blight is the new "beast in the East" in wet years and is probably what caused your pumpkins and summer squash to rot in 2006. Powdery mildew is still king in dry years. Black rot is what used to rot your pumpkins and winter squash before Plecto showed up - and is still out there! Downy mildew can now show up anywhere and at any time during the season and will kill the foliage on cucurbit crops in as little as 10 days.

You should also understand how these diseases damage your crop, how to identify the early symptoms and damage, how to scout for the disease, where or how the disease organism spends the winter, what conditions favor its development, the alternative management practices available that might help prevent damage, and finally, all your fungicide options, including which ones work well and which ones don't. I have written about *Plectosporium* and downy mildew in recent issues of *Crop Talk*, and you can find these articles archived on our UConn IPM website (www.hort.uconn.edu/ipm). I will write about powdery mildew and black rot in future issues; you can find information about these diseases in the recently released Pumpkin Production Guide ($45 each including S/H from NRAES, P.O. Box 4557, Ithaca, NY 14852-4557; 607-255-7654, www.nraes.org).

2) Use alternative and preventative management options before fungicides.

Now that you understand what favors and drives disease development, use this information to provide your crop with the best chance of survival and to minimize pressure on your fungicide program by employing alternative control practices. Examples include using proper crop rotations, improving soil organic matter and fertility, selecting planting sites that minimize leaf wetness times and do not have excess soil moisture, reducing plant density, separating early and late plantings, using resistant varieties, harvesting and sheltering ripe fruit, and incorporating crop residue immediately after harvest.

3) Understand that the goal of treating with fungicides is to *push back disease development and spread as late into the season as possible to minimize damage*.

Perfect spray coverage and control is impossible, so you will have some disease in your field no matter how many times you spray or what you spray with. The object is not to eradicate the disease but to minimize the number of spores, disease spread and crop damage in a cost effective manner. This means avoiding an excessive number of applications, beginning spray programs when the disease first occurs, *using the most effective fungicide first,* and continuing to spray the crop as long as the disease is a threat.

Some chemical reps have told growers to save the best product for when the disease has spread all over their field. That is the opposite of what you should be doing. Scout regularly and start your fungicide program as soon as you find the disease. Use the best product first, and the next best second, to minimize how much disease will be in your field by harvest. The longer the disease has to work on your crop, the more damage will occur.

4) Resistance management strategies are crucial with cucurbit fungicide programs.

Resistance management strategies are particularly critical to preserve the effective life of systemic fungicides, and these 'rules' will often determine what goes in the spray tank. Systemic fungicides have a single method of stopping a disease (mode of action), and thus resistance can become a problem even during one year, if used multiple times. Thus, pathologists recommend that you always mix systemics with a protectant or contact fungicide, which have multiple modes of action. *Note: This is different from insecticide resistance management where you should be alternating, not mixing products (see May 2006 issue of Crop Talk).*

The single most important thing you can do to prevent resistance is to *use only one application from each systemic chemical family or group per season.* I call this the golden rule of fungicide resistance management. Since there are a limited number of systemic groups, it is advisable to save applications of systemic materials for powdery and downy mildew control, which initially produce spores on the lower leaf surfaces and are tough to hit with contact fungicides. Additional resistance management rules include using the full rate of Procure or Nova (DMI fungicides - Group 3), alternating between fungicide groups throughout the season, maximizing spray coverage when applying products, and spraying in a timely fashion, well before the field is covered with disease and beyond hope.

5) When choosing a fungicide from within a particular systemic group, it is generally best to choose the newest active ingredient available.

Products that have spent less time on the market have generally had less exposure to the pathogen in the field, and resistance is less likely to be a problem. Your sales rep may stock only the older material(s) because that is what most folks have ordered in recent years. You may have to special order a newer product ahead of time to have it available when needed.

6) Whenever possible, choose fungicides that will be able to control multiple diseases to help minimize pesticide use, crop damage and expense.

Try to kill as many birds as possible with one stone. This is not always possible. Some of the very best fungicides for powdery mildew or downy mildew will not help control the other three diseases mentioned. However, they are certainly worth including in your fungicide program. Examples include the DMI fungicides for powdery mildew and some of the most effective materials for downy mildew *(see December 2006 issue).*

7) Choose materials with longer periods of effectiveness.

Some fungicides last longer than others. By choosing ones that last longer you can maximize your spray interval and minimize the number of applications necessary over the course of the season. To find materials that last longer, compare the recommended spray interval on different fungicide labels or in the New England Vegetable Management Guide.

8) Short-season cucurbit crops require fewer sprays than full-season crops.

This sounds obvious but some folks think that if 1 to 3 applications will protect summer squash, then that should protect pumpkins too. Remember that some of these diseases continue to pose a threat to your crop as long as it is in the field. Spores fall like rain all the time and fungicides only last so long.

Pumpkins are also a tough crop to spray because it is difficult or impossible to leave spray alleys. This means that you must run over some pumpkins to make spray alleys, which is a hard thing for some growers to do. However, you must sacrifice the few for the good of the many. The distance between spray allies should not exceed the range of your machine. You must provide good spray coverage all the way across each block to minimize disease spread and damage.

