The Vegetable and Small Fruit Gazette

Vol. 7, No. 7- July 2003

Horticulture Department
The Pennsylvania State University

In this Issue:

Tip for the Month-- "No matter how hard you try, you can't baptize cats"--Unknown

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Comments from the Editor

Bill Lamont, Department of Horticulture

We wish each of you a happy and safe 4th of July! Take time to celebrate the birth of the nation with family and friends, enjoy the fireworks but also take a moment to reflect on how it must have felt to place ones signature on the Declaration of Independence. To go against the might of the British Empire, which ruled the world at that time was no small step. When they signed that document they laid their lives and fortunes on the line for their belief in freedom. We owe them a debt that can never be paid. The 4th of July usually means that crops are really growing in the fields at the Horticulture Farm but this year it means that we finally planted our crops! Should be interesting to see how the insects and diseases play out this year. The High Tunnels

continue to produce beautiful flowers, red raspberries, a wide variety of vegetables and herbs and even blue potatoes. I appreciate the article from Scott Guiser, County Agent, Bucks County on **"Stinger for Strawberries"** and look forward to receiving an article from Tom Ford that will appear in the August issue. 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

August	Tom Ford
September	Cheryl Bjornson
October	Mary Conklin
November	John Esslinger
December	Andy Muza

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Congratulations

Bill Lamont, Department of Horticulture

Congratulations to the following faculty and county extension staff members of the Vegetable and Small Fruit Team on their recent promotions. Well done!!

ACTS Promotion-Kathy Demchak

To Professor:
Shelby Fleischer
Bill Lamont

To Senior Extension Agent:
Tom Ford

To Extension Agent:
Mary Concklin

To Associate Extension Agent:
Dwane Miller

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Vegetable and Small Fruit Field In-Service for Extension Agents July 29th and 30th

Bill Lamont, Department of Horticulture

Just a reminder that the Vegetable and Small Fruit In-service will be held on July 29 and 30th at the Horticulture Research Farm, Rock Springs, PA. There will be a cookout the evening of July 29th for team building, espirit de corp etc. The in-service will cover on-going vegetable and small fruit research both in the field and high tunnels located at the Horticulture Farm and will involve our colleagues from Entomology and Plant Pathology. We will meet at the Horticulture Farm at the main office at 9:30A.M.and proceed from there to tour the plots at the Horticulture Farm, Entomology and Plant Pathology Farms. Dinner will be an informal cookout. We should be finished up in the early afternoon on Friday. Contact Bill Lamont, at wlamont@psu.edu or 814-865-7118 to confirm your participation in the in-service and presence at the cookout.

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Field Day for New Marketing Ideas

Tom Butzler, County Extension Agent, Clinton County

Growers are always looking for new ideas in the marketplace, whether it is a different crop mix or a way to draw the consumer to the farm. In order to expose central Pennsylvania growers to some new ideas, a Field Day will be held at the Horticulture Research Farm at Rock Springs on July 23rd at 5:00 PM.

One new crop idea we will look at is a sweet Spanish onions. In addition to production aspects of onion production, we will also look at several sweet Spanish onion varieties. Evaluation will also be done on the variety Candy and how well this performs as greenhouse grown tray plants, field grown bare root transplants, and sets. There is a cooperative effort between Penn State University, Pennsylvania Vegetable Growers Association and the Pennsylvania Department of Agriculture in creating a name brand onion for Pennsylvania. The Pennsylvania Simply Sweet® Onion is a branded onion, licensed through the Pennsylvania Vegetable Growers Association. It has been marketed locally as a branded onion in Washington County, Harrisburg and Philadelphia retail stores. The onion is produced in Pennsylvania under a set of

production and grading standards that result in a very high quality, large, sweet, non-pungent onion. It is marketed in August and September, during a period of low competition from other branded sweet onions grown in other states or other countries. Several acres were grown in southwestern Pennsylvania and the demand for these Pennsylvania onions was greater than the supply.

