The Vegetable and Small Fruit Gazette

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Horticulture Department
The Pennsylvania State University

In this Issue:

Tip for the Month-- "An investment in knowledge pays the best interest"—Ben Franklin

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Comments from the Editor

Bill Lamont, Department of Horticulture

Boy where did the rain come from this past Saturday night!! We had 4 inches in a short period of time at the Horticulture Farm. One person said they recorded 1/4 inch in 2 minutes. Our planting of "Simply Sweet" onions, which were looking good got hit by hail about two weeks ago which tended to mangle the tops and now we get 4 inches of rain. We are going to try and harvest them this Thursday, if it doesn't rain. What a growing season. I look forward to receiving Cheryl Bjornson's article for the September issue and would encourage any agent who has an article they would like to share to send it in to me. I want to thank colleagues from other departments who contributed articles to this issue and I want to encourage others to join us in upcoming issues. If you have an event that you would like to advertise, please send it to me. As always, the Vegetable and Small Fruit Gazette Team encourages your feedback so that we can better serve your needs and address your concerns.

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Schedule for Agent Articles

Bill Lamont, Department of Horticulture

September	Cheryl Bjornson
November	John Esslinger
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Watch out for Stinkbugs on Tomatoes

Mike Orzolek, Department of Horticulture

As I was traveling around Lancaster County with Tim and Jeff, we noticed stinkbug damage on tomatoes. There are several types of stinkbugs but they are generally shield shaped. Nymphs are smaller but similar in shape to adults. Nymphs and adults pierce plants with their needlelike mouthparts and suck sap from pods, buds, blossoms, seeds and fruit. The damage on a tomato will show up as a yellow halo with a dark brown center. The dark brown center is where the stinkbug probed with its needlelike mouthparts.

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An Educational Program for Training Extension Professionals and Vocational Agriculture Teachers on Hight Tunnel Technology

Lee Young, County Extension Director, Washington County

We are developing six workshops under a Professional Development Grant from Northeast SARE Program to train extension specialists, county agents and vocational agriculture teachers on the use of high tunnel technology. The objective of the program is to train the trainers. Each workshop will be two days and expenses (lodging, meals and mileage) up to a limit will be covered for participants. The states we are soliciting participants from are Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia, Virginia, Ohio and Washington, D.C. Class size will be limited to 50 per workshop. Each workshop will be two days with a mixture of classroom presentations

on the different components of high tunnel technology, "hands-on" participation, and visit with growers utilizing this technology. A high tunnel guide will be given to each participant and will serve as a handy reference on all aspects of this technology. **The first workshop will be held September 4-5, 2003 at the High Tunnel Research and Education Facility, Horticulture Farm, Rock Springs, PA**. To sign up for the workshop or for more information contact Bill Lamont, Phone: 814-865-7118 or E-mail: wlamont@psu.edu.

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Buckwheat as a Summer Cover Crop

Alan Erb, Extension Agent, Lake Plains, New York

Buckwheat is an excellent summer cover crop to follow peas, lettuce, and early harvested Cole crops for weed control and soil building at this time. After harvesting these crops, Buckwheat can be drilled at 48-70 lb./A (1-1.4 bushels/A) or broadcast at 60-96 lb./A (1.2-1.5 bushels/A). Buckwheat will cover a soil quickly and keep weeds out of the field. It will also attract beneficial insects to the field, loosen topsoil and rejuvenate low fertility soils. To keep it from becoming a weed problem in subsequent years mow it down before it goes to seed. After mowing, it can be disked and planted to a fall cover crop like rye, wheat or barley. Cover crop seed suppliers are listed at: http://www.gov.on.ca/OMAFRA/english/crops/resource/covercrp.htm.

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Pumpkins: What You Don't Know Can Hurt You!

Terry Nennich, Extension Educator, University of Minnesota
Lake Plains Vegetable News, July 2003, Letter 7, Vol. XII

Unknown to most growers, root systems of pumpkins are as large and extensive as the foliage. With many trees, what you see in growth above the soil is matched by root growth below ground. The same situation exists with pumpkins. In a "one-of-a-kind" research project in 1927, John Weaver and William Brunder, botanists at the University of Nebraska, grew many different vegetable crops and excavated and mapped the course of the root systems. They published their work in a book titled "Root Development of Vegetable Crops", published by McGraw-Hill Company, New York. To my knowledge, no one since has attempted such a difficult task.

