

The Vegetable and Small Fruit Gazette

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Horticulture Department
The Pennsylvania State University

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Tip for the Month: "Let your life lightly dance on the edges of time, like the dew on the tip of a leaf." Rabindranath Tagore

Comments from the Editor

Bill Lamont, Department of Horticulture

The first home Penn State football game is the end of August (could be hot). I hope my blue and white potatoes will be ready, so my colleagues and I can make the blue and white potato salad for the tailgaters to sample. We will be continuing work on developing

the market for these specialty potatoes. We really wanted to get Martha Stewart back on campus to do a tailgating segment but she is busy with other matters right now and I suspect that she views us as small potatoes-no pun intended. Oh well... We are moving into high gear at the Horticulture Research Farm and have several field days, workshops and tours planned for the remainder of the summer, so check the calendar of upcoming meetings and special articles on these activities in the gazette. In this issue we have another article in the "**Problems from the Field**" and I want to again thank Tim Elkner for submitting this article. This section is intended to give agents and chance to highlight some problems or observations they have made in the field and want to share with a wider audience. I want to thank Mary Conklin for her excellent article "**Am I Watering Enough?**" and look forward to Eric Oesterling's article in the September issue. I am adding meetings, field days and twilight meetings to the Upcoming Meetings List. 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.

Schedule for Agent Articles

Bill Lamont, Department of Horticulture

September	Eric Oesterling
October	Cheryl Bjornson
November	John Esslinger
December	Andy Muza

Websites of Interest

Bill Lamont, Department of Horticulture

University of Massachusetts

Drought info: www.UmassDroughtInfo.org

UmassVeg Newsletter :

http://www.umassvegetable.org/newsletters/current_newsletter.html

Mississippi State University

Greenhouse Tomato FAQ: <http://www.msucare.com/crops/comhort/greenhouse.html>

Vegetable Resource Page: <http://www2.msstate.edu/~ricks>

Organic Fruit and Vegetable Web Page: <http://www.msstate.edu/dept/cmrec/organic>
Vegetable Press Newsletter: <http://www.msucare.com/newsletters/vegpress/index.html>

Am I Watering Enough?

Mary Concklin, Montgomery County Cooperative Extension

As the growing season progresses plants grow larger, root systems become more extensive, and leaf surface increases. This coupled with hot summer days increases water needs and water loss due to transpiration and evaporation. Common sense. But do you know how much water your crop utilizes? No-till plantings retain moisture for longer periods than conventional tillage allowing one to reduce the amount of water applied.

It is possible to apply too much water. Phytophthora and other root rot fungi thrive in saturated soils. Another potential problem is loss of fertilizer through leaching. In an ongoing research project with nursery stock, by monitoring leachate for nitrogen, potassium and phosphorus, we have seen slow-release fertilizer virtually depleted over a month before it should have been. The reason was two-fold: the high summer temperatures coupled with probably more water than was needed caused many of the nutrients to leach out of the soil. Adjusting water amounts to plant needs and weather conditions is a better utilization of resources, prevents nutrients from leaching past to root zone, and reduces pollution. Water applications should be evaluated with an eye towards possibly reducing the amount applied to young plants and increasing the amount applied to rapidly developing plants, especially during hot periods, while taking into account soil type, root depth, and tillage practices.

Calibrate your irrigation system, know how much water you are applying and the water needs of your crop.

Production and Marketing of Ethnic Crops

Elsa Sanchez and Kathleen Kelley, Department of Horticulture

Elsa Sanchez joined the department of Horticulture in January 2002 as the Assistant Professor of Horticulture Systems Management. Her research interests are in studying sustainable systems that meet the unique needs of small-acreage growers. In addition to developing other programs, she and Kathleen Kelley have formed a collaboration to study the viability of producing and marketing different ethnic crops. Kathleen Kelley joined the department in November 2001 as the Assistant Professor of Consumer Horticulture. Her research interests are in studying consumer preference of horticultural crop species with an emphasis on edible crops.

By studying alternate crops that may have appeal to certain ethnic groups, they hope to

address the economic sustainability of small-acreage growers. From a production standpoint, these crops may require experimentation with various production methods focusing on environmental sustainability. From a marketing standpoint, these crops may require more investigations of potential consumer segments, such as professional chefs, ethnic groups and health conscious individuals. Ethnic crops were chosen as the focus of the collaboration based on demographic research. The demographics of the US are increasingly becoming diverse. As our total population increases, the number of white or Anglo Americans is projected to decrease from 69.1% to 62% in 2025 to 54.5% in 2045 according to the USDA. The result will be an increase in ethnic diversity that will create increased demand for ethnic crops produced and marketed in the US.