Is the demand great enough for additional growers? Can local central Pennsylvania growers meet this demand? Come on out to the Field Day and see if there is an opportunity for you.
High tunnels will be highlighted after the sweet Spanish onion trial. According to Penn State's Center for Plasticulture, high tunnels encompass a crop growing system that fits somewhere between row covers and greenhouses. High tunnels are relatively inexpensive permitting entry into crop production with limited capital. This system is particularly appealing to new-entry growers who utilize retail-marketing channels.

High tunnels are not conventional greenhouses. But like plastic-covered greenhouses, they are generally quonset-shaped, constructed of metal bows that are attached to metal posts which have been driven into the ground about two feet deep. They are covered with one layer of 6-mil greenhouse-grade polyethylene, and are ventilated by manually rolling up the sides each morning and rolling them down in early evening. There is no permanent heating system although it is advisable to have a standby portable propane unit to protect against unexpected below-freezing temperatures. There are no electrical connections. The only external connection is a water supply for trickle irrigation. The tour will highlight some crops that can be successfully grown in this system. For additional information and/or directions, please call Tom Butzler at 570-726-0022. Refreshments will be provided.

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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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Nurtient Management in 2003

Mike Orzolek, Department of Horticulture

Many growers will remember 2003 as a year of extremes. From mid-May until late June, it has been very wet and 8°F to 10°F below seasonal daytime high temperatures. Almost over night, we have now gone from cool and wet to hot and dry. Young transplants set out last week have had to adopt to hot weather and water stress almost instantly or die. Transplanting in plastic mulch last week, I observed that IRT green, red, blue and black colors were on the average 10°F to 15°F warmer compared to the silverized mulch materials. Transplant loss was much lower on the cool colors (metallized silver and white) compared to the hot colors (black, red, blue and IRT green) of plastic mulch.

Growers who were able to moldboard or chisel plow fields in April and then disc, harrow or rototill the soil after broadcasting fertilizer (N-P-K) may want to consider tissue testing of their various crops especially if the crop is showing signs of nutrient deficiency. Any soluble nutrient such as nitrogen, potassium and boron that was applied prior to the rainy May/June has been significantly leached and only with tissue testing would a grower be able to determine if additional N, K or B needs to be applied to the crops. In the last 3 weeks, all tissue tests on various crops grown in high tunnels have had low levels of magnesium (between 0.25 to 0.4%). The recommended magnesium level in most vegetable crop leaf tissue should be between 0.6 to 0.75%. If there was leaching of nitrogen, make sequential applications of low rates of N (10 lbs/A) rather than one high rate of N (40 lbs/A) because the high nitrogen application in all practicality will result in greater vegetative growth of most crops and reduce the total marketable yield and increase the time to crop maturity. Because many crops were planted out of sequence and time is running out, delay in crop maturity could be disastrous if an early frost occurs this year in the state.

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Accessing the Sweet Corn Webpage

Shelby Fleischer, Department of Entomology

In sweet corn, most insect management is based on the timing and intensity of 3 species of lepidopterans: the corn earworm (CEW), European corn borer (ECB), and fall armyworm (FAW). We have been establishing a regional human and information technology infrastructure for monitoring these pests since 1998, anticipating a band of data stretching from the Atlantic to the Great Lakes, and hypothesizing that this would help provide advance warning of southerly immigrants. We are designing this so that it could be adapted to other pest species. One result has been a sweet corn webpage.

The webpage is changing and has moved. The web site has moved from the College server (which had .cas in the address) to the University server at http://www.pestwatch.psu.edu/ From there, click on the sweet corn icon. Then, mouse-over the icons along the top to the "Tool" icon. That is the map tool, which brings you to the data. If you prefer to go straight to the map tool, go to http://www.pestwatch.psu.edu/sweetcorn/tool/tool.html

Data providers create a human infrastructure for powering mapped representations. Virginia, Maryland, Delaware and New Jersey supply data from blacklight traps; Pennsylvania, New York, Connecticut, Massachusetts, Vermont, New Hampshire and Maine supply data from pheromone traps. In PA, this is being done by innovative Extension agents.