Vines of 'Small Sugar' pumpkin were about 16 feet long at maturity and the top 12 inches of soil were filled with roots. The taproot of mature pumpkins grew 6 feet deep and had 10 or more lateral branches that extended outward 5 to 17 feet or more. Many of these lateral roots were 2

to 4 feet long, intricately and minutely branched, forming a wonderfully efficient root complex. The second and third feet of soil were also thoroughly filled with roots, with the fourth foot of soil containing many vertically descending roots. Plant size of pie pumpkins may not be as large and vigorous as the jack-o-lantern types. It is probable that root systems of larger pumpkins may be more extensive than those reported in this book.

So what does this mean to the pumpkin grower? Both cultivation and fertility practices must consider the developing root system hidden beneath the surface. Generally, pumpkin roots grow faster than foliage and root extension usually is equal to or greater than the vine spread. If cultivation is necessary, it should be done before the vines run over the ground. Cultivation must only graze the soil surface to avoid root damage. Later cultivation should be avoided entirely and a good herbicide program used for weed control. Pumpkin vines root in the areas between the planted rows and provide "shortcuts" for water and nutrients to enter the plant. Therefore, pumpkin vines shouldn't be moved around unnecessarily. Broadcasting fertilizer within the space between planted rows may provide nutrition to support the rampant growth of pumpkins and help pumpkin fruits developing on satellite vines quite distant from the main plant.

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New Pumpkin Guide

Bill Lamont, Department of Horticulture

The Pumpkin Production Guide, published in June 2003, is a must -have for both new and experienced pumpkin growers, serious gardeners, and agricultural advisors. The 152-page guide covers the basics of pumpkin production and cutting-edge research. Twelve chapters offer practical information for preparing the field, evaluating varieties, and choosing the best cultural practices; groundbreaking insight into fruit set and pollination to help growers maximize yields; descriptions for identifying and controlling weeds, insects, diseases, and wildlife pests; ways to maintain postharvest quality ; and sample budgets and marketing ideas. Over 115 color photos supplement the text. The Pumpkin Guide, NRAES-123, is available from NRAES for $39.00 plus $6.00 S&H (within the continental U.S.). Make checks payable to NRAES; all major credit cards accepted. Contact NRAES for other S&H rates and possible quantity discounts: NRAES (Natural Resource , Agriculture, and Engineering Service), Cooperative Extension, PO Box 4557, Ithaca, NY 14852-4557; phone 607-255-7654; fax 607-254-8770; e-mail NRAES@Cornell.edu; website www.NRAES.org.

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Bug vs. Bug - Biological Insecticides as Part of an IPM Program

Cathy Thomas, Integrated Pest Management Program
Pennsylvania Department of Agriculture

Biological insecticides (bioinsecticides) are an ideal component to an IPM program and can serve as an effective alternative to broad-spectrum chemical insecticides. Insects and mites can be infected by disease causing organisms like fungi, bacteria, viruses and nematodes. These products are generally safe for humans and do not affect beneficial insects and non-target species. Many of these pathogens are commercially available for use on lawns, gardens and agricultural pests.

Bacterial Bioinsecticides

One of the most widely used bacterial pathogens is *Bacillus thuringiensis* (Bt). Bt products are produced commercially in large industrial fermentation tanks. Until the early 1980s, commercial Bt products were effective only against caterpillars. In recent years, however, additional isolates that kill other types of pests have been identified and developed. Bacterial insecticides must be eaten by target insects to be effective; they are not contact poisons. These products consist of endospores and crystals that must be ingested by the insect. After feeding on treated areas, the insect gut becomes paralyzed, feeding stops and the pest dies.

The best-known and most widely used Bt insecticides are formulated from *Bacillus thuringiensis* var. *kurstaki* (Btk) isolates that are pathogenic and toxic only to larvae of the butterflies and moths (Lepidoptera). *Bacillus thuringiensis* subspecies israelensis (Bti) is used exclusively for controlling dipteran pest (flies) such as mosquitoes, black flies, and fungus gnat larvae. Gnatrol , a commercial product containing Bti, is used in the greenhouse and nursery to control fungus gnat larvae. Another group of Bt isolates, including those from *Bacillus thuringiensis* var. *san diego* and *Bacillus thuringiensis* var. *tenebrionis* , are toxic to certain beetles.

