

The Vegetable & Small Fruit Gazette

September 2007

Volume 11, No. 9

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Little Wasps Take on a Big Worm

Lee Young, Penn State Cooperative Extension, Washington County

Pennsylvania pepper growers know that European corn borer (*Ostrinia nubilalis*) can be a troublesome pest. While European corn borer (ECB) moths prefer to lay their eggs on corn plants, they will also infest peppers, green beans, potatoes, and other crops. In peppers, eggs are typically laid on the underside of leaves. When they hatch, the tiny larvae will bore into fruit, usually right under the calyx, or into the plant stem. Once inside the fruit, the larvae will feed and grow, soiling the fruit with frass, and creating an environment for soft rot organisms to invade the damaged fruit tissue. Too often the end result is a battered, soggy, unmarketable pepper. This is bad enough, but consider the alternate scenario: a customer purchases a pepper from a local farm market, cuts it open, and, gasp (!), finds a worm inside.

Monitoring and controlling ECB in peppers can be tricky. While pheromone trap counts used for monitoring ECB and other worm pests of sweet corn can provide information on ECB activity (see http://www.pestwatch.psu.edu/sweet_corn.htm), scouting for ECB in peppers is quite like searching for a needle in a haystack. Usually, the problem is not recognized until harvest and packing, when it is far too late for corrective measures. Controlling ECB in peppers with insecticides is complicated by the fact that, unless systemic insecticides are used, there is a very narrow window—from egg hatch to when the tiny larvae burrow into the fruit—during which insecticide sprays will be effective. Once the larvae are inside the fruit, they are well protected from insecticide sprays.

Here is where the little wasps come into the picture. In the mid-1990's, researchers looking to establish natural enemies of ECB imported a tiny parasitoid wasp, *Trichogramma ostriniae*, from China. This wasp is a natural enemy of the Asian corn borer, a close cousin of our ECB. Through the 1990s, researchers learned that the trichogramma wasps would not overwinter in the northeast or mid-Atlantic states. They began to test whether inundative releases of the wasps—releasing tens of thousands of insects at a time—could control ECB infestations in sweet corn and other vegetables. Over a number of years and a number of crops, it has been shown that trichogramma wasps can cause significant mortality of ECB in the field, providing some level of control of the pest.

This summer we have a field project to test the release of trichogramma wasps in pepper fields. Grower collaborators include Kathy King of Harvest Valley Farms in Butler County, and Mark Duda of Duda Farms in Fayette County. Kathy and I have made three releases of trichogramma wasps at two-week intervals in July and August, and are scouting fields and assessing peppers for ECB damage. Dr. Tom Kuhar of Virginia Tech oversees the project, which is being conducted in Pennsylvania, New York, Virginia, and Massachusetts.

Our wasps are Fed-Exed to us from Dr. Mike Hoffmann's entomology lab at Cornell, and arrive as a dried slurry of eggs attached to the surface of a piece of glossy cardstock. Each card contains approximately 50,000 eggs. If the eggs are beginning to hatch, we can see the tiny wasps, not much larger than the period at the end of this sentence, crawling around the card. Releasing them couldn't be simpler: walk out to the field, open up the card, twist-tie it to a stake, and walk away. No mixing, no spraying, and no PPE required.

Once they have emerged from their eggs, these wasps, mostly females, have one thing on their tiny minds: find ECB eggs. As small as these wasps are (<0.5 mm long), they are very good at finding ECB egg masses in the field. When a female wasp finds an ECB egg mass, she then inserts one or two of her own eggs into each ECB egg. The ECB egg then becomes "room and board" for the developing trichogramma wasp. After about ten days, instead of an ECB larva hatching, an adult trichogramma wasp emerges from the egg case.

So far this summer, Kathy and I have seen very little evidence of ECB at the project sites, but final results will be available this fall. There are still many questions to be answered about the use of trichogramma in peppers, such as the cost per acre, the number and timing of releases, and whether or not supplemental insecticides would be needed for optimal control. But in the future, the release of trichogramma wasps may well be an easy, cost-effective control option for pepper growers seeking to control ECB.