A grant was secured from the Federal State Marketing Improvement Program to study edamame, also known as edible or vegetable soybean, as an alternative crop for small growers. The study will determine the most favorable varieties for cultivation; establish planting, harvesting and post-harvest protocols; and investigate the acceptance of edamame among consumers and professional chefs. Edamame originated in China. It is popular throughout Asia and is gaining popularity in the US. Currently, edamame is largely imported from China and Thailand. Edamame is nutrient rich and is recognized as decreasing the occurrence of certain cancers. It is becoming a crop accepted by populations other than Asian sub-groups, who have used edamame historically.

We know of one large-scale commercial edamame producer in the US located in Washington and one processor in California. Retailers have been contacted and have discussed a willingness to obtain domestically produced edamame if the quality is suitable. Some production and marketing research has been conducted in Washington, Kentucky and Colorado. Profits have been made in other areas of the country from edamame production. One estimate for potential grower profits from Kentucky State Cooperative Extension is \$400 to \$2500 per acre depending on the variable costs of production and based on \$1.50 wholesale price. Colorado State Cooperative Extension estimated potential grower profits at \$1300 to \$1600 per acre depending on yield and based on a retail price of \$0.12 to \$0.15 per pound. As the first step in studying the viability of edamame production in Pennsylvania a cultivar trial is being conducted and will be reported on in the next issue of the Vegetable and Small Fruit Gazette.

Problems from the Field

Tim Elkner, Extension Agent, Lancaster County

There are two problems I have seen lately or anticipate soon. The first is higher than normal levels of vine death in pumpkin fields due to bacterial wilt. One grower I visited with lost over 10% of his stand. I have heard several reports of high beetle pressure early this season - possibly this increased pressure resulted in more pumpkins becoming infected with the wilt bacteria. I have not seen this many pumpkins going down with bacterial wilt before this year. There does not seem to be any relationship between variety and susceptibility to the wilt although in one field it appeared that Prizewinner was suffering more than Magic Lantern. It

would be interesting to hear back from some growers or other Extension agents as to the extent of this problem as well as any varietal differences seen.

The second problem I anticipate soon is high populations of whitefly. I have seen this pest in my home garden already in fairly high numbers. The appearance of this pest is earlier than normal for my area. This could indicate potential problems for later crops of tomatoes, peppers, eggplant, crucifers (broccoli, cauliflower, etc.) and cucurbits. Be sure to scout your fields for this pest and take appropriate action if necessary. Control of this pest is improved by using higher gallons per acre when spraying. Also - the materials labeled for this pest vary from crop to crop so be sure to read the label carefully before applying to any vegetable crop. Tomato growers can try a new material called *Knack* that is actually an insect growth regulator. This material will not kill the adult whiteflies but will prevent any young from fully developing into adults. This material is easy on the natural enemies of whiteflies that may be present in your fields but needs to be applied before the population becomes too high. Knack has a 14-day PHI.

Tour of Vegetable Research in Centre County

Thomas M. Butzler, Extension Agent, Horticulture/Integrated Pest Management, Clinton County

Penn State Cooperative Extension is welcoming all vegetable growers to an educational field day on August 9th, 2002. Anyone involved with vegetable production is encouraged to attend. The first stop will occur at the farm of Brooks Way. Brooks Way was recently awarded the 2002 Master Farmer for his use of integrated pest management, involvement in state horticulture associations, interest in trying new technologies, and employment of new market strategies (you need to ask him about his pumpkin tossing catapult). Always questioning current farming p

Heads Up on High Tunnel In-service Training and Agent Roundtable

Bill Lamont, Department of Horticulture

Penn State Cooperative Extension is welcoming all vegetable growers to an educational field day on August 9th, 2002. Anyone involved with vegetable production is encouraged to attend.

The first stop will occur at the farm of Brooks Way. Brooks Way was recently awarded the 2002 Master Farmer for his use of integrated pest management, involvement in state horticulture associations, interest in trying new technologies, and employment of new market strategies (you need to ask him about his pumpkin tossing catapult). Always questioning current farming practices, Brooks wrote a SARE Farmer/Grower Grant on fertility of sweet corn. An equipment malfunction meant that one year he did not use starter fertilizer on his corn. He saw no drop in quality, and this project will evaluate whether starter fertilizer is needed, whether it can be replaced by a foliar feed, and whether using side-dress or incorporating pre-planting nutrients might also replace starter or foliar feeding.

Not only will the tour look at his current research but will allow participants to view his other activities. The Way Fruit Farm has over one hundred acres of fruit trees, twelve acres of strawberries, twenty-five acres of sweet corn, and several acres of pumpkins. Some product is sold wholesale but much is moved through local farmers market and from the family roadside market. Lunch will be served at Brooks operation before we move onto the next stop.