Fungal Bioinsecticides

A distinct advantage to using a fungus is that it has the ability to directly infect the host insect by penetrating the cuticle of the insect, something a bacteria or virus cannot do. The fungal spore when applied first adheres to the cuticle. Under appropriate environmental conditions the spore germinates, penetrates the cuticle of the host and enters the inner body. The fungus grows throughout the body, producing toxins and eventually causes death. When death occurs the fungus grows out through the softer parts of the cuticle, covering the insect with a layer of mold. Depending on the fungus, the insect may appear white, pink or some darker color.

Beauveria bassiana is the most common commercially formulated fungus used to control a broad range of insects. This fungus can be applied with standard spray equipment. Some of the products labeled for the greenhouse and nursery industry include, Botanigard ES® , Botanigard 22 WP ®, and Naturalis T&O® .

Viral Bioinsecticides

A large number of viruses may offer potential for control of insects. Those with the greatest potential are in the Baculoviridae (nucleopolyhedroviruses (NPV) and the Granuloviruses (GV). Several products have been released in the US to control pests on cotton, tomatoes, legumes, and grapes. The USDA Forest Service currently uses the gypsy moth nuclear polyhedrosis virus *(Ld*NPV) to aerially spray thousands of acres of forest each year. This product, registered as Gypchek, is effective against gypsy moths but leaves all other animals unharmed.

Entomopathogenic Nematodes

Nematodes are simple roundworms lacking segments or appendages. An entomopathogenic (insect-parasitic) nematodes has a symbiotic association with bacterial that is lethal to many soil dwelling insects. The two genera of insect-parasitic nematodes used for pest control include *Steinernema* and *Heterorhabditis*. These nematodes have been used successfully to control soil dwelling pests in many industries such as greenhouse, nursery, strawberry, mushroom and turf. Nematodes are shipped to the grower in the infective juvenile stage. When applied to the soil, the infective juveniles surround the pest insect and enter it through natural body openings such as the mouth, anus or spiracles, penetrating through the body cavity. Once inside the body, symbiotic bacteria are released from the nematode gut which multiplies rapidly and causes insect death within 24 - 48 hours. A nematode used in the greenhouse industry to control fungus gnat larvae is *Steinernema feltiae*. Trade names include, Scanmask® , Exhibit SF® , Entonem® .

Advantages of bioinsecticides

- Organisms used in bioinsecticides are essentially nontoxic and nonpathogenic to wildlife, humans, and other organisms not closely related to the target pest.
- Bioinsecticides are often specific to a single group or species of insects, and this specificity means that most microbial insecticides do not directly affect beneficial insects. If you are using a control program using natural enemies, ALWAYS consult the supplier before spraying any compound.
- The pathogenic organisms can become established in a pest population or its habitat and provide control during subsequent pest generations or seasons

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Disadvantages of bioinsecticides

- Heat, desiccation (drying out), or exposure to ultraviolet radiation reduces the effectiveness of several types of bioinsecticides..
- Proper timing and application procedures are especially important for some products.
- Products may have a limited shelf life

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The use of bioinsecticides in pest management will increase as more products become available through advancements in genetic engineering and manufacturing processes.

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Sampling Strawberry Leaves for Nutrient Analysis

Kathy Demchak, Department of Horticulture

This past spring, a number of grower cooperators and agents were involved in a survey involving nutrition of strawberry plasticulture plants. The main purpose of this survey was to determine the reliability of results using petiole sap testers, aka Cardy meters. During the course of this survey, the question came up concerning whether NOT removing the petioles would make a difference in the analysis results. Instructions included with plant analysis kits do state to remove the petioles, but discussion with lab personnel at the Penn State Plant Analysis Lab revealed that nearly all strawberry samples from growers that have been received in the lab in previous years have consisted of the leaf petiole plus blade. So, for a while, we collected extra samples of separate petioles and blades to determine whether this discrepancy makes a significant difference in sample results (i.e., could cause incorrect diagnoses). There was a significant difference in the nutrient concentrations in petioles and leaves, plus the petiole is a fairly large proportion of the dry weight, so incorrect interpretations could easily result due to a failure to remove the petioles from samples sent in for a nutrient test. The nitrogen concentration in the petioles was half that in the leaf blades, while the potassium concentration was double. Other elemental concentrations which varied widely between petioles and leaf blades were manganese and the micronutrients manganese, iron, copper, boron, and zinc. The percentage of dry weight of the sample that the petiole comprised ranged from 12% with 'Earliglow' in samples early in the season, to 30% with 'Sweet Charlie' in samples taken later. Therefore, if the petiole is included as part of the sample, it would be easy for deficiencies to be diagnosed that don't exist, or to be missed when in fact present. Bottom line - whether you are in matted-row or plasticulture production, please be sure to remove the petioles from strawberry leaf samples that you send in to labs. And, make sure that you sample the leaves that have most recently reached their full size - not old ones and not ones that are still growing, as this makes quite a difference, too. If you don't, you may be getting inaccurate results.