Data quality is best for CEW. Pheromone trapping for CEW has been around since the 1970's, and the lure appears to be stable and "clean" (it captures almost entirely CEW, with little non-target capture). It also appears to be fairly robust to variation in trap placement. I believe our second best candidate for good quality data from pheromone trapping is FAW. The northeast gets very high rates of capture of non-target species, primarily from the non-pest *Leucania phragmatidicola* (there is no common name). However, we can clean this up, albeit with reduced trap capture of FAW, using a 2-component lure. Scentry is now selling this as the "FAW-PSU" lure.

Data quality is most problematic with ECB - but this is the species for which good phenology models exist from the work of Drs. Dennis Calvin and Joseph Russo. Phenology is defined as the timing of biological events. Phenology models give predictions of the time (but not the intensity) of infestation. Within the map tool, there is an icon that looks like a thermometer. That brings you to modeled estimates of when 5% of the multivoltine ECB population is entering a life stage. For example, when the map color at a location matches the legend for adults, it means that 5% of the ECB population is entering the adult stage. These modeled estimates have been well-validated, and are being used throughout the US.

Trap catch data are input into password-protected databases, and then into a MySQL database. Trap catch data are estimates of a catch-per-day, rounded up to the nearest whole number. Maps are finalized for each week, but data flow in daily. Therefore, for the current week, the map shows the compiled newest information. Maps for the current week are updated daily.

Geographic Information Systems and internet tools create interactive hierarchical maps enabling users to observe current and past conditions, and "drill down" to the point of interest. Maps are "clickable, enabling users to obtain time-series graphs - the catch over time at any site. Clicking on bars on the time-series graph will show the map for that time. Maps can be advanced over time to show temporal patterns.

By adopting this new method, we will be able to see the data at each site, as before, in clickable maps, but also be able to move among maps easily using a scrollbar. You can even "play" the maps as a mini-movie. In the future, we hope to bring in weather data. You can zoom-in to an area, so we can have higher participation rates, or be able to see more detail when it exists (as in New Jersey). Populations of both the corn earworm and the fall armyworm are primarily influenced by annual re-invasions from the south. By aggregating across spatial scales, regional patterns and early-warnings become more evident.

The spatial and temporal data are best viewed through interactive maps, but it can also be helpful to access the same data in a table format. One of the icons brings you to a "Reports" webpage, which organizes the trap catch data as tables that can be put into spreadsheets.

Regional monitoring is not always popular. In this case, it relies on trap data. Why bother, if you can carefully scout your own farm? Yes, it's typically better to make management decisions based on pest density of a life stage (such as an egg stage) that is closest to the stage for which management decisions are made (such as early instar larva). But not all fields and farms are able to do this, especially in areas with a lot of diversified crop production, which is common in Pennsylvania. Field-by-field, and planting-by-planting, pest monitoring is hard to develop due to farm and crop diversity, multiple plantings of each crop, spatial segregation in urbanizing landscapes, and small size of many farms. Even if you are an excellent scout, there is a lot of variability with an egg-density estimate: it makes common sense to obtain another estimate from another sampling method. Also, it is extremely difficult to monitor for the egg stage of some pests, such as the corn earworm, and if we can assume that egg-laying occurs at about the same time as moth flight, and that egg density if related to moth flight activity, then pheromone trapping makes sense. Furthermore, two of the pests (CEW and FAW) are primarily or exclusively annually re-invasive species, where most of the population arrives from the south. If we track these pests on a regional basis, we have some advance warning of their time and intensity of immigration. Finally, pheromone trapping is becoming increasingly easy to accomplish. There is a lot of noise in the data - but patterns emerge when data are aggregated over a large area. By collaborating through Extension programs, we can get a regional perspective of recent pest activity, helping pest management for all growers, which tends to reduce pesticide inputs, improve farm-worker safety, reduce environmental problems, and helps ensure food safety.