Protecting Honey Bees from Pesticides

Maryann Frazier, Penn State University

Reprinted from the Mid-Atlantic Apiculture Research and Education Consortium website at http://maarec.cas.psu.edu

Honey bees are vulnerable to many of the insecticides used to control damaging pest species by fruit, vegetable, nut, and seed growers. Growers dependent on honey bees for the pollination of their crops must constantly maintain a delicate balance between protecting their crops from pests and pathogens and protecting the insects that are necessary to pollinate these crops.

The recent dramatic die-off of tens-of-thousands of honey bee colonies has left many beekeepers devastated and possibly many growers without the quantity and quality of bees needed to pollinate crops this spring and summer. A research group, the Colony Collapse Disorder Working Group (see www.maarec.org) is trying to determine what factors are responsible for these unprecedented colony losses. Chemical contamination is one of the possible contributing factors that is being investigated. This includes chemicals being used within the hive for mite and disease control as well as chemicals pesticides used on crops that may inadvertently find their way into hives. Until we have more documented information, it is advisable to use pesticides with care, erring on the precautionary side.

The neonicotinioids (Group 4A) are a relatively new class of insecticides that impact the central nervous system of insects. They act either as contact insecticides or they are translocated throughout the plant tissue, making all parts of the plant toxic to pests that ingest them. While imidacloprid, registered in 1992, is the best-known insecticide in this class, there have been a number of new neonicotinoids introduced since then (clothianidin, acetamiprid, thiamethoxam, etc.). Their use has increased dramatically over the past few years and they are now the most widely used group of insecticides in the US. Their many uses

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include: seed treatments for corn, cotton, canola and sunflowers; foliar sprays of fruit, vegetable, nut and coffee crops; granular, and liquid drench applications in turf, ornamentals, fruit crops and in forests; and in California the number one use of imidacloprid is for the control of structural pests.

There is conflicting information about the affects of neonicotinoids on honey bees, and different chemicals in this class are known to vary in their toxicity to bees. However the EPA identifies both imidacloprid and clothianidin as highly toxic to honey bees. For example: "Clothianidin is highly toxic to honey bees on an acute contact basis (LD_{50} > 0.0439 µg/bee). It has the potential for toxic chronic exposure to honey bees, as well as other non-target pollinators, through the translocation of clothianidin residues in nectar and pollen. In honey bees, the affects of this toxic chronic exposure may include lethal and/or sub-lethal effects in the larvae and reproductive effects in the queen" (EPA Fact Sheet on Clothianidin). Documented sub-lethal affects of neonicotinoids include physiological affects that impact enzyme activity leading to impairment of olfactory memory. Behavioral effects are reported on motor activity that impact navigation, orientation and feeding behavior. Additional research has found that imidacloprid impairs the memory and brain metabolism of bees, particularly the area of the brain that is used for making new memories (Decourtye et al., 2004). Recent research done on imidacloprid looked at crops where imidacloprid was used as a seed treatment. The chemical was present, by systemic uptake, in corn and sunflowers in levels high enough to pose a threat to honey bees (Bonmatin et al., 2003 and 2005). In 2002 a broad survey for pesticide residues in pollen was conducted across France. Imidacloprid was the most frequently found insecticide and was found in 49% of the 81 samples (Chauzat et al., 2006).

In addition, there is concern about the practice of combining certain insecticides and fungicides. A North Carolina University lab study found that some neonictinoids in combination with certain fungicides synergized to increase the toxicity of the neonicotinoid to honey bees by over 1,000 fold (Iwasa et al., 2004). Both the neonicotinoids and the fungicides (Terraguard and Procure) are widely used. This synergistic effect needs to be looked at more carefully.

See Table 1 for a summary of the chemical and brand names of the commonly used neonicotinoids and their toxicities to honey bees. *We are asking growers who are using these materials and who are dependent on honey bees for pollination to use caution when selecting and applying these materials.*

Recommendations for Growers

- Know the pesticides you are using and their toxicity to bees (do not depend on third party to provide this information).
- Read the label and follow the label directions.
- Never use a neonicotinoid pesticide on a blooming crop or on blooming weeds if honey bees are present.
- The use of a neonicotinoid pesticide pre-bloom, just before bees are brought onto a crop is not recommended. If one of these materials MUST be used pre-bloom (for example at pink in apples), select a material that has a lower toxicity to bees (acetamiprid or thiacloprid) and apply only when bees are not foraging, preferably in late evening.
- Do not apply these materials post-bloom (e.g. at petal fall) until after the bees have been removed from the crop.
- Blooming time varies depending on varieties. Bees pollinating one variety or crop may be at risk while another post-bloom crop or variety is being treated. Also, while crops may have completed blooming, bees may be visiting blooming weeds in and around crops. Be aware of these situations and avoid the application of pesticides on a non-blooming crop if there is risk of drift onto blooming crops and weeds if bees are present. If a spray must be applied, use the least toxic material and apply when bees are not foraging.
- Protect water sources from contamination by pesticides. If necessary, provide a clean source of water close to colony locations prior to their arrival in the orchard or crop.