***Vegetable Alert!** Late Blight on Tomato**

[Andy Wyenandt](#), Extension Specialist Plant Biology and Pathology, Rutgers

Date: 8/3/07

Pest: Late blight reported on tomato in southeast PA

Found: Late blight has been reported on tomato in southeast PA (Lancaster County).

Crop(s) at risk: all tomato and potato crops in New Jersey and Pennsylvania.

Potential impact: not known

What growers should do: Scout on a regular basis

Although recent isolated rainfall has made the conditions favorable in some areas for late blight development, temperatures above 90°F have made it extremely hot and unfavorable for its development. However, all tomato and potato growers should remain diligent and scout fields on a regular basis. If late blight is suspected, growers should contact their county agricultural educator. Under extremely hot conditions, typical LB lesions on leaves may not have their characteristic 'greasy', water-soaked appearance and lack sporangia (spore) formation on the undersides of infected leaves. Scout for dried-down, brownish-tan circular lesions on tomato and potato leaves. Green tomato fruit with Late blight will have dark-brown, irregular, and slightly sunken lesions that are firm

- not soft! For more information on the control of late blight on tomato and potato please see the 2007 Vegetable Recommendations Guide.

***Vegetable Alert!** Cucurbit Downy Mildew Confirmed in Delaware**

[Andy Wyenandt](#), Extension Specialist Plant Biology and Pathology, Rutgers

Date: 8/3/07

Pest: Cucurbit downy mildew confirmed in Delaware

Found: cucurbit downy mildew reported in 3 cucumber fields in Caroline, Sussex and Dorchester counties in Delaware on August 3rd.

Crop(s) at risk: all cucurbit crops in Delaware and surrounding states.

Potential impact: Significant losses will occur if not controlled properly

What growers should do: Control of downy mildew begins with regular scouting, recognizing symptoms and regular protectant fungicide applications. The following are the most effective materials.

Once Downy mildew has been detected in the Mid-Atlantic states, basic fungicide maintenance programs for cucurbit crops should be adjusted to include downy mildew control.

Tank mix one of the products listed below with a protectant fungicide such as chlorothalonil (M5), or maneb (M3), or mancozeb (M3) (see label for rates and specific crop uses):

Ranman (cyazofamid, 21) at 2.1 to 2.75 fl. oz. 400SC/A, or

Previcur Flex (propamocarb HCL, 28) at 1.2 pt 6F/A, or

Gavel (zoxamide + mancozeb, 22 + M3) at 1.5 to 2.0 lb 75DF/A (some muskmelon may be sensitive)

Curzate (cymoxanil, 27) at 3.2 oz 60DF/A, or

Tanos (famoxodone + cymoxanil, 11 + 27) at 8 oz 50WDG/A, or

Remember that downy mildew materials should always be tank mixed with a protectant fungicide and rotated weekly with fungicides from a different FRAC code to reduce the chances for fungicide resistance development.* *For more information on downy mildew control for specific cucurbit crops please see the 2007 Commercial Vegetable Production Recommendations Guide.

All abandoned cucumber and summer squash fields should be sprayed with gramoxone or disced under immediately after use to kill the foliage! Abandoned fields left unattended after use will only serve as a source of inoculum for other fields once downy mildew makes it way into our area.

If you suspect downy mildew on your farm, please contact your county educator so we can confirm its presence.

To track the progress of cucurbit downy mildew in the eastern US and to keep up with reports of Downy mildew from other states please visit North Carolina State University's Cucurbit Downy Mildew Forecasting Center at <http://www.ces.ncsu.edu/depts/pp/cucurbit/>.

Why Such High Corn Earworm Captures this Year?

[Shelby Fleischer](#), PSU Entomology

What's with the extraordinarily high captures of corn earworms (CEW) in pheromone traps this year? I'm seeing the highest numbers I can remember over the past ~ 15 years. The only other year that comes close was 2002. I cannot pretend to know why, but if you want to listen to an entomologist offer guesses, read on.