The afternoon stop will occur at the Horticulture Research Farms at Rock Springs. Dr. Mike Orzolek will talk about his current research activities which include; evaluation of different mulch colors for crop response and retention of polyethylene properties and color during the growing season, evaluation of zucchini squash genetic populations for disease resistance (powdery mildew and the multiple viruses) as well as marketable yield and fruit quality, evaluation of different formulations of photodegradable plastic mulches for crop response and retention of polyethylene properties and degradation rate during the growing season, and evaluation of no-till pumpkin production with four different cover crops; hairy vetch, Austrian winter pea, annual rye and bare ground.

Afterwards, the tour will head over to the part of the farm where thirty plus high tunnels adorn the landscape. Dr. Bill Lamont will talk about current efforts such as high tunnel environmental research, performance of fall and spring sown cover crop in high tunnels and management of cover crop, and high tunnel insect and disease pests. Dr. Lamont will also show participants other high tunnel research such as the various vegetable variety trials, raised permanent wood beds versus flat ground, and strawberry and raspberry production.

The tour will start at 10:00 AM and will end at 3:30 PM. Because lunch will be served to participants, pre-registration is required. Please call Clinton County Extension Office at 570-726-0022 to let us know if you re planning on attending. Pre-registration deadline is August 6th. Brooks operation is located in Stormstown, Pa on Rt 550, approximately 10.5 miles west of Penn State University. Maps will be mailed or faxed upon request.

Heads Up on High Tunnel In-service Training and Agent Roundtable

Bill Lamont, Department of Horticulture

In an effort to minimize travel and maximize efficiency of time spent by county extension staff at the Penn State campus, the ornamental and vegetable teams in the Department of Horticulture have again decided to schedule their in-service training programs back to back. **The Ornamental In-service will be on September 5 and the High Tunnel In-service will be held on September 6.** On the evening of September 5 an informal dinner will again be offered to participants of both in-services to promote team building and esprit-de-corp.

In November the Ornamentals team will be having an In-service on November 13 and the Vegetable and Small Fruits Team will be holding their annual Agent Roundtable the next

day on November 14th. There will again be a dinner on November 13th for participants of both groups to foster interaction and the concept of being part of a team.

For information on the ornamental programs contact Dr. Jim Sellmer, 814-863-2250 e-mail: ics32@psu.edu and for information on the High Tunnel In-service or the Vegetable and Small Fruit Roundtable contact Dr. Bill Lamont, 814-865-7118 or e-mail: wlamont@psu.edu.

Status Report of Worm Pests of Sweet Corn

S.J. Fleischer, Department of Entomology

As of August 1, about 36 sites in Pennsylvania, and about 248 sites from Virginia to Maine, are contributing data from pheromone and blacklight traps. The data estimate flight activity from the European corn borer, corn earworm, and fall armyworm. The information from Pennsylvania and neighboring states are best reviewed as maps on the WEB at <http://pestwatch.cas.psu.edu/>. From there, click on "sweet corn". Both the website and this message report average counts per day. Click on a date to see the regional map for a given species. You may need to use one of the older maps (picked from the list of dates) to see a full set of data. Then clicks on a location in that map provide a look at the capture over time (the "time-series" graph) for that site. We currently have too many sites to enable you to be able to see all the time series, and are working on an interface that would enable you to "zoom" into a part of the map. However, I doubt that we will have that working this year. You can still examine the data from a given site by clicking on the "Yearly Reports" on the home page of maps.

Corn earworm appeared to have overwintered, but at low densities. However, they started invading from the south during late July, which is 7 to 10 days earlier than recent years. Important positive values are on both sides of the Chesapeake Bay by late July; very dramatic increases recently occurred on the Eastern Shore of Virginia. In Pennsylvania, corn earworm catches are present in most locations, and have started to exceed thresholds in Centre, Fayette, Lancaster, Washington and Westmoreland counties.

As of August 1, European corn borer (ECB) is into its 2nd generation flight in Maryland, and beginning the 2nd generation flight in much of Pennsylvania. Counts of adults from pheromone traps are expected to rise during the first week of August.

Fall armyworm captures were mostly absent until the last week of July. Now, however, we are seeing spotty, but important, increases, notably in Erie County. In past years, we have seen fall armyworm move into the state from the northwest, and the south-central counties.

August Disease Reminders for Commercial Producers

Dr. Alan MacNab, Department of Plant Pathology

DISEASE IDENTIFICATION

Identification information is available in the colored publication, "Identifying Vegetable Diseases" which is available from most Pennsylvania Extension offices, as well as from Penn State University.

ASPARAGUS

Rust: Continue applying fungicide sprays to young plantings. In addition to mancozeb and Bravo, Nova is now labelled for rust control on asparagus.

BEANS

Mosaic Viruses: Use resistance to BV-1. Provide good weed control; weeds are a source of bean viruses. Do not plant near clovers; they are a source of bean viruses. Do not make successive plantings in adjacent strips or fields; the few diseased plants that appear in early plantings act as an important virus source for later adjacent plantings.