Table 1. Neonicotinoids' Toxicity to honey bees

Chemical	Brand Name	Acute Contact	Acute Oral
thiamethoxam	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	highly toxic	highly toxic
clothianidin	Poncho, Titan, Clutch, Belay, Arena	highly toxic	highly toxic
imidacloprid	Admire, Advise, Alias, Confidor, Couraze, Encore, Gaucho, Imida, Impulse, Ledgend, Leverage, Macho, Merit, Nuprid, Pasada, Prey, Provado, Premise	highly toxic	highly toxic
acetamiprid	Assail, Intruder, Adjust	toxic	toxic
thiacloprid	Calypso	toxic	toxic
dinotefuran	Safari, Venom	highly toxic	highly toxic

For more information on CCD visit the Mid-Atlantic Apiculture Research and Extension Consortium website at www.maarec.org. For more information on pesticide toxicity and protecting bees from pesticides, please visit the online publication, How to Reduce Bee Poisoning from Pesticides, at extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf.

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2007 Apple Foliar Nutrient Suggestions

Win Cowgill, Rutgers University and Jeremy Compton, Fruit Grower

Reprinted from the Plant and Pest Advisory Fruit Edition, April 10, 2007

The addition of foliar nutrients has become standard practice for most progressive apple growers to help set fruit and prevent certain physiological disorders. Dr. Ed Stover, formally of the Cornell Hudson Valley Lab, conducted two years of research on Nitrogen, Boron and Zinc as pre-bloom sprays on apple. He concluded that pre-bloom nutrient treatments enhance cropping by increasing retention of flower buds that would otherwise abscise during early bud development. He indicated that "the most obvious use of these treatments (N, B, Z) would be on apple blocks where cropping is expected to be light. There is potential to increase fruit size as long as aggressive thinning practices are followed."

Urea (N)

Urea is beneficial on apples for helping to improve fruit set and increase size on apple cultivars that are low in nitrogen as indicated by leaf tissue analysis. Use 2-3 pounds of urea per 100 gallons of water at pink bud, full bloom, and/or at petal fall to improve fruit set and tree vigor. Use 5 pounds per 100 gallons in cover sprays after petal fall only on nitrogen-deficient trees. Foliar nitrogen is not a replacement for ground-applied nitrogen as it does not translocate down into the wood. Rather, it is an aid to fruit set and fruit sizing.

Boron (B)

Solubor sprays of 1 pound in 100 gallons of water applied at full bloom and at 1 week after full bloom may reduce cork in apple flesh if boron is deficient. Boron aids calcium movement into fruit. Adequate boron is essential; excessive boron hastens apple maturity and increases fruit drop. Both soil and leaf analyses are essential in determining the need for boron. Apply no more than two sprays per season. Note: Boron may be added to pesticide sprays. Do not pre-mix Solubor with calcium chloride. Do not apply boron with oil or when trees are wet with oil, as an increased uptake of boron may result, causing boron toxicity.

Zinc (Z)

Low levels of zinc are known to cause small fruit size, especially in Red Delicious, even when no other symptoms of zinc deficiency are evident. Most of our New Jersey soils and orchards are deficient in Zinc. If zinc level is low (as indicated by leaf tissue sample) apply zinc chelate (EDTA) at 1 qt liquid formulation per 100 gallons dilute equivalent at tight cluster to pink. Caution: some zinc products are labeled for repeat applications 2-3 weeks after petal fall and again 4-5 weeks later. Some varieties may be sensitive to zinc with regard to fruit finish. A better time to make applications to increase zinc levels might be after harvest.

Calcium (Ca)

The quickest and most effective short-term corrective treatments for control of bitter pit and cork in apple are as follows:

For bitter pit control: Spray trees with a solution of either calcium chloride or calcium nitrate. Use 2 pounds of calcium chloride or 4.25 pounds of calcium nitrate per 100 gallons of water, plus a wetting agent. Calcium nitrate should not be used on trees that contain high to excessive amounts of nitrogen in the leaf tissue as indicated by leaf analysis or excessive shoot growth. Make applications at 2-week intervals with the last spray 2 weeks before harvest. These calcium sprays can reduce bitter pit in apples by 50 to 90 percent.

For control of cork in apple flesh*:* Spray trees with 1.5 pounds of calcium chloride or 3.2 pounds of calcium nitrate per 100 gallons of water with the first cover spray and each subsequent cover spray until a total of 18 to 24 pounds per acre has been applied. The calcium nitrate sprays will apply 2 to 3 pounds of actual nitrogen (N) per acre and should be used only on trees that do not contain high to excessive nitrogen levels as measured by leaf analysis or reflected in excessive shoot growth.

For calcium-sensitive varieties such as Enterprise, Braeburn, Fuji, York, and Cortland apply the following rates of calcium chloride ($CaCl_2$): 2-3 lb/100 gal prior to August 1; 3-5 lb/100 gal after August 1.

Late-season calcium sprays are usually more effective against cork than early-season sprays. Reduced rates of $CaCl_2$ should be applied if there was no rain between applications, or if it is very hot and humid.