First, the warm winter: OK, it got cold in late winter, but much of the earlier winter was very, very mild. CEW overwinter as pupae in the top 8-inches of soil, and freezing temperatures kill those pupae. We typically say CEW cannot overwinter north of about 40-degrees latitude (approximately the latitude of Philadelphia), but that's an oversimplification. Old data shows very weak survivorship (maybe 2%) in Virginia, and higher rates (say, 30%) in Georgia. Maybe, without deep freezing temperatures, we had higher rates of overwintering survivorship – not necessarily in Pennsylvania, but nearby. Maybe early spring populations were closer this year.

Second: the dry year. CEW develop in a wide range of weed and crop host plants, and then move as adults. A long-standing, but unproven, idea has been that drier host environments lead to increased migratory behavior. The other year that had high trap captures – 2002 – also was a drought year, especially in the southeast.

Third: a hot August. Remember, we expect our CEW populations to be primarily migrants from the south. We typically get some immigration early (even in June), but at very, very low numbers. This year, we started seeing appreciable (say, >50 per week) during the last week of July and first week of August. The offspring of those experienced enough degree-days in August to complete a generation. So by the latter part of August, we may be seeing a 2nd generation in Pennsylvania in addition to whatever migration is coming in.

Fourth: the wind patterns. CEW is a migrant and synoptic wind patterns typically bring up southerly flows.

Many of the ideas here can be quantified with some better modeling. It is feasible to make models that provide mapped estimates of overwintering survivorship rates of pupae, movement rates with respect to host plant quality and synoptic wind patterns, and development as a function of temperature given initial biofixes to predict a 2nd generation. Future work could help us estimate risk of high CEW years.

And if we continue to see warm winters and hot Augusts, perhaps with southeastern dry weather, we may need to more commonly deal with higher insect pressure from migratory species – and possibly the occurrence of some additional species that typically do not reach this far north.

Advice for Protecting Bees

From [PA IPM News – Summer 2007](#)

In the midst of one of the most alarming die-off of honey bees ever documented, Penn State Entomology Extension offers advice for beekeepers and growers of bee pollinated crops.

The recent die-off of more than a quarter of the country's 2.4 million bee colonies has left many beekeepers devastated and growers wondering how they will pollinate their crops this season. The affliction, called Colony Collapse Disorder (CCD), was first discovered in November 2006 after a Pennsylvania beekeeper reported that more than 50 percent of the bee colonies he was overwintering in Florida had collapsed, meaning that the tens of thousands of bees that are supposed to be in each hive had simply disappeared.

“Since the beginning of the year, beekeepers from all over the country have been reporting unprecedented losses,” said Maryann Frazier, apiculture extension associate in entomology at Penn State's College of Agricultural Sciences. According to Frazier, symptoms of CCD include the sudden reduction or disappearance of the adult bee population without dead bees present. “The hive will contain brood pollen and honey, with little evidence of robbing, wax moth or small hive beetle attack.”

Researchers from Penn State and other universities along with government agencies and other institutions formed the CCD working group to determine what factors are responsible for these unprecedented colony losses. The cause of CCD is still largely a mystery with several factors such as a compromised immune system, poor nutrition, parasites, new viral or fungal diseases and chemical contamination being investigated. Researchers have collected samples in several states and have begun doing bee autopsies and chemical and genetic analysis. A definitive answer for CCD could be months away.

Until there are answers, Frazier recommends a precautionary strategy on the part of beekeepers and growers in need of pollination services to reduce bee exposure to chemicals, parasites, and diseases. “Chemicals include those being used within the hive for mite and disease control as well as pesticides used on crops that may inadvertently find their way into hives,” Frazier explains.

Beekeepers should:

- Know the pesticides you are using and their toxicity to bees (do not depend on a third party to provide this information).
- Read the pesticide label and follow label directions.
- Never use a pesticide pre-bloom, just before bees are brought in to pollinate. If a pesticide must be used, select one that has a lower toxicity to bees and apply only when bees are not foraging, preferably late evening.
- Do not apply pesticides post-bloom until after the bees have been removed from the crop.

- Avoid applications on a non-blooming crop if there is a risk of drift onto blooming crops and weeds while bees are in the area. If a spray must be applied, use the least toxic materials and apply when bees are not foraging.
- In the pre-bloom period, avoid the use of pesticides that are long-lived in or on the plant, such as some of the systemic pesticides.
- Protect water sources from contamination of pesticides. Provide bees a clean source of water close to colony locations.