White Mold and Gray Mold: Apply protective fungicide sprays when warranted. Wet conditions immediately before and during bloom promote white mold and gray mold. Ronilan is very effective, although only labelled for snap beans; Benlate and Topsin M also are good when timed well, and can be used on snap and other beans.

Rust: In addition to Bravo, Nova is now labelled for bean rust.

BEANS, LIMAS

Downy Mildew: During wet weather, when conditions favor disease, use fungicides. Conditions that favor late blight of tomatoes and potatoes also favor downy mildew of lima beans.

BEETS

Leaf Spots: Use fungicides where disease usually occurs. In addition to fixed copper, Quadris now is labelled for beet leaf spot.

CABBAGE

Fusarium Yellows: This disease is favored by hot weather. When possible, avoid susceptible varieties.

Clubroot: Where present, it is too late to apply controls for this year. Determine the source if possible. Then plan rotation, pH adjustment, or Terraclor WP use for next season. Wet soil conditions favor development.

Downy Mildew and Leaf Spots: These diseases become most important late in the season. Where anticipated and warranted, fungicides provide some control. For downy mildew, Ridomil Gold/Bravo 81W (1.5 to 2 lb/A) is effective and can be applied at 14-day intervals until 7 days before harvest. Weekly applications of Bravo and maneb also provide control. For downy mildew only, Aliette can be used (3 to 5 lb/A) at 14 day intervals until 3 days before harvest.

CARROTS and CELERY

Leaf Spots: Continue regular fungicide sprays; they are most important for the remainder of the season. Wet weather will promote their appearance and development. Quadris was labelled in 2001 and could be very helpful in controlling fungal leaf spots.

CUCURBITS

Bacterial Wilt: Symptoms sometimes appear shortly after rainfall. Where present, it is too late to attain control this year. Plan cucumber beetle (bacteria carrier) control for next year.

Powdery Mildew, Leaf Spots, and Blights: Use regular fungicide sprays unless varieties are resistant to the diseases of concern. Leaf diseases are of major importance on muskmelons (cantaloups) during late season. Quadris 2.1F (11 to 15.4 fl.oz./A) and NOVA 40W (2.5 to 5 oz/A) are excellent for powdery mildew, a disease which appears yearly starting about mid- to late-season. Use the high rates if powdery mildew is present. On cucurbits, to reduce the chance for the fungus to develop resistance to Quadris and/or Nova, alternate these two fungicides, and use the high labelled rates if powdery mildew is present. When NOVA is used, Bravo can be added to help control diseases in addition to powdery mildew. Ridomil/Bravo 81W is especially good for downy mildew, a disease that appears less frequently than powdery mildew in Pennsylvania. For a less expensive and less effective program, fixed copper and Bravo fungicides are labelled, but are not systemic, so coverage of both top and bottom leaf surfaces is especially important.

Scab: For susceptible varieties, use fungicides when conditions are cool and wet. For cucumbers, use resistant varieties when possible. Beware of this disease if you plan late plantings of susceptible cucumbers.

Mosaic Viruses: Use resistant varieties. When resistant varieties are not available, plant in large fields, control perennial weeds, and control aphids. Fusarium Wilt: It is too late to apply controls for this year. For future years, try rotation, resistance when available, and if necessary, soil fumigation. Symptoms appear first on plants in wettest areas of fields, and the disease is more prevalent in cool soil than in warm soil. The variety Athena may have the most resistance.

EGGPLANT

Verticillium Wilt: Follow rotations that avoid susceptible crops for as many years as possible. Where present yearly, consider fumigation where crop value warrants the expense.

ONIONS

Leaf Spots: Apply fungicides on a regular schedule, especially for those planned for storage. Defoliation diseases are active in August. Note that Ridomil Gold/Bravo, Ridomil Gold MZ, and Aliette are labeled for onions, and are materials of choice if one has difficulty controlling downy mildew. Other materials (Bravo, mancozeb, Quadris, and Rovral) listed in the Commercial Vegetable Production Guide are good for other leaf diseases that affect onions.

PEPPER

Mosaics and Virus Spots: It is too late to affect control for this year. For future years, use TMV

resistance, plant in large fields, control aphid vectors, and eliminate perennial weeds near fields.

Bacterial Spot: Where present, determine source. Did it come on plants? If present, start basic copper sprays early and tank mix with maneb. Plan to rotate to fields not recently planted to tomatoes or peppers. This can be a serious problem. Inoculum can be seed-borne. If disease is detected in a field, do not work in the field when plants are wet. The bacteria that cause this disease are spread less when plants are dry than when plants are wet.