Table 1. Suggested Compounds, Rates and Timing for Foliar Nutrients

Application Timing	Material	Nutrient	Application Rate *(Follow Label Rates)*
Delayed Dormant	TriBasic Copper Sulfate	Cu	2 lb/100 gal dilute equivalent
Pink	Urea	N	2-3 lb/100 gal dilute equivalent
	Zinc Chelate	Zn	1 qt/100 gal dilute equivalent
Bloom	Urea	N	2-3 lb/100 gal dilute equivalent
	Solubor	B	1 lb/100 gal dilute equivalent
Petal Fall	Epsom Salts	Mg	15 lb/100 gal dilute equivalent
	Solubor	B	1 lb/ 100 gal dilute equivalent
First Cover	Calcium Chloride	Ca	2 lb/100 gal dilute equivalent
	Epsom Salts	Mg	15 lb/100gal dilute equivalent
	Zinc Chelate	Zn	1 qt/100gal dilute equivalent
	Manganese Sulfate	Mn	4 lb/100 gal dilute equivalent
Cover Sprays	*2nd:* Epsom Salts	Mg	15 lb/100 gal dilute equivalent
	All: Calcium Chloride	Ca	2 lb/100 gal dilute equivalent
After Harvest	Zinc Chelate	Zn	label rate

New Insecticides and Miticides for Vegetable Crops

Jude Boucher, University of Connecticut

Products with New Active Ingredients:

- **Beleaf 50SG (flonicamid):** Resistance management Group 9C. Controls aphids, plant bugs and whiteflies on Brassica, cucurbit, fruiting, and leafy vegetables and potatoes by contact and ingestion. Feeding stops rapidly, mortality will follow. Currently registered in MA and not CT, but that may change in the near future.
- **Oberone 2SC (spiromesifen)**: Resistance management Group 23. Contact insecticide and miticide for potatoes, sweet potatoes, cucurbit, fruiting, Brassica, and certain leafy green vegetables. One of several new miticides available to help control mites on eggplant. Effective against whitefly nymphs and pupae. Released in 2005, but not in time to be included in the 2006-2007 New England Vegetable Management Guide.
- **Prev-AM (sodium tetraborohydrate decahydrate):** Resistance management Group 25. A product containing borax that causes soft-bodied insects to desiccate (dry out). Labeled to control aphids, whitefly, thrips, mites and certain caterpillars on many different herbs and vegetables. Do not apply in midday sun or mix with copper, sulfur or oils. Not registered in MA, VT or RI. Registered in CT.
- **Pylon Miticide (chlorfenaspyr):** Resistance management Group 13. A selective insecticide/miticide that functions as both a contact and stomach toxin. Pest loses the ability to generate energy. Labeled in the greenhouse for mites, thrips and caterpillars on tomato, eggplant and pepper. Released in 2005, but not in time to be included in the 2006-2007 New England Vegetable Management Guide.
- **Safari 20SG (dinotefuran):** Resistance management Group 4A. A systemic insecticide in the nicotinoid family to protect vegetable transplants (cucurbit, Brassica, leafy vegetables, eggplant, pepper and tomato) grown in enclosed structures from aphids, thrips, leafminers, mealybugs, and whiteflies**.** Same active ingredient as in Venom.
- **Venom 70SG (dinotefuran):** In the nicotinoid chemical family, resistance management Group 4A. Used as a systemic foliar spray **or** soil treatment to control Colorado potato beetles, aphids, leafhoppers, leafminers, thrips and whiteflies on cucurbits, Brassicas, leafy and fruiting vegetables, and potatoes. Same active ingredient as in Safari.

Products with Old Active Ingredients:

Insect Growth Regulators

- **Distance IGR (pyriproxyfen):** Resistance management Group 7. An insect growth regulator that suppresses the development of the embryo within the egg and inhibits metamorphosis and adult emergence. No activity against adult insects. When used on immature insects, provides extended control (up to 28 days) of fungus gnats, shore flies and whiteflies on tomatoes, eggplant and peppers in the greenhouse. Same active ingredient as in Knack IGR and Esteem.
- **Esteem 0.86EC (pyriproxyfen):** Resistance management Group 7. An insect growth regulator that suppresses the development of the embryo within the egg and inhibits metamorphosis and adult emergence. No activity against adult insects. When used on immature insects, provides extended control of thrips on onions and whiteflies on beans and peas. Same active ingredient as in Knack IGR and Distance IGR.

Broad-Spectrum Synthetic Pyrethroids (Group 3A)

- **Adjourn* (esfenvalerate):** A broad-spectrum, pyrethroid insecticide with the same active ingredient as in Asana*.
- **Battalion* 0.2EC (deltamethrin):** A broad-spectrum, pyrethroid insecticide with the same active ingredient as in Decis*.
- **Bifenture EC*, Brigade*, Discipline 2EC*(bifenthrin):** Three broad-spectrum, pyrethroid insecticides with the same active ingredient as in Capture* and Fanfare*.
- **Fury 1.5EC* (zeta-cypermethrin):** A broad-spectrum, pyrethroid insecticide with the same active ingredient as in Mustang*.
- **Lambda-T*, Taiga Z*, Silencer* (lambda-cyhalothrin):** Three broad-spectrum, pyrethroid insecticides with the same active ingredient as Warrior.
- **Permethrin 3.2EC* (permethrin):** A broad-spectrum, pyrethroid insecticide with the same active ingredient as in Pounce or Ambush.
- **Tombstone*, Renounce 20WP* (cyfluthrin):** Two broad-spectrum, pyrethroid insecticides with the same active ingredient as in Baythroid.