Frazier says growers should be prepared to cope with a potential shortage of pollination services and plan well ahead. “If growers have an existing contract or relationship with a beekeeper, they should contact that beekeeper as soon as possible to ascertain if the colonies they are counting on are available,” she advises.

For more information on honey bees and CCD, visit the Mid-Atlantic Apiculture Research and Extension Consortium Web site at <http://www.ento.psu.edu/MAAREC/ColonyCollapseDisorder.html>. You may also contact Frazier at (814) 865 4621 or e-mail mxt15@psu.edu.

Japanese Beetle Management for Organic Fruit Farms

[Mary Barbercheck](#) and [Elsa Sánchez](#), Penn State Entomology and Horticulture, respectively

Japanese beetles were out in force this year. Several growers noted this and we also had larger than typical populations at the research farm. In fact, they were found feeding on strawberries in our day-neutral plots. That’s the first time we’ve seen that! If you’re thinking about next year, below are some options for Japanese beetle management.

Both adult Japanese beetle adults and the soil-dwelling larvae (white grubs) can be destructive plant pests. Knowing the life cycle of Japanese beetle can help with understanding how to manage this pest. The mobile adult beetles feed on the foliage and fruits of several hundred species of fruit trees, ornamental trees, shrubs, vines, and field and vegetable crops. The larvae (grubs) develop in the soil, feeding on the roots of various plants and grasses and in high numbers can damage turf and pastures. Because adults and larvae live and feed in two different environments, management of each stage is quite different. A good IPM program incorporates a diversity of control tactics – cultural, physical, biological, and when necessary, appropriate chemical controls – for vulnerable life stages of a pest.

The adults are present and feed and reproduce in early to mid-summer. During the feeding period, females intermittently leave plants, burrow about 3 inches into the ground – usually into sod or pasture – and lay a few eggs. This cycle is repeated until the female lays 40 to 60 eggs. By mid- to late summer, the eggs hatch, and the young grubs begin to feed in the soil. Each grub is about an inch long when fully grown and lies in a curled C-shaped position. In autumn, the grubs burrow 4 to 8 inches into the soil and remain inactive all winter. This insect spends about 10 months of the year in the ground in the larval stage. In early spring, the grubs move towards the soil surface and feed on grass roots until late spring, when they develop into pupae. Development of adults from the pupal stage takes about 2 weeks, after which time adults emerge from the ground. This life cycle takes a year.

Japanese beetle flight is greatest on clear days with temperatures between 84° and 95° F and winds less than 12 miles per hour. Arrival of new beetles into a field can challenge any control program. When these weather conditions exist, check plants frequently for new arrivals. A few beetles on plants or moderate damage will attract more beetles because they produce aggregation pheromones that will attract others to feed and mate. Also, volatile odors from damaged plants may attract more beetles and keep numbers high. Keeping numbers and damage low can result in fewer new arrivals.

Management of adults:

Cultural options:

Hand Picking: If you have only a few plants to protect, pick off the first adults that arrive and destroy these scouts that attract additional pests. Adults are less active in the early morning or late evening. They can be destroyed by dropping into a container of soapy water.

Plant selection: Plant non-attractive plants or remove attractive plants from borders of vulnerable crop area. Japanese beetles are highly attracted to plants in the apple (*Malus* spp., *Prunus* spp., *Rubus* spp.) family. They are also attracted to wild grape, Virginia creeper, linden and sassafras. Removing attractive non-crop species from the areas around your fields may help with management of adults. The adults do not like to feed on ageratum, arborvitae, ash, baby's breath, garden balsam, begonia, bleeding heart, boxwood, buttercups, caladium, carnations, Chinese lantern, cockscomb, columbine, coralbells, coralberry, coreopsis, cornflower, daisies, dogwood (flowering), dusty-miller, euonymus, false cypresses, firs, forget-me-not, forsythia, foxglove, hemlock, hollies, hydrangeas, junipers, kale (ornamental), lilacs, lilies, magnolias, maple (red or silver only), mulberry, nasturtium, oaks (red and white only), pines, poppies, snapdragon, snowberry, speedwell, sweet pea, sweet-William, tuliptree, violets and pansy, or yews (*taxus*). Having a well-dispersed mixture that favors non-preferred species can reduce the level of beetle-caused damage.

