

## THE VEGETABLE AND SMALL FRUIT GAZETTE

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Tip for the Month: "Use what talents you have—the woods would be silent if no bird sang except those that sing best" -Unknown

Comments from the Editor  
Bill Lamont, Department of Horticulture

It is hard to believe that we are nearing the end of the year 2000. Where did the time go!! I know that each of you is asking the same question, as we prepare to march on into the Holiday Season, then Farm Show and then the schedule of winter meetings. It was great working with each of you and I look forward to continuing working as editor of the Vegetable and Small Fruit Gazette and I know that my colleagues look forward to continuing to serve your needs throughout the next year. As always, the Vegetable and Small Fruit Gazette Team encourages your feedback so that we can better serve your needs and address your concerns. The coming months also presents growers with time to attend some of the excellent upcoming educational opportunities at the county, state and national levels. I would refer you to the extensive listing of upcoming meetings at the end of the gazette. In closing, I want to wish each of you a very "Merry Christmas", one that finds each of you taking some time off from you busy schedules to enjoy family and friends and the experience the true spirit of the season. I, like Bing Crosby, will be "Dreaming of a White Christmas".

Bug vs. Bug

Biological Control of Fungus Gnat Larvae  
Cathy Thomas, Integrated Pest Management Program, Pennsylvania Department of Agriculture

Fungus gnats, a common greenhouse pest, are known for infesting cuttings and other young plant materials, potted and long term crops such as greenhouse vegetables. Fungus gnats have an egg stage, four larval stages, a pupal stage, and finally the winged adult. One adult can lay up to 200 eggs. Eggs are deposited in the top inch of soil or planting medium. Fungus gnat larvae (black head capsule and transparent body) generally eat rotting plant material, algae and fungi, however they will also eat root hairs, stem and leaf tissue. Young seedlings and plugs are particularly prone to attack. The most common symptoms that appear are the wilting and slowing of growth of the infested plants. Indirect damage can occur to plants when larvae feeding on roots create entrance sites for soil born pathogens such as pythium, phytophthora and thielaviopsis. The adult fungus gnat is also capable of spreading disease spores. Begin monitoring in greenhouse with yellow sticky cards before seedlings are started to determine if fungus gnats or other pests are present. This practice allows a grower to catch a pest problem in its earliest stages and maybe solve the problem before it gets started. Continue to monitor after vegetable seedlings emerge and during the crop cycle. Sanitation is critical for controlling this pest. Eliminate wet spots and algae growth since they promote fungus gnat development.

The larval stage of the fungus gnat can be controlled biologically with the use of the insect parasitic nematode, *Steinernema feltiae* and the predatory soil mite, *Hypoaspis miles*. These biocontrols should be used as preventive measures with low pest populations. *Steinernema* actively searches for fungus gnat larvae and upon finding enters the body through natural openings. Once inside, the nematode releases a bacteria which will eventually cause the death of the larva. *Steinernema feltiae* can be applied through an irrigation system, knapsack or motorized sprayer (remove screens) or with a watering can.

*Hypoaspis* is a predatory mite that inhabits the top layer of the soil and feeds on harmful soil dwelling insects such as fungus gnat larvae, thrips pupae and collembola. *Hypoaspis* can be used in combination with insect parasitic nematodes and usually one application is sufficient. This predatory mite is supplied in sprinkler tubes mixed with peat and vermiculite.

In the next issue, I will discuss specific information relating to the mode of action and application of these natural enemies. Please contact me if there are specific issues you would like to see addressed in this column.

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A Better Fall armyworm Lure?  
Chris Harding, Department of Entomology

It is well publicized that the fall armyworm lures commercially available have limited utility for monitoring fall armyworm populations due to high non-target trap capture of *L. phragmatidicola* a moth that feeds on grass and is not know to be a pest of sweetcorn

(Harding 1999, 2000). Non-target captures artificially inflate the trap count giving the appearance that there are more pest insects than is truly the case. When an error from non-target captures is not corrected, it can result in recommendations to spray when sprays are not needed. While it is possible with a little diligence and experience, to distinguish fall armyworm from lookalike species it still is an extra step in most people's already busy day. For those of you interested in learning how easy it is to distinguish fall armyworm from *L. phragmatidicola*, see the following web page.