This research was supported in part by agricultural funds administered by The Pennsylvania Department of Agriculture.

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Potato Musings

Bill Lamont, Department of Horticulture

Potato Field Days Set for Cambria and Lehigh County

Bill Lamont, Department of Horticulture

Potato field day in **Cambria County** will be held Friday August 22nd at Tom Smithmyer's Farm where the Snack Food Association Trial is located. For more information contact Mike Harteis, 814-472-7986.

Potato field day in **Lehigh County** will be held September 3rd at Smokey Wessners Farm where a variety trial is located. For more information contact Bob Leiby, 610-391-9840.

Fungicide Resistance Management: Potatoes and Blights

Modified and rewritten by Barbara Christ and Sara May, Department of Plant Pathology, Penn State, from Tom Zitter, Department of Plant Pathology, Cornell, published in the Long Island Fruit and Vegetable Update under the title of Potatoes. **(I am running this article again because of the presence of late blight in several counties in Pennsylvania)**

New Foliar Fungicides Offer Choices and Precautions:

Controlling early and late blight on potatoes used to be so simple. Growers in the past relied heavily upon protectant fungicides such as chlorothalonil (Bravo), mancozeb (Dithane), metiram (Polyram), triphenyltin hydroxide (TPTH, Super Tin), and fixed coppers. However, we now know that repeated use of some of these materials without alternation with different chemistries can result in pathogens becoming less sensitive to these chemicals. We have witnessed this with the advent of new genotypes of the late blight fungus, *Phytophthora infestans*. Growers were forced to discontinue their use of chemicals such as Ridomil (metalaxyl) or Ridomil Gold (mefenoxam) and switched to fungicides like Curzate, Acrobat, Tattoo C (now called Previcur Flex), or Gavel. These new late blight fungicides need to be used judiciously or they also will become ineffective due to resistance. Furthermore, there are now three new chemicals (Quadris, Headline, and Gem) which are all strobilurin chemistries. Because of multiple products in the same class of chemicals, we now need to understand which fungicide belongs to which chemical class.

Why do we need to be so careful?

Strobilurins, like Quadris, Headline, and Gem, have a single-site mode of action (they are called QoI fungicides and they simply inhibit mitochondrial respiration in the fungus), this means there is a high risk of fungi overcoming this form of control mechanism. In fact, this resistance problem has already occurred when using Quadris on curcurbits for the control of powdery mildew in New York and gummy stem blight in several southern states. Decreased sensitivity with the use of Quadris for the early blight fungus, *Alternaria solani*, has also been noted in potatoes in the Midwest. In Pennsylvania we have tested populations of Alternaria that have not yet been exposed to Quadris and isolates with high levels of tolerance to the fungicide were recovered. In a population that was exposed to some applications of Quadris, there were even more isolates of Alternaria with high tolerance. Clearly the message to rotate strobilurin chemistry is real and applies to all three strobilurin fungicides (labeled Quadris , Headline and Gem). In an effort to prevent further widespread resistance problems from developing, Syngenta is introducing the Quadris/Bravo Performance Pak. Additionally the company is recommending that if Quadris was used as an in-furrow treatment, then the first foliar spray should not include a strobilurin (the brand name for the in-furrow formulation will be called Amistar 80 WG). If resistance is present on a farm or an adjacent field, then no strobilurin (any of the three) should be used for the entire season. The other chemical companies have also stressed the need for a fungicide resistance management program. We are working with these companies to provide growers with appropriate resistance management practices. Following are guidelines that we have developed to assist you.

Resistance Management:

1. If MonCoat is used as a seed treatment, do not apply Moncut as an in-furrow fungicide. They have the same chemistry.
2. Strobilurin fungicides include Quadris, Amistar, Headline, and Gem.

   a) If Quadris (Amistar) is used in-furrow, do not apply a strobilurin fungicide as first foliar spray.

   b) If you use a strobilurin that is not a premix with a protectant (Performance Pak), tank mix with either a mancozeb or chlorothalonil.

   c) Do not make sequential applications of strobilurin fungicides.

   d) If applying a strobilurin, no more than 1/3 of the total season's fungicide applications may be a strobilurin fungicide.

   e) Srobilurin fungicides have a single-site mode of action, which makes them more vulnerable to resistance than other fungicides that have multiple-sites of activity such as chlorothalonil and mancozeb. Because of this single-site activity, strobilurins can encounter resistance through one mutation in the fungus.