Phytophthora blight: This disease is promoted by wet soil (poor drainage and/or heavy rainfall). The most severe losses are reported on cherry and cheese types. Follow a 3-year rotation between susceptible crops such as pepper, cucurbits, eggplant, and tomato. Ridomil Gold 2E (1 pt/A) or Ultra Flourish 2E (1 qt/A) soil applications (banded over the row at planting, and directed onto the soil at the base of plants at 30 days and 60 days after planting) are helpful. In addition, provide the best drainage possible; in some areas, for susceptible peppers, it is necessary to grow them on high ridges. In place of a "60 days after planting" application (above), Ridomil Gold/Copper can be applied as sprays at 10 to 14-day intervals to prevent the stem and fruit rot stage of this disease. If the "60 days after planting" application is made, fixed copper alone can be applied as a spray at 7- to 10-day intervals to control the stem and fruit rot stage of this disease.

PUMPKIN and SQUASH

Powdery Mildew: Use regular fungicide sprays. Start applications no later than when powdery mildew is detected on 1 leaf in 50 leaves; usually, powdery mildew symptoms appear first on the underside of leaves. Quadris 2.1F (11 to 15.4 fl.oz./A) and NOVA 40W (2.5 to 5 oz/A) are excellent for powdery mildew, a disease which appears yearly starting about mid- to late-season. Use the high rates if powdery mildew is present. On cucurbits, to reduce the chance of resistance development in the fungus, alternate Quadris and Nova, and use the high labelled rates if powdery mildew is present. When NOVA is used, Bravo can be added to help control diseases in addition to powdery mildew, and also slow development of resistance. For a less expensive and less effective program, fixed copper and Bravo fungicides are labelled, but are not systemic, so coverage of both top and bottom leaf surfaces is especially important. Ridomil/Bravo 81W is especially good for downy mildew, a disease that appears less frequently than powdery mildew in Pennsylvania.

Phytophthora blight: This disease is promoted by wet soil (poor drainage and/or heavy rainfall). Follow a 3-year rotation between susceptible crops such as pepper, cucurbits, eggplant, and tomato. Ridomil Gold 2E (1 to 2 pints/treated A) applied at planting as labelled for Pythium and cottony leek control may be helpful. Foliar applications of Ridomil Gold/Bravo 81WP at 3 lb/A may be adequate; it is labelled for application at 14-day intervals.

SWEET CORN

Leaf Spots and Rust: Some varieties have some resistance. Some fungicides are effective for leaf spots but less effective for rust. Quadris, Tilt and mancozeb are labelled for rust; Quadris and Tilt are somewhat systemic and are materials of choice when rust is especially difficult to

control at the end of the season.

TOMATOES

Bacterial Speck and Spot: If spots are a yearly problem, and symptoms appear on leaves, continue sprays with basic copper plus maneb/mancozeb. Next year, rotate to new fields, use pathogen-free seed, and spray seedlings regularly with streptomycin before transplanting. If symptoms are not present on leaves now, the fixed copper applications may not be needed for the rest of the season. Where present, try to avoid working and spraying in plantings when they are wet.

Bacterial Canker: Bacterial canker is appearing in some fields. I suspect that inoculum source is either infected seed, or infested soil. The causal bacteria can persist in soil for at least 3 years! Control is very difficult at this time. Do not work in affected plantings when plants are wet. Application of fixed copper tank mixed with either maneb or mancozeb, as for bacterial spot and bacterial speck, may help slow spread in fields. Fruit infection occurs at the blossom stage.

Fruit Rots and Leaf Spots: Where possible, rotate and provide adequate fertility. Continue a good fungicide program. Quadris is an excellent new fungicide (with some systemic activity) for early blight and Septoria leaf spot control; it should be alternated with standard protectant fungicides like Bravo and mancozeb.

Late Blight: As of July 28, 2002, I have only one report of late blight in Pennsylvania. Late blight was confirmed to be present on June 26 in a commercial potato field in Crawford Co., PA; the planting was destroyed. Since late blight has been reported in New Jersey, Michigan, Wisconsin, and Pennsylvania, all growers should be vigilant for the disease for the rest of the season. Scout fields for late blight at least weekly, make sure all potato cull piles are destroyed, and maintain fungicide protection when conditions favor late blight development. Results from our LATE BLIGHT forecaster are updated twice a week on the Pennsylvania toll free "Hotline": (1-800-PENN-IPM; 1-800-236-6476). Weather conditions through mid-June were favorable for development of late blight, but have been too hot and dry until recent rainfall.

Bug vs. Bug - Two-Spotted Spider Mite

Cathy Thomas, Integrated Pest Management Program
Pennsylvania Department of Agriculture

The two-spotted spider mite is widely distributed and a common pest of many plant species in greenhouses, nurseries, high tunnels, orchards and field crops. Hot and dry environmental conditions (such as a drought) enhance spider mite development, necessitating the need for early weekly plant inspection.

Most of the difficulty in controlling this pest is initial detection. Since there is no winged stage, sticky traps are ineffective, hence, plant inspection is the only method to assess if mites are present. It is important that one recognize the early signs of mite feeding,

which is the stippling or speckled effect that initially appears on the foliage when foliage is still green. In addition, it is essential that one uses a good hand lens to view populations of mites in egg, nymph, and adult stages.