<http://www.ento.psu.edu/vegetable/armyworm/armyworm.html>

During the spring of 2000 we began a cooperative research project with Scentry biological with the goal of developing a fall armyworm lure that would eliminate the need to sort out *L. phragmatidicola* from the capture.

A pheromone trap is designed to attract only males of the desired species using chemicals that resemble insect sex pheromones (sexual attractants). However, insect pheromones are very complicated blends of volatile chemicals and similar species are often attracted to similar blends. In this case the fall armyworm and *L. phragmatidicola* are in the same taxonomic family (Noctuidae). If a lure does not have the exact chemicals in the correct proportions, it may attract insects other than the insect you want to trap. It is these unwanted (although often very similar) insect species that are called non-target captures.

Our study evaluated 3 new lures and back tested against the commercial lure available prior to 2000. A complete randomized four-block design was employed with each block consisting of a separate sweetcorn field. Moths were collected from the traps each Monday morning starting June 19 through September 18, and sorted as fall armyworm, *L. phragmatidicola* or other. The fall armyworm population had one generation late in the season, which is a typical pattern due to its late season immigration into Pennsylvania from southern states. The *L. phragmatidicola* population had two generations including one in early June suggesting that *L. phragmatidicola* may overwinter in Pennsylvania in high populations.

Two of the new lures had very low *L. phragmatidicola* captures (Table 1). Although we have only one year of data we are encouraged by the results. Lures with a low rate of non-target captures will provide a significant improvement in the fall armyworm monitoring program by reducing the need to sort non-target captures from fall armyworm prior to making a spray decision. Proper monitoring allows growers to time the application of insecticides (Adams and Clark 1996, Flood et al. 1995). Using accurate trap counts to adjust spray frequency results in fewer total sprays, offering a saving in product cost, time/effort and environmental hazards.

For the 2001 growing season Scentry will produce one of the two lures that had a low rate of non-target capture during the 2000-growing season. We expect these lures to be a significant improvement over the industry standard and have an immediate benefit to sweetcorn growers monitoring for fall armyworm. We will be expanding this study to

additional locations throughout the state. A full text report of our study report can be found at:

<http://www.ento.psu.edu/vegetable/Vegrecs/Fallarmywormreport2000.pdf>

You will need a copy of Adobe viewer to view this report.

Four potential fall armyworm lures evaluated for percent *L. phragmatidicola* capture

| Lure | Percent <i>L. phragmatidicola</i> Capture for the 2000 growing season |
|------|---|
| A    | 48.1  |
| B    | 1.5   |
| C    | 38.7  |
| D    | 0.5   |

#### References:

Harding, C. L. ,S. J. Fleischer. and J. Grehan. 2000. Armyworm confusion: are look-a-like moths making you spray more frequently than you need?. Vegetable grower gazette. The Pennsylvania State University, June

Harding, 1999. Evaluating the non-target capture rate of fall armyworm pheromone lures in 1999. Report to Scentry Biological.

Adams, R. G. and J. C. Clark [eds]. 1996. Northeast sweet corn production and integrated pest management manual. Univ. of Conn. Coop. Extn., Storrs, CT.

Flood, B., R. Foster, and B. Hutchison. 1995. Sweet corn. pp 19 - 40 In Foster, R. and B. Flood. Vegetable Insect Management, With Emphasis on the Midwest. Meister Publ. Co.

Bluebottle flies as Pollinators in Greenhouses or High Tunnels  
Mike Orzolek, Department of Horticulture

Bluebottle flies are being used as an alternative to honeybees, cutter bees and house flies in pollinating carrot flowers for breeding purposes, according to Pam Ponsness of Forked Tree Ranch, Porthill, Idaho. "They'll work in small areas where bees get depressed. They work at cooler temperatures. They will fly below 50 degrees where a bee usually has to have it a little warmer. "Their source of food and water is the nectar on

the plants. The life span can be up to a month and I've heard several customers this year tell us they've had to kill them finally to get rid of them."