Please bear with us as we migrate to this system. Changes are underway even as we utilize the map tool interface to the data. Past work relied on each file (each map, each time-series) being written to a hard drive, and then linking all files. But we were

generating >2,000 files per week in 2001. To grow into a regional site, to fill in with better spatial resolution (which is especially important for insect data that have relatively poor spatial correlation properties), and to be able to "zoom in" to better view information at a local level, we are migrating towards "live-web-GIS", while working to keep an interface that is relevant to growers. We are doing this through collaboration with Outreach in the College of Earth and Mineral Sciences that houses the Department of Meteorology. This will move us towards seeing moth flights, at least at the end of the year, as mini-movies, and reviewing patterns with respect to wind trajectories. Just as coaches do, perhaps reviewing the tapes at the end of the season, for several seasons, will help us understand, mathematically model, and then partially predict, this annual re-invasion.

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Bug vs. Bug - Leafminer Control in Greenhouse Crops

Cathy Thomas, Integrated Pest Management Program
Pennsylvania Department of Agriculture

Leafminers (*Liriomyza* spp.) are dipterous (flies) insects attacking a wide range of vegetable and ornamental crops in the greenhouse and in field crop production. The most common species found to infest greenhouse crops is *Liriomyza trifolii*, American serpentine leafminer. The larval stage of these tiny black and yellow flies feed between the upper and lower surfaces of leaves appearing as wavy lines that are visible on the top of the leaf. This feeding damage affects the aesthetic value of ornamental plants and photosynthesis is reduced causing withering or early defoliation of the leaves. Biological control of leafminers is very effective means of controlling this pest and should be part of an IPM program.

Life Cycle

Adult female leafminers are small, measuring about 2 -3 mm. They are black with yellow and have a yellow spot on their back. The female leafminer has a very sharp ovipositor that she uses to pierce the holes in the upper surface of the leaf to extract plant sap for feeding. The adult female may also lay an egg in this puncture mark. The egg hatches into a tiny fly larva (maggot), that starts eating its way through the leaf. There are three larval stages. Before pupating, the larva cuts a sickle shaped hole in the leaf cuticle and exits. The pupa usually falls off the leaf into the soil, however sometimes the pupae may remain hanging on the leaf. Development time from egg to adult is dependent upon temperature. At 86 ° F, a life cycle is completed in 12 to 14 days.

Cultural Control

Sanitation is critical in the control of this pest. Remove infested leaves if possible and destroy all plant debris. Broadleaf weeds may serve as sources of inoculum. Practice good weed control in the greenhouse and outside the structure. Yellow sticky traps can be used to trap adult leafminers.

Biological Control

Diglyphus isaea

This tiny black parasite is 2 - 3 mm long and occurs naturally in North America. The female wasp punctures a leafminer larva of the second or third instar to paralyze it. She then deposits and oval egg next to the leafminer larva. The egg hatches into a larva that feeds on the leafminer larva. A *Diglyphus* population will build up rapidly, controlling increasing leafminer populations in a short time. At lower leafminer densities, *Dacnusa sibirica* more efficient in locating prey.

Dacnusa sibirica

This tiny parasitic wasp occurs naturally in North America and Europe. The adult is dark brown, 2- 3 mm long with very long antennae. This wasp is able to locate mines at very low densities, searching mainly in lower crop canopy. The female deposits her egg in a leafminer larva, preferably of the first or second instar. A new parasite will emerge from the body of the leafminer. Development time takes 17 to 19 days at 68°F. *Dacnusa* can hibernate in leafminer pupae.

Benefits of using biocontrols include:

- Applicable in many crops
- Controls common leafminer species
- Efffective parasitization at low temperatures

Tips for using biological controls:

- Eliminate the use of toxic insecticides 2 months before introducing biocontrols
- Parasites can be used in combination with compatible insecticides (consult supplier for compatibility information)
- Introduce biocontrols when leafminers are at low levels

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Stinger for Strawberries

Scott Guiser, Extension Agent, Bucks County Cooperative Extension

A 24(c) Special Local Needs Registration for Stinger (clopyralid) for control of various troublesome weeds in strawberries in Pennsylvania has been approved. This is particularly good news for strawberry growers who have Canada thistle problems because Stinger provides excellent control of this perennial weed. In addition, Stinger will control dandelion, smartweed, ragweed, clover, groundsel and nightshades. However, it is important to realize that Stinger will not control many common broadleaved weeds such as pigweed and lambsquarters.
Stinger is a foliar-absorbed, post-emergent, translocated herbicide. Only weeds which are present at the time of application will be affected. Good control of perennial weeds is achieved because Stinger will move to underground plant parts and kill them, provided that the application is made at the proper time.