3. Even for multiple-site fungicides, we now recommend that you rotate between classes of fungicides periodically rather than using only one type (i.e. chlorothanonil vs. mancozeb). Our reasons for this are observations that the efficacy against the fungus

erodes away to a slight degree with constant use of one class.

Tank mix Curzate, Acrobat and Previcur with appropriate protectant fungicides. I (Barb Christ) recommend that these chemicals be rotated. After 3 applications are made of one chemical, it is highly suggested that you switch to another fungicide. I suggest Curzate for early-mid season, Acrobat for mid-late season and Previcur for mid-late season late blight control.

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Upcoming Meetings

Bill Lamont, Department of Horticulture

Local

August 27, 2003. Seed Cleaning and Processing Techniques. Sonnewald Natural Foods, Spring Grove, PA. Contact: Michael Glos, 9398 W. Creek Rd., Berkshire, NY 13736. (607) 657-2860 or michaelglos@nofany.org

September 9, 2003. Evening Pumpkin Meeting. See the results of one of the Penn State variety trials in Northampton County. Unangst Tree Farms, 7317 Bethlehem-Bath Pike, Bath, PA 18014. Call Emelie Swackhamer at 610-391-9840 for information.

September 19-20, 2003. Passive Solar Greenhouse Workshop: Design, Construction and Year Round Production. Sonnewald Natural Foods, Spring Grove, PA. Contact: Steve Moore ((717)-225-2489 or sandemoore@juno.com

September 26, 2003. Fall High Tunnel Workshop at the High Tunnel Research and Education Center, Horticulture Farm, Rock Springs, PA. Contact: Lisa White 814-692-4635.

March 5-6, 2004. Passive Solar Greenhouse Workshop: Design, Construction and Year Round Production. Sonnewald Natural Foods, Spring Grove, PA. Contact: Steve Moore ((717)-225-2489 or sandemoore@juno.com

Regional

September 4-5, 2003. First High Tunnel Workshop for Extension Specialist, Agents, andVocational Agricultural Teachers funded through the NE SARE Professional Development Grant and held at the High Tunnel Research and Education Facility, Horticulture Farm, Rock Springs, PA. For more information contact: Bill Lamont 814-865-7118 or wlamont@psu.edu.

October 26-29, 2003. Compost Advanced Short Course. Cornell Waste Management Institute, Holiday Inn, Ithaca, NY Contact: (607) 255-1187 or www.cfe.cornell.edu/wmi.

January 27-29, 2004. Mid-Atlantic Fruit and Vegetable Conference, Hershey, PA. Contact: Bill Troxell (717)-694-3596 or e-mail: wt.pvga@tricountyi.net

National

August 10-14, 2003. Potato Association of America Annual Meeting, Red Lion Hotel, Spokane, Wash. Contact: (800) 325-4000. Information/Registration: www.paa2003.wsu.edu.

August 16-19, 2003. 31st American Society for Plasticulture Congress. The Crown Plaza, Grand Rapids, MI. Contact: Pat Heuser (814) 238-7045 or http://www.plasticulture.org

October 3-6, 2003. American Society for Horticultural Science Centennial Conference, Providence, RI. Contact: ASHS at http://www.ashs.org/ where all registration info is on-line or call ASHS Headquarters at (703) 836-2024.

Great Lakes Fruit, Vegetable and Farm Market Expo, The Grand Center and Amway Grand Plaza Hotel, Grand Rapids, MI. Contact: Hilary Morolla (810) 234-4126.

December 8-12, 2003. National Potato Council Seed Seminar; Cruise, Los Angeles, Calif., to Baja, Mexico. Contact: Oregon Seed Potato Association, www.oregonseedpotatoes.org or (503) 731-3300.

January 6-10, 2004: National Potato Council 55th Annual Meeting, Cancun, Mexico, Moon Palace Resort. Contact: (202) 682-0333, or www.nationalpotatocouncil.org.

International

December 7-11, 2003. The XVIth World Congress on Plastics in Agriculture. Sheraton Hotel, Algiers. Contact: sophom@wissal.dz