Nicotinoid Insecticides (Group 4A)

- **Admire Pro (imidacloprid):** A concentrated formulation of Admire with more than twice the active ingredient per gallon, but used at lower applied rates than Admire. Soil-applied systemic insecticide for controlling aphids, flea beetles, Colorado potato beetles, leafhoppers, thrips, whiteflies and cucumber beetles on potatoes, tomatoes, peppers, eggplant, herbs, cucurbits, and leafy, legume and root vegetables. Also for aphids and whiteflies on greenhouse cucumbers and tomatoes. Same active ingredient as in Advise, Alias, Couraze, Imida, Impulse, Gaucho-MZ, Leverage, Macho, Nuprid, Pasada, Prey, Provado.
- **Generic soil-applied products with the same active ingredient and similar formulation as Admire 2F (imidacloprid):** Alias 2F, Couraze 2F, Advise 2F, Macho 2FL, Nuprid 2F, Imida E-AG 2F.
- **Generic foliar-applied products with the same active ingredient and similar formulation as Provado 1.6F (imidacloprid):** Couraze 1.6F, Imida E-AG 1.6F, Impulse 1.6F, Nuprid 1.6F, Pasada 1.6F, Prey 1.6F.
- **Generic foliar-applied products with the same active ingredient and similar formulation as Provado 75WSP (imidacloprid):** Couraze 75WSP, Pasada 75WSB.

Organophosphates

- **Whirlwind* (chlorpyrifos):** An organophosphate pesticide in resistance management Group 1B, applied to the soil for onion root maggots. Also available for pests on asparagus, sweet potato and sweet corn. Same active ingredient as in Lorsban*.

Avermectin Product

- **Abacus* (abamectin):** Resistance management Group 6. A selective insecticide/miticide for Colorado potato beetle, mites and leafminers on tomato and potato; leafminers, mites and thrips on pepper; and/or leafminers on head lettuce, celery and cucurbits. Same active ingredient as Agri-Mek* and Abba*.

New Pre-mixed Insecticide Products

Note: mixing two insecticides may not be a good resistance management technique (see: 'Resistance Management: Mix or Rotate Between Insecticides?' in May 2006 issue of *Crop Talk* at www.hort.uconn.edu/ipm).

- **Consero* (spinosad + gamma-cyhalothrin):** Resistance management Groups 5 & 3A. Pre-mix of one selective and one broad-spectrum insecticide for corn and legume vegetable insects. Same active ingredients as in SpinTor and Proaxis*.
- **Leverage* (imidacloprid + cyfluthrin):** Resistance management Groups 4A & 3A. A pre-mixed, foliar-applied product for potato pests with active ingredients in the nicotinoid and synthetic pyrethroid chemical families. Same nicotinoid active ingredient as in Admire, Advise, Alias, Couraze, Imida, Impulse, Gaucho-MZ, Macho, Nuprid, Pasada, Provado. Same pyrethroid active ingredient as Baythroid* and Tombstone*.

Crops dropped from old labels

- **Dimethoate (dimethoate):** cancelled on cabbage, collards, head lettuce and spinach.
- **Guthion* (azinphosmethyl):** cancelled on potatoes.

New crops added to old labels

- **Agri-Mek* 0.15EC (abamectin):** Added eggplant. Important because it provides an additional material and resistance management group (6) to rotate to for mite and Colorado potato beetle control.
- **Rimon 0.83EC (novaluron):** An insect growth regulator now registered on diamondback moth, cabbage looper, imported cabbageworm, thrips and whiteflies on Brassica crops. Important because it represents a new mode of action and resistance management group (16B) available for DBM and CL control.
- **Trigard (cyromazine):** Insect growth regulator now registered for Colorado potato beetle control on potatoes and tomatoes. Important because it represents a new mode of action and resistance management group (17) available for CPB control.

** Restricted-use products*

New Herbicide for Sweet Corn

Andrew Senesac, Long Island Horticulture Research and Education Ctr

Reprinted from the Long Island Fruit and Vegetable Update, 4/27/07

Impact (topramezone) is a newly registered post-emergence herbicide that can be applied to sweet corn or field corn to control a variety of annual grasses and broadleaf weeds. Impact is a systemic herbicide absorbed by both leaves and roots. As an HPPD Inhibitor, it inhibits carotenoid synthesis and affected weeds appear to be 'bleached' or whitish as they die. Impact has the same mode of action as Callisto. However, while Callisto can only control crabgrass, Impact has the ability to control or suppress several weedy grass species, including fall panicum, barnyardgrass, and foxtails. Important broadleaf weeds controlled include pigweed, lambsquarters and ragweed. Most sweet corn varieties appear to tolerate Impact. Dr. Robin Bellinder has evaluated dozens of sweet corn varieties with little or no injury or yield loss. To achieve long-lasting broad spectrum weed control, Impact can be tank-mixed with other herbicides, including reduced rates of atrazine. For optimal control, Impact should be applied with an adjuvant. Methylated seed oil (MSO) is recommended. In addition, a nitrogen fertilizer source such as urea ammonium nitrate or ammonium phosphate (1.25-2.5% by volume) can be added to improve weed control. Guidelines for rotational crop restrictions following Impact application recommend an 18-month interval for vegetable crops except potatoes and peas. Cereal crops can be planted in 3 months. Impact may be particularly useful to control grassy weeds in early sweet corn after plastic has been removed.