Since Canada thistle is a primary problem, let's see how Stinger can be used to control it. Post-harvest applications of 1/3 - 2/3 pints per acre can be made anytime after harvest through early fall. As a practical matter, growers should consider completing their normal renovation treatments (2,4-D, mow, apply pre-emerge herbicides, fertilize, irrigate) and then plan to apply Stinger in late summer to early fall. At this time, thistle colonies have re-grown and produced plenty of foliage to absorb the herbicide. In addition, late summer/early fall applications will result in maximum translocation to underground thistle parts. In any event, be sure to treat Canada thistle before flowering, ideally when first flower buds are seen. A single 2/3 pint rate or two 1/3 pint applications will give excellent suppression of Canada thistle.

Follow-up, spring applications may be needed. The 1/3 pint rate may be used up to 30 days before harvest. Again, it's important to allow the thistle to develop plenty of foliage before treatment. Don't treat at the first sign of thistle emergence. Rather, wait for plenty of foliage to develop, at least 6 to 8 inches high, before treating (about the time first flower buds can be seen is ideal). Since there is a 30 days to harvest restriction, this will probably mean late April to early May applications in Pennsylvania.

Only spot treatments may be necessary, especially if applications were made the previous year. There's no need to broadcast spray if thistle colonies occupy only part of the field. Refer to the Stinger label for hand held sprayer instructions. It's important to realize that Stinger rates are relatively low. So when using the 2/3 pint per acre rate, you would use only one-quarter of an ounce (7ml) to treat 1000 square feet …perhaps the amount added, per gallon, to a backpack sprayer. For a point of reference, this is about six times less material than if you were using Roundup at the 2 quart per acre rate. Measure carefully.

Stinger may be used in first year plantings but applications should be delayed until the planting is well established. The label refers to "post harvest" in the first year. This does not seem to fit Pennsylvania's production systems, unless you haven't removed some or all of the first year's blossoms. At any rate, delaying Stinger applications until summer or fall makes sense, especially for Canada thistle control.

A few more details.

- Some strawberry leaf cupping can be expected. If severe leaf distortion occurs, check you rates and calibration.
- Do not add a surfactant to Stinger for strawberry weed control.
- Do not tank mix Stinger with other herbicides.
- Observe the 30 days to harvest limit.
- Do not apply more than 2/3 pints of Stinger per year.
- Remember that Stinger is not a material that will "clean-up" all broadleaved weeds. It has major weed weaknesses… but it's a real thistle killer.
- Consider spot treating thistle colonies to save time and money, but calibrate the backpack and measure carefully. Don't over apply.

A Wavier of Liability certificate is being distributed with the supplemental labeling. Dow requires that growers obtain and sign the waiver of liability certificate before using Stinger, releasing Dow AgroSciences from liability for damages caused by Stinger on strawberries.
Growers should have the complete Stinger label and the Supplemental Label for Strawberries so that they have complete information before using this material.

Labels and waiver paperwork can be found at: http://www.cdms.net/manuf/products.asp/ and at Dow AgroSciences Web site at http://www.dowagro.com As of this writing, the SLN label for Pennsylvania was not yet on either site, though it should be shortly. Once at either site, search for Stinger.