Plant damage is caused by larvae, nymphs and adults piercing the plant cells and sucking out the contents. The damaged cells appear as yellowish white spots (chlorophyll is destroyed) on the upper surface of the leaf. As populations increase, the whole leaf will eventually turn yellow. Crop losses may occur when about 30% of the leaf surface is damaged.

In greenhouses or tunnels, mites usually develop on the undersides of leaves and are often found at certain spots in the greenhouse (vents, doors, heaters). These areas have a more favorable climate for development (dry, warm). If you have difficulty detecting mites on leaves, tap the leaves over a sheet of white paper. This technique dislodges mites and provides for easier identification.

In a field situation, initial infestations tend to occur in fields bordering grassy areas. Field perimeters and corners tend to exhibit the earliest symptoms of infestation. Dispersal over a wide area occurs when spider mites are carried on a balloon of their webbing by the wind.

Life Cycle

Two-spotted spider mite has five life stages, egg, larva, first nymphal stage (protonymph), second nymphal stage (deutonymph), and the adult mite. The female deposits round eggs on the underside of the leaf. These eggs hatch into larva with six legs that begin feeding immediately. After they have eaten, their color changes and two dark spots appear in the middle of the body. The larvae take in enough food before they settle on the leaf with their legs drawn in until they develop into the protonymph. After a period of feeding the protonymph develops into the deutonymph. The two body spots are very visible on these two stages compared to the larvae. The total development time varies with temperature, humidity and the host plant. Approximate development time (egg to adult) at 86°F is 7 days. Nymphs and adults produce webs and if populations are high the plant can be completely covered with webs. At this point, obtaining control is difficult and biological (or chemical) control may be ineffective.

Remember to maintain broadleaf weed control inside the greenhouse and at least 20 ft around the outside. In many cases, spider mite infestations develop from weeds left in the greenhouse from the previous crop season. Remove the weeds and destroy!

Control

Few chemical options are available for minor crops such as greenhouse vegetables and herbs.

Ultra-fine horticultural oil and insecticidal soap are low residual toxicity pesticides that provide control when applied thoroughly to cover plants where mites are feeding. Oils have little or no impact on natural enemies and can be incorporated into a biocontrol

program.

Biological Control

The spider mite was the first greenhouse pest to be controlled by a commercial application of natural enemies. Several predators are commercially available from biocontrol suppliers.

Phytoseiulus persimilis - predatory mite

Phytoseiulus - the mainstay in spider mite control, can be used on many crops including tomato, pepper, cucumber, squash, beans, flowers and strawberries. It can also be an effective predator in field crops such as strawberries and other small fruits.

Amblyseius californicus - predatory mite

This predatory mite is used in crops where high temperatures and/or relative humidity variations occur. *Amblyseius* can survive for a long period of time without eating and can be used on a preventative basis when it is very hard to detect mites.

Feltiella acarisuga - predatory midge

Feltiella is a gall midge that is used especially when spider mites occur in colonies. It should be used in conjunction with a predatory mite. The gall midge larva feeds on spider mite eggs.

Please phone or email me if there are specific issues you would like me address in this column.

Cathy Thomas
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High Tunnel Tours at Ag Progress Days

Bill Lamont, Department of Horticulture

Tours to the High Tunnel Research and Education Facility will be conducted August 20, 21 and 22nd twice a day at 10:30 AM and 1:30 PM. The bus for the tour will leave the red corncrib at those times. There will be tickets for the tours available at the corncrib. There is a 14-foot wide by 20-foot long high tunnel located at the flower garden by the "Ask the Expert" tent for visitors to Ag Progress Day's to view.

2002 Vegetable and Vegetable Fruit Field Day Set for August 19

Bill Troxell, Executive Secretary, PVGA

The 2002 Pennsylvania Vegetable, Small Fruit and Tree Fruit Field Day is scheduled for August 19, 2002. It will be held at Penn State's Russell E. Larson Agricultural Research Center at Rock Springs located 11 miles west of State College on PA Route 45. The event is being sponsored jointly by Penn State University's College of Agricultural Sciences, the Pennsylvania Vegetable Growers Association and the State Horticultural Association of Pennsylvania. Growers will have the opportunity to see first-hand the research projects being conducted by Penn State researchers at the Research Center. The itinerary is as follows:

8:00 a.m. Registration at the Horticulture Farm - Coffee and donuts will available.

Exhibitors - The following exhibitors have signed up to date:

- Binkley & Hurst Brothers Inc.
- Imants.
- Haygrove Tunnels
- Ag Chem Equipment
- Penns Creek Welding

9:00 a.m. Tour of Vegetable and Small Fruit Horticulture and Entomology Research Plots.