IPM Program Funding up for Renewal

This past year the CT General Assembly appropriated $300,000 in funding for the University of Connecticut IPM program. During this legislative session, efforts are underway to renew this appropriation. The funds received last year have supported the salaries of IPM Extension staff working in fruit, field crops, nurseries, turfgrass and wine grapes. In addition, the funds provide for the maintenance of the IPM website and support staff for the vegetable and fruit IPM programs. The funding also served as an important source of required matching funds for federal programs such as the USDA-NRCS Environmental Quality Incentives Program, which funds IPM training for Connecticut growers.

Last year, many growers contacted their legislators regarding the bill which provided the funding for IPM. However, the funding needs to be renewed each year and the renewal for this year does not appear in the proposed budgets being considered by the Connecticut legislature. It is important that during the budget reconciliation process, the $300,000 funding for IPM be included under the UConn budget. The state funds have bolstered the IPM program services provided to the public. If these services are important to you, please express your opinions on the renewal of IPM funding to your local legislators and the following people:

Governor M. Jodi Rell
Executive Office of the Governor
State Capitol
210 Capitol Avenue
Hartford, Connecticut 06106
(860) 566-4840; 1-800-406-1527
Governor.Rell@po.state.ct.us

State Rep. Terry Backer
Assistant Majority Whip
Legislative Office Bldg., Rm. 2102
Hartford, CT 06106-1591
(860) 240-8585; 1-800-842-8267
Terry.Backer@cga.ct.gov

State Rep. Lawrence Cafero
House Republican Leader
6 Weed Avenue, Norwalk 06850
Residence: 203-854-6769
Capitol: 1-800-842-1423
Lawrence.Cafero@housegop.ct.gov

State Rep. Clark J. Chapin
105 Chapin Rd., New Milford 06776
1-800-842-1423
Clark.Chapin@housegop.ct.gov

State Rep. James A. Amann
Speaker of the House
Legislative Office Bldg. Rm. 4105
Hartford, CT 06106-1591
(860) 240-8500; 1-800-842-1902
Jim.Amann@cga.ct.gov

State Senator Louis C. DeLuca
Senate Republican Leader
Senate Republican Office
Legislative Office Bldg. Rm. 3400
Hartford CT, 06106
(860) 240-8800
Louis.Deluca@cga.ct.gov

State Rep. Denise W. Merrill
Legislative Office Bldg. Rm. 2704
Hartford, CT 06106-1591
(860) 240-0394; 1-800-842-8267
Denise.Merrill@cga.ct.gov

State Senator Toni N. Harp
Legislative Office Bldg. Rm. 2700
Hartford, CT 06106-1591
(860) 240-0393; 1-800-842-1420
Harp@senatedems.ct.gov

For more information, please contact IPM Coordinator Ana Legrand at (860) 486-0869 or ana.legrand@uconn.edu.

Using Brassica Cover Crops to Alleviate Soil Compaction

Ray Weil and Stacey Williams, University of Maryland, College Park

Reprinted from the University of MD College of Agriculture and Natural Resources website at www.enst.umd.edu/weilbrassicacovercrops.pdf

Cover crops in the Brassica (mustard) family may provide a less expensive and less energy-intensive alternative to tillage for alleviating the effects of subsoil compaction on agricultural soils (Figure 1). Winter cover crops with large taproots can alleviate the effects of soil compaction by penetrating the compacted layer when the soil is wet and relatively soft during the winter, leaving channels that enable water, air and cash crop roots to penetrate the soil profile more easily during the summer when the soil is dry and hard. This action has been dubbed *"biological drilling."*

Figure 1. Forage radish penetrating compacted soil.

In recent years, soybean growers in Brazil have used a cover crop of forage radish (*Raphanus sativus* L., or daikon radish) on compacted soils. Brassica roots are known to penetrate about one foot deeper than cereals and nearly two feet deeper than grain legumes (1995 research in Australia by Cresswell and Kirkegaard). In addition, the large taproot of the forage radish (observed root biomass as high as 465 lb/A in the plow layer) decomposes quickly after it is killed in the spring, providing easy pathways for the roots of the summer crop to reach the water and nutrients stored in the subsoil.

A study conducted at the University of Maryland's Wye Research and Education Center tested several Brassica cover crops for their ability to alleviate soil compaction in a Maryland coastal plain soil. The cover crops tested included forage radish, oilseed radish, canola, rye (a commonly used Maryland cover crop) and a combination of the forage radish + rye. A deep ripping tillage treatment, with and without a forage radish + rye cover crop was also included. Cover crops were planted in the fall of 2001 and killed during the spring of 2002. Soybean above-ground dry weights and seed yields following the forage radish and rye combination cover crop were significantly greater than yields following either no cover or rye cover alone (Figure 2). This difference in soybean yield was attributed to the combined benefits of the two cover crop species. The rye cover crop left a thick mulch (Figure 3) that conserved surface soil moisture during the first half of the soybean growing season. The root channels left by the forage radish cover crop benefited the soybean crop later in the summer by allowing better soybean root penetration of the compacted subsoil. The deep ripping treatments (12" chiseling) had no effect on soil moisture or soybean yields. This trial was a conservative test of the cover crop benefits because the unusual droughty conditions during the winter of 2001-2002 probably limited the ability of the forage radish cover crop to penetrate through the compacted subsoil layer.