Like that of honeybees and other pollinators, the effectiveness of bluebottle flies is dependent on the weather. Hot weather is "tough on them," says Ponsness. "A good wind, rain or a big thunderstorm doesn't do them any good. "The husband-wife team began raising bluebottle flies for fishing bait before finding that some customers wanted to use them for pollinating a variety of crops research or greenhouse settings. The downside was that they won't stay put and they do spread and where you have neighbors, they're going to complain.

The bluebottle flies available from Forked Tree Ranch have been identified by the USDA Systematic Entomology Laboratory as *Diptera Calliphoridae*, according to Ponsness. The common name is bluebottle fly. They are meat flies by nature, but the species also loves the nectar of flowers. "Our brood fly colony is a closed colony to prevent any contamination from other fly species," according to Ponsness. "They are primarily used outdoors in tents ranging from selfing cages to 100-foot tents. Flies do not return to a hive or to the tent in which they have been released if they escape. Unlike bees, they will not bring contamination (pollen or otherwise) back to their point of origin, according to Ponsness. "In the off-season, our flies are being used successfully in greenhouse tomato and pepper production including other vegetables and canola," Ponsness said.

Bluebottle fly pupae are available in small or large quantities on a year-round basis, according to Ponsness. They can be delivered the day after ordering via FedEx. If the pupae arrive early, they can be stored for several weeks at 40°F and the ranch keeps extra supplies on hand in case customers are met with changes in weather that disrupt schedules and plans. "The quantities are easily adjusted," Ponsness reports. "We're just a phone call away and we can have them to you tomorrow anywhere in the United States, two days in Canada." When conditions are right — about 80°F — the flies will hatch out of their pupae in two to three days, according to Ponsness. The busiest months for bluebottle fly sales are April through July. Ponsness said it is necessary to give the ranch several weeks to several months in advance in order to guarantee timely shipment of an order "We can guarantee your order if we have 14 days' prior notice," she said. "We suggest you have your first batch of flies ready to hatch or hatching before you go into full bloom. We're already getting orders already for after the first of the year in January and February."

Ponsness said unhatched pupae don't take up a lot of room. A cup is equivalent to about 1,500 flies and a shoe box or gallon jug will hold about 25,000. "Shipping is a very intricate part of the whole process," she said. "We package them in Styrofoam cardboard boxes and use gel ice packs. We package them in cotton cloth bags. You have to remember a fly is a living creature and you have to treat them like that. "When you receive them, it's very important that you get them out of the box. If you don't, they sweat and they suffocate and die. "We suggest you divide them into smaller quantities. One of the best ways to hatch them that we have been told is to put them in paper bags. If it's the middle of the summer and you have good temperatures night and day, you can just put them right into your cages. They'll hatch. You can open up the bag after they hatch or just leave it open. They'll crawl right out and crawl onto the plants and start pollinating. "If

it is springtime and your nights are cooler, you may want to hatch the flies before putting them out. If it's possible to put a few pupae on the flower, then when they hatch, they're right there. It's whatever works for you. I suggest you keep them off the wet ground. They just don't need that much moisture."

To inquire about or order bluebottle flies, contact: Dennis & Pam Ponsness, HCR 60, Box 226, Porthill, Id 83853. Phone (208) 267-2632. Fax (208) 267-1182. **e-mail:** [ptr@dmi.net](mailto:ptr@dmi.net)

#### Angular Leaf Spot in Strawberries

Kathy Demchak, Department of Horticulture

Angular leaf spot is caused by a bacteria, *Xanthomonas fragariae*, and was first reported in the United States, which is probably the country of origin. It is distributed on contaminated plants, and survives in plant material in the field (alive or dead). It does not survive free in the soil, so staying out of an infected field for one year will eliminate inoculum. The bacteria causes angular spots on the leaves, and may turn the caps brown (which are the sepals, a modified leaf structure). The bacteria are systemic within the plant, exude out onto the plant's leaves, and then are spread by splashing water or movement of people or equipment through the field. The disease really likes cool to moderate day temperatures, night temperatures near or below freezing, and high humidity, so times when you use frost protection are just great, from the bacteria's viewpoint. Conditions have been very conducive to development of this disease the last couple of years. Warm springs have resulted in frost protection needed to be done more than usual in some locations, and the wet weather this past summer also been a problem.