Ripe and damaged fruit removal: Adult Japanese beetles are attracted to ripe fruit; therefore, harvesting on a tight schedule as well as harvesting all ripe fruit helps manage this pest. Diseased and poorly nourished trees and plants are especially susceptible to attack by beetles. Therefore, keep your plants healthy. Also, prematurely ripening or diseased fruit is very attractive to beetles. Remove this fruit from the plants and the ground. The odor of such fruit will attract beetles, which are then in a position to attack sound fruit.

Physical options:

Row covers: Row covers may be appropriate for some high value, susceptible crops where larval populations do not exist or have been controlled.

Traps: Traps for adult Japanese beetles are commercially available. Under favorable conditions, a trap will capture only about 75% of the beetles that approach it. Traps operate primarily with a combination of a pheromone, or sex attractant and a floral lure to attract male and female adult beetles to the trap. Adult beetles can fly long distances, so those caught in traps may have come from up to a mile away. Traps are not recommended for general use unless special conditions can be met. Traps have been demonstrated to be effective in reducing damage and populations only when landscapes are isolated from other Japanese beetle breeding areas or when mass trapping (everyone in the area) is used. In most areas, traps tend to attract more beetles into the area than would normally be present. If you use traps, be sure **not** to put traps near your fruit crops or susceptible plants. Put them at the

borders of your property, away from plants the beetles may damage.

Biological Control:

Japanese beetles are an invasive pest from Asia that entered the US without the parasites that keep it under control in its native lands. Two parasites of the Japanese beetle have been brought to the US from Asia. Researchers have established these insects in areas inhabited by the Japanese beetle, and the parasites are now functioning as important biological control agents of the beetle. These parasites are not yet commercially available; however, you can contact your local Extension educator to see if they are established in your area. If they are, planting the appropriate food plants will attract these parasites and increase the rates of parasitism, and help control the Japanese beetle on your property.

Parasites: Tiphia vernalis, a parasite of the Japanese beetle grub, and *Istocheta aldrichi*, a parasite of the adult, have been shown to be important in regulating the population dynamics of the beetle in the NE US. The fly, *Istocheta aldrichi*, is an internal parasite of the adult Japanese beetle. The female flies are capable of depositing up to 100 eggs during a period of about 2 weeks. The eggs are usually laid on the thorax of the female beetles. Upon hatching, the maggot bores directly into the beetle's body cavity, killing the beetle. Because it does not take this fly long to kill the beetle, *I. aldrichi* can suppress Japanese beetle populations before beetles can reproduce. Another food source for *I. aldrichi* is aphid nectar deposited on Japanese knotweed (*Polygonum cuspidatum*), a persistent perennial weed native to Japan.

Chemical control:

Pyganic targets adults and is listed as a restricted product by OMRI (Organic Materials Review Institute) and can be used if other methods provide inadequate control.

Kaolin clay particle film (e.g., Surround) acts as a repellent by creating an unsuitable surface for adult feeding, and the white color may disrupt the insect's host-finding ability. Particles of kaolin act as an irritant to the insect. After landing on a treated surface, particles of kaolin attach to the insect's body and trigger an excessive grooming response that distracts the pest from feeding. Apply Surround as soon as beetles begin to emerge. Kaolin clay, especially when applied later in the season, may not be a good option for managing Japanese beetles on fruit for direct markets. The whitish coating left on fruit may discourage buyers. Informing consumers about kaolin clay may be necessary to promote sales. Washing the fruit, particularly small fruit, prior to marketing can promote postharvest disease development and decrease shelf-life.

As always, contact your certifier to verify that using any product will not compromise your certification.