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Determining When to Irrigate Highbush Blueberries

Elsa Sánchez, Assistant Professor of Horticultural Systems Management and Kathy Demchak, Small Fruit Extension Specialist, Department of Horticulture

The amount of water supplied to blueberry plants influences vegetative growth, fruit size and quality. Supplemental irrigation is almost always needed for maximal yields even in years of plentiful rainfall because rain events occur irregularly resulting in periods of drought during the growing season. In addition, the nature of the root system makes the plants sensitive to moisture fluctuations.

The distribution of the blueberry root system is dependent on the age of the plant and climactic and soil conditions. In general, blueberry plants have shallow root systems with the majority of the roots 8 to 12 inches deep in the soil and rarely deeper than 16 inches. Most of the roots, 90%, are located within the dripline of the blueberry canopy.

Root systems of highbush blueberry plants are composed primarily of very thin roots. Roots can be up to 0.04 inch in diameter, however most are 0.02 to 0.03 inches in diameter, about the thinness of a strand of hair. Blueberry roots lack root hairs that are used in other plants for mining the soil for water and nutrients. Instead, blueberry roots have formed a unique association with endomycorrhizal fungi. The fungi inhabit blueberry root cells and facilitate water and nutrient (especially nitrogen and phosphorous) uptake for the blueberry plant, essentially acting as root hairs. In return, the fungi use carbohydrates from the plant for nourishment. Endomycorrhizal fungi survival is jeopardized in production systems using extensive inorganic fertilizers and cultivation. In this situation the roots can be less efficient at water and nutrient uptake.

The following example will help determine the need for supplemental irrigation in various situations. First, determine the available water holding capacity of the root zone. Ascertain the soil texture of the site and use a rooting depth of 16 inches, multiply the rooting depth by the available water holding capacity (from the table below) to determine the available water holding capacity of the root zone. For example, a clay loam soil would have an available water holding capacity of 2.24 inches of water (0.14 inch of water per inch of soil multiplied by 16 inches of soil). The water held in the root zone should not drop below 50% of capacity to avoid moisture stress to the plants. In this example the amount of available water should not drop below 1.12 inches of water held in the root zone.

Available Water Holding Capacity Based on Soil Texture. Source: Commercial Vegetable Production Recommendations Pennsylvania 2003.

Soil Texture	Available Water Holding Capacity (inch of water/inch of soil)
Course sand	0.02-0.06
Fine sand	0.04-0.09
Loamy sand	0.06-0.12
Sandy loam	0.11-0.15
Fine sandy loam	0.14-0.18
Loam and silt loam	0.17-0.23

Clay loam and silty clay loam	0.14-0.21
Silty clay and clay	0.13-0.18

The next piece of information needed is how much water the plant uses a day or the average peak use rate. In Pennsylvania, the average peak use rate varies from 0.19 to 0.22 inches per day (see the table below). A blueberry plant in Harrisburg in July can be using up to 0.22 inches of water per day. With 1.12 inches of water easily available to use and no other water supplied, the plant will use 1.12 inches of water in about 5 days (1.12 inches of water divided by 0.22 inches of water per day equals 5.09 days). The daily peak values are averages and can be up to 25% higher.

Monthly average potential evapotranspiration or peak use rate of water demand for July and August at various locations in the US. Source: adapted from Pritts, M.P. and J.F. Hancock, 1992.

Location	Average Peak Use Rate (inches/day)
Allentown	0.21
Erie	0.21
Harrisburg	0.22
Philadelphia	0.19
Williamsport	0.21

Several methods exist to determine when to irrigate. One is the 'checkbook' or water budget method, which uses the water holding capacity of the soil (described above). To use this method determine the plant water use and the amount of rainfall daily. Subtract the daily plant water use and add the daily amount of rainfall to the available water holding capacity of the soil. Irrigate the plants when the available water holding capacity of the soil drops to 50% of capacity. Soil moisture content should be checked periodically to verify water use and availability.

Another method is to assume that blueberry plants need about 1 - 2 inches of water per week depending on the growth stage of the plant. Two inches may be supplied from the period of fruit expansion to harvest. Irrigate the plants when rainfall does not meet the plant demand water in a given week. This method is less precise than the water budget

method. As with the water budget method, soil moisture content should be checked periodically to verify water use and availability.