Control is a bit of a problem. The most important control is to start out with plants that are not infected. Fresh-dug transplants or plugs should be checked before planting. With dormant plants, symptoms will not become apparent until favorable conditions occur for the disease. Sprays containing copper won't cure it, but may help to keep the disease from spreading; however, phytotoxicity may be more of a hazard than the disease itself, especially if multiple sprays or the full labeled rate is used. Any cultural controls that increase air circulation will help, as will staying out of the field until the foliage has dried as much as possible. A change to drier conditions will usually be the only thing that helps markedly. Nearly all cultivars are susceptible, especially 'Allstar' and 'Honeyoye'. 'Jewel' seems to have some tolerance or resistance.

Reference: Bacterial Angular Leafspot Disease of Strawberry: Present Status and Prospects for Control by J.L. Maas, M. R. Pooler and G. J. Galletta. 1995 Advances in Strawberry Production. Vol. 14, pp. 18-24.

That's a Berry Good Question!!!

Kathy Demchak, Department of Horticulture

Subject: Bacterial Angular Leaf Spot

Q. Why did the caps on my 'Allstar' strawberries turn brown and dry out? The fruit otherwise seemed not to be affected. This has happened for the last couple of years. (Anonymous).

A. This is an especially good question because the same disease that usually causes this cap problem, angular leaf spot, also usually causes leaf symptoms that can easily be mistaken for fungal leaf spots or leaf scorch. Symptoms of angular leaf spot have been present in nearly every field of 'Allstar' that I've been in. Angular leaf spot is caused by a bacteria (not fungi, which are the cause of other common leaf spots) and so is not controlled by common fungicides. Meaning, all the captan sprays in the world won't help. 'Allstar' seems to be an especially susceptible cultivar. How do you tell whether the leaf spots you have are caused by this bacteria? Pluck off a leaf, hold it up to the sky, and look upward through the leaf. If the problem is angular leaf spot (the bacterial one), you'll see translucent light green or yellowish areas (which can range from 1/16" or smaller to 1/4" across), confined by the veins in the leaf. This results in the discolored spots being 'boxed in', and so they appear angular, hence the name. If you look down on the leaf, these areas appear dark. Fungal leaf spots are round, and look about the same color no matter how you look at them. Once either type of leaf spot (fungal vs. bacterial) becomes severe, it can be more difficult to tell them apart, as injured areas die and spots coalesce. If you have brown caps, fruit that otherwise looks OK, and angular leaf spots, you can be fairly certain this is the cause of the brown caps. Also, if another disease had been the cause of the caps turning brown, there probably would have been some fruit rot near the caps. As always, it never hurts to submit a sample to the Plant Disease Clinic for diagnosis. This is especially true if control measures seem not to be working, as is what happens when bacterial leaf spot is present but fungicides are being used for control. Treating a misdiagnosed disease can be costly, and the unnecessary use of fungicides may result in resistance development in other diseases that should have been controllable. See the article below on Angular Leaf Spot for more info.

Got a question? Send it to Kathy Demchak, at 102 Tyson Bldg., University Park, PA 16802. You will be credited with the question, or can remain anonymous, as you wish.

Potato Musing

County Winter Potato Meetings  
Bill Lamont, Department of Horticulture

February 22, 2001: Cambria and Somerset Regional Vegetable and Potato Meeting, Ebensburg, PA. Contact: Ron Hostetler (814) 472-7986

March 1, 2001: Lehigh/ Schuylkill County Potato Growers Meeting. Contact: Bob Leiby (610) 391-9840

March 14, 2001: Erie County Potato and Vegetable Growers Meeting. Contact Andy Muza (814) 825-0900

#### Upcoming Meetings

Bill Lamont, Department of Horticulture

#### Local

January 6-11, 2001: Pennsylvania Farm Show, Harrisburg, PA. Contact: Dr. Pete Ferretti, (814) 863-2313.