Management of soil-dwelling larvae:

Cultural options:

Removal of sod cover between rows: A survey in Michigan revealed farms using cultivation between rows had Japanese beetle larvae populations 72% lower compared to farms with sodded row middles. A study conducted in Michigan verified these results; cultivation of row middles in the spring and fall reduced Japanese beetle populations over 50%. Incorporation of cover crops and green manures into a rotation can help maintain soil quality, increase soil fertility, suppress weeds, prevent soil erosion and conserve soil

The Vegetable & Small Fruit Gazette, September 2007

The Pennsylvania State University

moisture. Some growers are placing shredded bark mulch peat moss, straw, or similar material or landscape fabric between rows; although, this can be costly on a large scale.

Biological controls:

Nematodes: Insecticidal nematodes are microscopic insect-parasitic roundworms that actively seek out grubs in the soil. Upon infecting a grub, the nematode progresses through its own life cycle, reproducing and ultimately killing the grub. When the resources inside the nematode-killed grub are used up, the nematodes leave the cadaver to seek new host insects. The two nematodes that are most effective against Japanese beetle grubs are *Steinernema glaseri* and *Heterorhabditis bacteriophora*. The latter is commercially available. More information on using insect-parasitic nematodes can be found at <http://www.ento.psu.edu/extension/factsheets/nematode.htm>.

When using nematodes (and any biological control), remember they are alive and should be ordered when needed and used in a timely fashion. They should also be protected from high temperatures and direct sunlight until used.

Bacteria: Milky spore is a bacterium that is applied to the soil to kill larvae. It is costly; although, at least one grower mentioned finding it in commercial quantities, therefore, making it more economical. When grubs eat spores in the soil, spores germinate in the grub's gut, and enter the blood, where they multiply. The buildup of spores in the blood causes the grub to take on a characteristic milky appearance. Milky spore disease builds up in soil slowly (over 2-4 years) as grubs ingest the spores, become infected, and die, each releasing 1-2 billion spores back into the soil. Milky spore disease can suppress the development of large beetle populations. It works best when applied in community-wide treatment programs. Check with your Extension educator regarding the availability of milky spore material.

Bacillus thuringiensis (Bt) var. BuiBui is a naturally occurring soil bacterium typically used as a microbial insecticide. The Bt strain registered for the Japanese beetle is for use on the grub stage only. Bt is a stomach poison and must be ingested to be effective. Apply it to the soil as you would insecticides. Effectiveness is similar to that of insecticides. Check with your Extension educator regarding the availability of *Bt var. BuiBui*.

Parasites: *Tiphia vernalis* is a small, parasitic wasp of Japanese beetle grubs resembling a large, black, winged ant. Its current distribution is believed to be throughout the NE US and south to North Carolina. After a brief period of feeding and mating during the spring, the female wasp digs into the soil, paralyzes a grub by stinging, and then deposits an egg on the grub. When the egg hatches, the emerging wasp larva consumes the grub. Other food sources for adult wasps of this species include the honeydew of aphids associated with the leaves of maple, cherry, and elm trees and peonies. In North Carolina, the nectar of tulip poplars has been found to be an important food source for the adult wasps.

Blossom End Rot-How is it Caused and How to Reduce Incidence

From MICH-ORGANIC@LIST.MSU.EDU listserv (<http://list.msu.edu/archives/mich-organic.html>)

Causes and Remedies for Blossom End Rot in Peppers, Tomatoes, and other Solanaceous Vegetables

Blossom end rot is a physiological disorder caused by factors other than pathogens or insects. In 1914 Brooks described blossom end rot in tomato in the journal *Phytopathology* but did not explain its exact causes. The disorder appears as a water-soaked region, often chlorotic, on the blossom end of large fruited varieties of tomato, pepper, eggplant, watermelon and zucchini grown either in the field or in greenhouses. Symptoms of blossom end rot usually occur within two weeks after fruit set. Blossom end rot symptoms usually occur on the earliest fruits but it can also occur on later fruits if conditions are favorable. Long fruited varieties are more vulnerable to blossom end rot than round fruits, but it can also occur on round fruits. However, no blossom end rot symptoms have been seen on wild tomatoes and they rarely occur on small fruited varieties like cherry tomatoes. The disorder can also occur on the inside of the fruit in the tissue surrounding the seed where it is called black seeds. The incidence of blossom end rot is infrequent in most properly managed fields, but it can be very serious under certain conditions.