Researchers and support staff will be in the field to answer questions and comment about their current research.

12:30 p.m. Lunch: A hearty sandwich accompanied chips, beverage will be provided.

1:30 p.m. Demonstrations - Various equipment demonstrations are planned.

Tour of Tree Fruit Research Plots - Researchers and support staff will be in the field to answer questions and comment about their current research.

Exhibitors ^ See list above.

Vegetable Variety Trials ^ Visitors may walk through these plots on-their-own.

3:30 p.m. Tour of Vegetable Plant Pathology Research Plots

^ Dr. MacNab will be in the field to answer questions and comment about his current research. Current projects underway at the Plant Pathology Farm include

4:30 p.m. Adjourn

To pre-register, use the form in the back of this newsletter or call PVGA at 717-694-3596 or email PVGA at wt.pvga@tricountyi.net. Registration is \$13 per person to cover the costs of

lunch, morning and afternoon refreshments, and other costs for persons registering before August 12, 2002. Late registrants will be charged an extra \$5. Children under 16 will be charged \$10 registration. Pre-registration is important to obtain good estimates of the food needed. The Field Day will be headquartered at the Horticulture Farm of the Russell Larson Agricultural Research Center, located at Rock Springs on PA Route 45 about 11 miles west of State College between Pine Grove Mills and Spruce Creek. The Horticulture Farm is just east of the Ag Progress Days site.

That's a Berry Good Question!

Kathy Demchak, Department of Horticulture

No question this month, look for a question next month.

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.

Elevate for Gray Mold Control in Caneberries and Bushberries

Kathy Demchak, Department of Horticulture

Elevate 50WDG fungicide (fenhexamid, Arvesta Corp., which was formerly Tomen Agro, Inc.) is labeled for use for grey mold control on Bushberries (blueberries, gooseberries, currants and huckleberries) and Caneberries (red and black raspberries, blackberries, and loganberries). The use rate is 1.5 lb of product per acre, with application starting at 10% bloom. Applications can be made 7 days apart through harvest, with a pre-harvest interval of 0 days. The re-entry interval for Elevate is 12 hours.

As with strawberries and grapes, for which this material has been labeled for some time, no more than 2 consecutive applications should be made before changing to another fungicide (Rovral or Captan 50WP) to avoid a buildup of resistant gray mold strains. PA has a Special Local Needs label for Captan 50WP on raspberries and blackberries.

Potato Musings

Bill Lamont, Department of Horticulture

Potato Tour at Ag Progress Days

Bill Lamont, Department of Horticulture

The Potato Tour at Ag Progress Days will be on Thursday, August 22, 2002 at 12:30 PM. The bus will leave from the red corncrib like last year. There will be tickets for the

tour so stop by the corncrib and pick up your tickets. We will visit research plots at the Horticulture, Entomology and Plant Pathology Farms.

Potato Field Days

Bill Lamont, Department of Horticulture

Cambria/Somerset Potato Field Day

The Cambria/Somerset Potato Field Day will be held August 23, 2002 at Tom Smithmyer Farm, Patton, PA where the Snack Food Association Trial is located. For more information about the field day contact Mike Harteis, County Extension Agent, Cambria County (814)-472-7986.

Lehigh/Schuylkill Twilight Potato Meeting

The Lehigh County Potato Twilight Meeting will be held on September 4, 2002 at Bobby Schmidt's, Clearview Farm where the potato variety trial is located. The meeting will start at 6:30 PM. For more information about the twilight meeting contact Bob Leiby, County Extension Agent, Lehigh County (610)-391-9840.

Figuring Your Potato Yield

Bill Lamont, Department of Horticulture

Dig 10 feet of row per sample. Collect at least 5 samples per field. Add up the total pounds dug and divide by the number of samples collected. Refer to the following table to calculate yield. (Use average sample weight).

<u>Weight in lbs. of 10 feet of row</u>	<u>CWT per Acre</u>	<u>Weight in lbs. of 10 feet of row</u>	<u>CWT per Acre</u>
10	153.7	21	322.8
11	169.1	22	338.1
12	184.4	23	353.2
13	199.8	24	368.9
14	215.2	25	384.3
15	230.6	26	399.6
16	245.9	27	415.0

17	261.3	28	430.4
18	276.3	29	445.7
19	292.0	30	461.1
20	307.4		

Late Blight Alert

Alan MacNab, Department of Plant Pathology and Andy Muza, County Agent, Erie County

Late blight was confirmed in a commercial potato field in Northern Crawford County in Pennsylvania. No hard evidence of source has been found. To stop the spread of inoculum, the entire planting was destroyed. This June 26 confirmation of LATE BLIGHT in Pennsylvania, as well as the June 7 confirmation of LATE BLIGHT in Michigan increases our concern regarding this potentially serious disease. Growers should immediately check their potato and/or tomato fields for the presence of Late Blight.