January 12, 2001: Susquehanna Regional Vegetable Meeting, Mifflinburg, PA. Contact: Jeff Mizer (570) 837-4252

January 15, 2001: New Holland Vegetable Growers Day, New Holland, PA. Contact: Tim Elkner (717) 394-6851

January 16, 2001: Belleville Vegetable Growers Meeting, Belleville, PA. Contact: Tom Ford (814) 693-3265

January 18, 2001: Morrison's Cove Produce Auction Meeting, Martinsburg, PA. Contact: Tom Ford (814) 693-3265

January 30- Feb 1, 2001: Mid-Atlantic Fruit and Vegetable Growers Convention, Hershey, PA. Contact: Bill Troxell (717) 694-3596.

February 6, 2001: Northeast Vegetable Growers Meeting, Thompson's Dairy Bar, Clarks Summit, PA. Contact: John Esslinger (717) 963-4761

February 8, 2001: Tri-County Vegetable and Small Fruit Meeting, Penn Township Community Bldg., Shippensburg, PA. Contact: Steve Bogash (717) 263-9226

February 13, 2001: Schuylkill County Regional Vegetable Growers Meeting, Extension Office, Pottsville, PA. Contact: George Perry (570) 622-4225

February 14, 2001: Southeastern Vegetable Growers Meeting, Heritage Restaurant, Franconia, PA. Contact: Mary Conklin (610) 489-4315

February 15, 2001: Kutztown Vegetable Auction Growers Meeting, Fleetwood Grange Hall, Kutztown, PA. Contact: John Berry, Lehigh County Extension Office (610) 391-9840 or Laura McNutt, Berks County Extension Office (610) 378-1327

February 21, 2001: Lebanon County Winter Vegetable Meeting, Shaefferstown Fire Hall, Shaefferstown, PA. Contact: Ginger Pryor (717) 270-4391



February 22, 2001: Cambria and Somerset Regional Vegetable and Potato Meeting, Ebensburg, PA. Contact: Ron Hostetler (814) 472-7986

February 27, 2001: Strawberry and Raspberry School, Adams County Extension Office, Gettysburg, PA. (717) 334-6271

March 1, 2001: Lehigh/ Schuylkill County Potato Growers Meeting. Contact: Bob Leiby (610) 391-9840

March 5, 2001: North Central Vegetable Meeting, Lockhaven, PA. Contact: Tom Butzler, (570) 726-0022

March 13, 2001: North Central Vegetable Producers Conference, Coudersport, PA. Contact: Greg Burns (814) 776-5331

March 14, 2001: Erie County Potato and Vegetable Growers Meeting. Contact Andy Muza (814) 825-0900

#### Regional

January 16-18, 2001: New Jersey Annual Vegetable Growers Meeting, Trump Taj Mahal, Atlantic City, NJ. Contact: Phil Traino (609) 985-4382.

February 6, 2001: New York State Berry Growers' Association, Owego, NY

February 7-9, 2001: Ohio Fruit and Vegetable Growers Congress and Ohio Roadside Marketing Conf., Toledo, OH. Contact: John Wargowsky (614) 249-2424.

February 9-10, 2001: PASA (Pennsylvania Association for Sustainable Agriculture) 10th Annual Farming For The Future Conference, The Penn Stater Conference Center Hotel, State College, PA Contact: Shirley Gryczuk (814) 863-7235.

February 13-15, 2001: New York Vegetable Conference, Holiday Inn and Convention Center, Syracuse, NY. Contact: Jean Warholic (607) 539-7648.

#### National

January 9-11, 2001: Great Lakes Vegetable Growers Convention and Farm Market Show, Grand Center, Grand Rapids, MI. Contact: Dave Smith (734) 848-8899.

January 10-16, 2001: North American Berry Conference, Sheraton Fallsview Hotel, Niagara Falls, Ontario. Contact: Erin Griebel, (517) 548-4990

January 16-20, 2001: National Potato Council 52<sup>nd</sup> Annual Meeting, San Diego, CA. (303) 773-9295