Since 1942, most experts have agreed that the disorder is likely caused by calcium deficiency in the distal end of the affected fruits. However, there are other factors that have also been linked to blossom end rot incidence, including low tissue phosphorous and manganese, high tissue nitrogen, magnesium, and potassium, high soil salinity, drought stress, too much water, high temperature, high light intensity, location of the fruit on the plant, root damage, and cultivar. Most of these factors, however, appear to affect plant growth and so their effect may be indirectly related to the incidence of the disorder compared to calcium. Calcium controls the process of cell expansion and serves as a messenger for cell to cell communication. Calcium is delivered into the fruit via the xylem vessels. There are fewer and narrower xylem vessels at the blossom end of the fruit where the rot is likely to occur. Also the xylem to phloem ratio is low and there are fewer vessels in the seed cavity in the blossom end of affected fruits. Combined, these factors are believed to be the reason why the rot develops on the blossom end of the fruit. Before you jump on your tractor and start spraying the plants you need to be aware that blossom end rot is not a simple disorder that can be cured with calcium for many reasons. Studies have shown that there is no critical level for calcium that can induce the rot, other elements beside calcium can also contribute to the rot development, and some hormones and high temperature have also been shown to induce the rot. Even when assuming that calcium is the main reason for the rot, some fruits like tomato are not likely to respond to calcium treatment. Tomato fruits do not have openings (stomates or lenticels) on their skin and so it is difficult for calcium to move through the skin and into the fruit, especially during the critical times at the early stages of development.

Here are a few tips on how to prevent blossom end rot from developing in your tomatoes, peppers or other fruits.

1. Check soil pH the previous fall before planting and add non dolomitic lime to correct low pH.
2. Check the soil organic matter. Subtract the amount of nitrogen in the soil from the total amount of nitrogen that the plants need for optimum growth.
3. Avoid adding too much Mg, K, or other cations that compete with calcium unless the plants show

visible signs of deficiency.

4. Do not use ammonia type fertilizers, use nitrate forms instead. Ammonia fertilizers compete with calcium uptake.
5. Choose cultivars that grow slowly, produce less foliage, and produce medium size fruits. Cherry tomatoes do not develop blossom end rot.
6. Avoid planting too early in the season.
7. Do not severely prune the plants.
8. Avoid damaging the root system by cultivating away from the plants.
9. Adding too much nitrogen, especially early in the season will likely lead to blossom end rot development.
10. Maintain adequate soil moisture. It is better to irrigate frequently at low rate than to irrigate once at high rate.

Spraying calcium, regardless of its form, will not eliminate blossom end rot on affected fruits. The three most important factors that will likely minimize blossom development in your tomatoes, peppers or eggplants are to monitor the level of nitrogen carefully (divided the rate into smaller doses and use nitrate nitrogen), prevent fluctuation in soil moisture, and keep the soil pH at 6.5 to 6.8. If you can manage these three factors, you can manage blossom end rot.

New Insecticides for Berries

[Kathy Demchak](#), PSU Horticulture

Several new insecticides became available for use on berry crops in PA recently. Here is a summary of additions.

Actara (thiamethoxam) is a group 4A (neonicotinoid) insecticide that had been labeled for control of aphids and whiteflies on strawberries, blueberries, gooseberries and currants for a couple of years. A supplemental label that adds uses against Japanese beetles, aphids, cranberry weevils, leafhoppers, and weevil adults on blueberries; and Japanese beetles (adults), aphids, leafhoppers, stinkbugs, tarnished plant bugs, whiteflies, and weevil adults on caneberries (brambles) has been approved. Previously, there were very few materials labeled for Japanese beetle control on these crops, especially on brambles. Actara has a 3-day PHI, which is at least shorter than the 7-day PHI for Sevin, and a 12-hr REI.

Platinum, a soil-applied insecticide drench, with the same active ingredient as Actara (thiamethoxam) has a supplemental label for control of white grubs in blueberries, including grubs of Japanese beetles, and for treatment of strawberry root weevil larvae and other grubs on strawberries. It can be quite effective for this use, but must be applied while the larvae are small. For strawberry root weevils, this means that the material should be applied during mid-late summer. Platinum has a 75-day PHI on bushberries, and a 50-day PHI on strawberries. There is a 12-hr REI.