Late blight is a devastating disease, which should not be taken lightly. Intense scouting of fields should be conducted at least weekly for the rest of the season. Fungicide protection should be maintained using at least a 5 day spray schedule. Good spray coverage is essential to ensure adequate fungicide protection. If there are no new reports of LATE BLIGHT, it may be possible to relax this program, but for now, since it is so early in the season, a conservative approach is warranted. Also, as noted in the past, future occurrence of LATE BLIGHT will depend on: 1. presence of late blight inoculum, 2. occurrence of moderate conditions that favor further development (cool wet conditions will promote LATE BLIGHT), and 3. Extent of fungicide protection. In past years we learned that many fungicides do an excellent job as long as they are applied before inoculum reaches the plants.

Finally, if you hear of any additional reports of LATE BLIGHT present in or near PA, please phone a report to Alan MacNab, at 814-692-7990. We will continue to monitor conditions in PA, and will update this message weekly, or more frequently when necessary. This is a cooperative project involving PDA, Penn State Extension, and PA growers.

Call the 1-800-Penn-IPM (1-800-736-6476) number for the most up-to-date information concerning the late blight situation.

Spider Mites on Potatoes

Bill Lamont, Department of Horticulture

Bob Leiby , County Extension Agent in Lehigh County reports that he has observed spider mites on the outside rows of potatoes adjacent to a harvested field of wheat. As was mentioned in the above article on spider mites would not be uncommon given the

hot and dry conditions that we have experience this season. In conversation with Dr. Shelby Fleischer, Department of Entomology he recommended to use Agrimek 0.15 EC at the rate of 8-16 oz per acre. Bob wondered if others have observed spider mites on potatoes this year?

Upcoming Meetings

Bill Lamont, Department of Horticulture

Local

August 23, 2002. Cambria/Somerset Potato Field Day at Tom Smithmyer Farm, Patton, PA where the Snack Food Association Trial is located. For more information about the field day contact Mike Harteis, County Extension Agent, Cambria County (814)-472-7986.

September 4, 2002. Lehigh County Potato Twilight Meeting at Bobby Schmidt's Farm where the potato variety trial is located. For more information about the twilight meeting contact Bob Leiby, County Extension Agent, Lehigh County (610)-391-9840.

September 6, 2002. High Tunnel In-Service Training for County Extension Agents, High Tunnel Research and Education Facility, Rock Springs, Pa. Contact: Bill Lamont 814-865-7118 or E-mail: wlamont@psu.edu

Regional

August 19, 2002. Vegetable, Small Fruit and Tree Fruit Field Day, Horticulture Farm, Rock Springs, Pa. Contact: Mike Orzolek 814-863-2251 or e-mail mdu1@psu.edu

August 20-22, 2002. Ag Progress Days, Rock Springs, PA. Contact: Bob Oberheim 814-865-2081 or e-mail bah4@psu.edu

January 14-16, 2003. Vegetable Growers Association Annual Meeting and Trade Show. Trump Taj Mahal Casino and Resort in Atlantic City, NJ.

January 15-17, 2003. Ohio Fruit and Vegetable Growers Congress/Ohio Roadside Marketing Conference/Ohio Christmas tree Winter Meeting. Toledo Sea Gate Centre, Toledo, OH. Contact: Tom Sach (614) 249-2424.

February 4-6, 2003. Mid-Atlantic Fruit and Vegetable Conference, Hershey, PA. Contact: Bill Troxell 717-694-3596 or e-mail: wt.pvga@tricity.net

National

August 11-17, 2002. International Horticultural Congress; Metropolitan Toronto Convention Centre, Toronto: Call (416) 504-4500 or visit www.ihc2002.org

August 11-17, 2002. Potato Association of America Annual Meeting; Metropolitan Toronto Convention Centre, Toronto: Contact Leslie Copp at (519) 824-4120 or icopp@uoguelph.ca

August 11-17, 2002. American Society for Horticultural Science; Metropolitan Toronto Convention Centre, Toronto: www.ihc2002.org or contact ASHS at (703) 836-4606.

September 22-25, 2002. Florida Fruit and Vegetable Convention. Ritz Carlton Hotel, Naples, Florida. Contact: (407) 894-1351.

November 14, 2002. South Dakota Potato Growers Annual Meeting. Clark, SD. Contact: (605) 532-3311

November 15-16, 2002. Red River Valley Potato Growers Annual Meeting. Fargo, ND. Contact: (218) 773-3633.

December 5-7, 2002. National Potato Council Seed Seminar. Hoiday Inn by the Bay, Portland, ME. Contact: (207) 769-5061.

January 7-11, 2003. National Potato Council 54th Annual Meeting. Loews Ventana Canyon Resort, Tucson, AZ. Contact: (202) 682-9456.

International

World Potato Conference. Kunming, China. See www.potatocongress.org