References:

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- Galletta, G.J. and G. Himelrick (Eds). 1990. Small Fruit Crop Management. Prentice-Hall, Inc, NJ.
- Pritts, M.P. and J.F. Hancock (Eds). 1992. Highbush Blueberry Production Guide. Northeast Regional Agricultural Engineering Service Publication NRAES-55.

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Potato Musings
Bill Lamont, Department of Horticulture

Potato Website of Interest: Global Potato News http://www.potatonews.com

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.

Brown Rot-Bacterial Wilt: A Threat that needs to be monitored
Barbara J. Christ and Sara May, Department of Plant Pathology

Brown rot (sometimes referred to as southern bacterial wilt) has not been a problem in PA and most of the US except for Florida. Brown rot is typically found in potato production areas that have higher temperatures such as the tropics and subtropics. In those areas it can be the most destructive disease limiting production.

So why do we bring up the subject?

This disease is caused by a bacterial pathogen, *Ralstonia solanacearum*. The host range is quite broad. Until recently, the race and biovar that infected potatoes required warmer environments, now there is a new race 3 biovar 2, newly detected on other crops that can survive colder environments. This pathogen is listed on the USDA's Agricultural Bioterrorism Act of 2002 Select Agents and Toxins list. In 1995 and 1999, the pathogen was introduced into the US from Guatemala. In 1999 the PDA Plant Diagnostic Lab received diseased geranium samples from several greenhouses in PA and from one in Delaware. These samples were found to be the new biovar 2 adapted to cooler climates. Again in 2003, the pathogen was introduced to the US from Kenya propagated geraniums via rooting stations in Michigan, and New Hampshire. This organism was detected in PA on geraniums in greenhouses in Cambria, Lancaster, Franklin, Montgomery, Mercer, and Blair counties, which was revealed during the 2003 geranium survey. All infested greenhouses were quarantined and disinfested. At this time there is no case of field potato or tomato infection with this new race. This new race 3 biovar 2 could become one of the most destructive pathogens to potato seed production areas and needs to be monitored. We know that this new race has caused extensive crop loss in potatoes in Europe.

Symptoms:
Symptoms include wilting and yellowing of the foliage and stunting of plants. Wilting due to brown rot is similar to ring rot, but is distinguished from ring rot in that the wilting proceeds more rapidly. Often one stem in a hill may show wilting and the remaining stems will wilt quickly if the disease is progressing rapidly. Leaves may not turn color as they wilt and other times leaves will turn a pale green and later brown as they dry. The cross section of the stem typically has vascular browning and bacteria oozes from the cut surface. This bacterial ooze can be observed as streaming if the cut stem is placed in water.

On tubers there is a grayish brown discoloration evident through the periderm. Some tubers may not show symptoms but cross sections of the tuber usually show a distinct vascular discoloration that may extend into the pith or cortex. Upon cutting the infected tubers and applying light pressure, grayish white droplets of bacterial slime ooze from the vascular ring.

Management:
Exclusion by quarantine is the most important control practice. Therefore detecting this disease in seed potatoes is paramount.

Brown rot has a wide host range, which means crop rotation to non-host species can be a difficult task and therefore is not the answer for management. The most susceptible hosts are in the Solanaceae family, but do include other economically important crops such as geranium, bean, pepper, tomato, eggplant and beet. Many hosts are weedy species which include black nightshade, climbing nightshade, horsenettle, Jimson weed, purslane, mustards, and lambsquarters.

In other economically important crops, planting resistant varieties is an effective management tool. For potatoes there is little resistance available at this time.

Other practices such as those used for ring rot are important. These include planting pathogen free seed and disinfecting cutting knives and other equipment.

This disease caused by *Ralstonia solanacearum* race 3 biovar 2 could become the most devastating disease in the US if not monitored closely and successfully excluded.

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.

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

July 9, 2003. An Organic Success Story Field Day. Sprial Path Farm, Loysville, PA. Call NOFA office before July 2 to register at (609) 737-6848

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