Admire and Admire Pro, soil-applied formulations of imidacloprid, are labeled for control of aphids and whiteflies on strawberries; and white grubs on strawberries post-harvest in perennial systems. Admire and Admire Pro are also labeled for both adults and grubs of Japanese beetles feeding on bushberries, as well as other grubs, and for control of aphids, leafhoppers, whiteflies, and red-necked

cane borer on caneberries (brambles), a pest for which a control measure was sorely needed. The PHIs are 14 days for strawberries, and 7 days for bushberries and caneberries. Both are group 4A insecticides, so they cannot be rotated with Actara or Platinum for resistance management.

Mustang Max (zeta-permethrin) is a group 3 (pyrethrins and synthetic pyrethroids) insecticide labeled for use on the berry crop group (bushberries and caneberries), which includes blueberries, brambles, gooseberries, and currants, but not strawberries. It is restricted-use due to toxicity to fish and other aquatic organisms. Mustang Max has a 1-day PHI and 12-hr REI. It can be used for control of leafrollers, orange tortix, and root weevils (adults). These aren't typically much of a problem in PA, so this product will likely have limited use.

Be careful with use of any of the above insecticides to avoid affecting foraging bees, as all are very toxic when they come in contact with bees. Remember that even though your crop may not be in bloom, weeds in or near the field may be, and insecticides on the weeds are just as toxic to the bees as insecticides on your crop. Take precautions such as pulling, mowing, or applying a burndown herbicide to the weeds before making an insecticide application to your field.

Consult the labels for additional precautions and changes. The label is the law concerning how the material in your possession can be used.

Upcoming Meetings

If you have a meeting you would like to announce, please send the meeting title, date, location and contact information to esanchez@psu.edu.

Local

- ✓ Sept 6, 2007. **PASA Field Day – Science-Based Organic Grape Production.** Penn State Grape Center, Erie County. For More information call (814) 349-9856 or visit www.pasafarming.org.
- ✓ Sept 15, 2007. **PASA Field Day – Urban Farming.** Greensgrow, Philadelphia County. For More information call (814) 349-9856 or visit www.pasafarming.org.
- ✓ Sept 22 and 23, 2007. **Mother Earth Harvest Fair.** Spoutwood Farm, Glen Rock, PA. For more information call 717-235-6610 or visit www.spoutwood@supernet.com.
- ✓ Sept 27, 2007. **Pumpkin Variety Demonstration,** Franconia, Montgomery County. For more information contact Andrew Frankenfield at (610) 489-4315.

- ✓ Sept 28, 2007. **PASA Field Day – Bio-Diesel & Compost on the Farm.** Briar Patch Organic Farms, Union County. For More information call (814) 349-9856 or visit www.pasafarming.org.
- ✓ Oct 3, 2007. **PASA Field Day – The Nuts and Bolts of Organizing and Packing a Choice CSA.** Red Earth Farm, Schuylkill County. For More information call (814) 349-9856 or visit www.pasafarming.org.
- ✓ Oct 8, 2007. **PASA Field Day – New and Beginning Farmers: Small Group Tour with the Nordells.** For More information call (814) 349-9856 or visit www.pasafarming.org.

Regional

- ✓ Nov 8-11, 2007. **Farm Education Symposium.** Shelburne Farms, Shelburne, VT. For more information visit www.farmbasededucation.org or call Brooke Redmond at 617-306-0090.
- ✓ Jan 15 – 17, 2008. **NJ Annual Vegetable Meeting** at the Taj Mahal in Atlantic City. For more information contact Mel Henninger at henninger@aesop.rutgers.edu.
- ✓ Feb 7-9, 2008. **Pennsylvania Association for Sustainable Agriculture (PASA) 17th Annual Farming for the Future Conference.** Penn Stater Conference Center, State College, PA. For more information visit www.pasafarming.org.

National

International

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The newsletter is also posted within three days on the Department of Horticulture Vegetable program website at: <http://hortweb.cas.psu.edu/extension/veg crops/newsletterlist.html>.

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