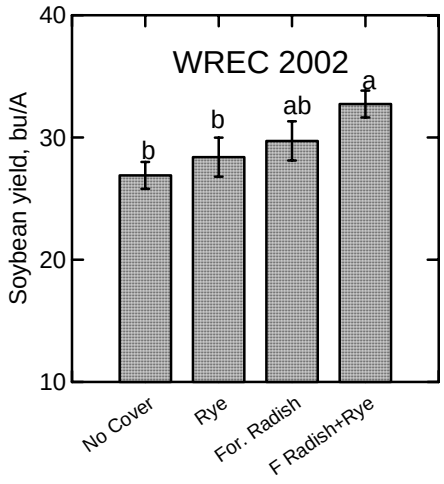

Figure 2. Soybean seed yields at Wye in 2002 following either no winter cover crop, or cover crops of cereal rye, forage radish alone, and forage radish + rye. Bushels per acre at 15% moisture. Conditions were extremely dry.

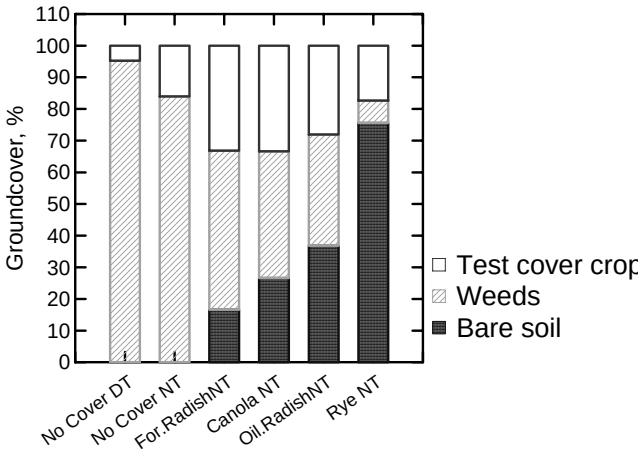

Figure 3. Percent groundcover by cover crop and weeds at Wye as measured on 29 March 2002. Although forage radish provided 70-90% groundcover during the fall, it partially winterkilled and lost most of its foliage by the time of these early spring measurements. DT = with Deep Tillage; NT = with No-Till

Research is underway to assess Brassica cover crops for suppression of weeds, nematodes and certain plant diseases, as well as for the capture of excess nutrients before they can leach away in the fall.

Management of a Brassica Cover Crop

- As with any new practice, its best to start small either by using part of a field or by using test strips.
- Drill or broadcast the seed of forage radish at a rate of 15 - 20 lb/A.
- For the cover crop mixture with rye, seed 10 - 15 lb/A forage radish + 40 lb/A rye.
- Cover crops should be established as early as possible [no later than mid-September in CT]. Broadcast over-seeding into soybeans at leaf yellowing has been successful.

- Kill cover crops in the spring, using a full rate of glyphosate. Experiments with mowing as a kill mechanism are currently being considered.
- Killing should be accomplished before seeds mature on the cover crop.
- The forage radish may entirely winter kill (depending on the severity of the winter and/or your location) so the inclusion of rye in the mixture will supply surface cover in early spring.

Seed Availability

Forage radish is not a common cover crop in the U.S. (though daikon radish seed is commonly sold in small quantities for food production), so supply and pricing may be an issue until demand increases or growers start producing their own seed. It is best to call seed suppliers a few months prior to planting to check on availability. One source of the seed is Steve Groff of Cedar Meadow Farm (steve@cedarmeadowfarm.com; (717) 284-5152; 679 Hilldale Rd., Holtwood, PA 17532).

The MD Soybean Board, the Maryland Center For Agroecology, the University of MD and USDA-SARE provided support for this research.

Strawberry Weed Management with Buckwheat Cover Crops

Thomas Björkman, Cornell University

Reprinted from New York Berry News, Vol. 6, No. 4

Buckwheat is a traditional tool for weed control, but knowledge of how to use it effectively is being lost as the practitioners leave farming. The published guidance has been too general, missing important details needed to make it consistently effective for strawberry growers. An ongoing SARE project has involved learning from those farmers who use it effectively now, and doing some research-farm trials. We have developed specific information on the procedures for success. We would now like to have strawberry growers try the method to see that methods are sound and well-described.

For strawberries, weed control is difficult for several reasons. The cost of weeds is very high compared to other crops, particularly in you-pick operations. Perennial weeds are often the reason strawberry beds have to be abandoned. The available herbicides are few and timing is crucial for them to be effective. Sometimes the weather spoils that timing. Furthermore, the cost of hand-hoeing is very high. The purpose of using a buckwheat cover crop is to reduce perennial weeds and minimize the seed bank for summer annuals. That should extend the time until perennials become serious, reduce the amount of hoeing, and reduce the consequences of not being able to apply a herbicide at the right moment. While buckwheat can be beneficial as a single cover crop or a late season grain crop, we have found that not to be enough for strawberries. What's needed is the more aggressive double crop. There are two scenarios available. One is for land that was in another crop and is open in the spring. The second is for those who need to replant old strawberry beds to strawberries. Please don't count on buckwheat to help much with the root disease that may arise in the second scenario.

Procedure for Full season:

1. Prepare ground in mid-spring when conditions are best.
2. Plant in late May or early June. Drill 50 lb/A, 1 inch deep or less. Alternatively, broadcast at 70 lb/A to avoid gaps. Spread as evenly as possible and use shallow incorporation, such as with a drag or chain, to give the buckwheat a faster start than the weeds.
3. Mow after 45 - 50 days, after immature seed begin to form.
4. Allow second crop to grow from volunteers, or reseed.
5. Mow second crop within a week of flowering. Plant a winter cover crop (annual ryegrass, oats) in late August or early September.
6. Till in spring and plant next strawberry crop.

Procedure for Replanting:

1. Harvest strawberries and apply herbicide to control perennial weeds. After the herbicide has been translocated, till in and allow 10 days to decompose. Cultivate just before seeding to kill weed seedlings and prepare seedbed.
2. Plant buckwheat in July. Drill 50 lb/A, 1 inch deep or less. Alternatively, broadcast at 70 lb/A to avoid gaps. Spread as evenly as possible and use shallow incorporation, such as with a drag or chain, to give the buckwheat a faster start than the weeds.
3. Mow after 35-40 days to avoid volunteers.
4. Plant a second buckwheat crop immediately (mid-late August).
5. Mow or incorporate second crop after 35 days; plant winter cover crop such as wheat in late September.
6. Till in spring and plant next strawberry crop.

Alternative winter cover: In wet years, medium red clover can be broadcast with the second buckwheat planting. It will grow after the buckwheat is mowed in the fall and provide both winter cover and nitrogen. If it was too dry for the clover to take, plant a conventional grain winter cover crop.

Controlling volunteers: The program described here should not produce volunteer buckwheat in the strawberries. However, delays in controlling the buckwheat may result in viable seed that mostly germinates in mid-May. If you do get volunteers, they can be easily killed with early cultivation. Many growers who cultivate the seedlings say that control is very easy. Those who wait disagree. Buckwheat volunteers may succumb to your regular herbicide program. Unfortunately, they are relatively tolerant of devrinol and dachthal.

Regional Pest Messages

UConn Vegetable Pest Message—Available from June to September online at www.hort.uconn.edu/ipm or by calling the recorded message at (860) 870-6954.

UConn Fruit Pest Message—To receive by email, contact Lorraine Los at (860) 486-6449 or Lorraine.Los@uconn.edu. They are also available online at www.hort.uconn.edu/ipm.

UConn Greenhouse Update—To receive by email, contact Leanne Pundt at (860) 626-6240 or Leanne.Pundt@uconn.edu. They are also available online at www.hort.uconn.edu/ipm.

The New England Greenhouse Update—Timely reports about what's happening in MA, CT and RI with pests, nutrition, greenhouse engineering, marketing, and other issues. Available online at www.negreenhouseupdate.info or by email or fax by contacting Leanne Pundt at (860) 626-6240 or Leanne.Pundt@uconn.

2007 VEGETABLE TWILIGHT MEETING

Wednesday, May 30th at 6:00 PM

Theresa and Matt Freund will be our hosts this year at Freund's Farm Market and Family Dairy at 324 Norfolk Road (Rt. 44) in East Canaan. This may be the best farm stand in the state! The main portion of the stand is a gambrel barn, which adds that "country store" atmosphere. It features a full bakery upstairs, several attached, gutter-connect greenhouses for added display space, garden center, gift shop and a full line of locally-grown and value-added items. The Freunds produce ornamental/vegetable bedding plants, baked goods, greenhouse tomatoes, a variety of garden vegetables, pumpkins, sweet corn, and of course their milk helps make Cabot Cheese. Both Theresa and Matt are master marketers and incorporate many colorful and innovative techniques to help fill their stand with customers and send them away happy. Theresa also hosts school tours, offers a full catering service, hosts wedding receptions and prepares everything from wedding cakes to floral arrangements. If you have never visited this farm stand, you don't want to miss this opportunity. Leanne Pundt from UConn's IPM team will also provide information on retail greenhouse IPM. The bonus is that Matt will show us how he makes his famous 'COW POTS' (recently featured on the 'DIRTY JOBS' show on the Discovery Channel). As usual, if you arrive before 6:00 you will get pizza, dessert and a beverage, courtesy of UConn's Cooperative Extension System.

Directions: *From the Hartford area, take Rt. 44 all the way out through Winsted and Norfolk to E. Canaan. The farm is about 4 miles west of Norfolk on the south side of the road. Look for the second large dairy and the Freund's Farm Market sign (you can't miss it). This is God's country about an hour from Hartford, so be sure to leave plenty of travel time. We hope to see you there!*

University of Connecticut
Cooperative Extension System
24 Hyde Avenue
Vernon, CT 06066