

# The Vegetable and Small Fruit Gazette

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Horticulture Department  
The Pennsylvania State University

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**Tip for the Month--** “That you always have warm words on a cold evening, a full moon on a dark night, and downhill roads to your door.”

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## **Comments from the Editor**

Bill Lamont, Department of Horticulture

Well fall is moving in quickly as the temperatures continue to fall. I hope we can get the potatoes out soon.. This growing season has certainly been a real one interesting one.. We have the high tunnels full of fall crops that can take the cooler temperatures and the warm season ones will continue to decline as the temperatures continue to go down. We are cleaning up the fields and getting ready for winter. We had a good workshop at the high tunnels hosted with The Pennsylvania Association for Sustainable Agriculture. We look forward to during several more next year. I look forward to receiving John Esslinger's article for the November 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

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| November | John Esslinger |
| December | Andy Muza      |

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## Variety Selection for 2004

Mike Orzolek, Department of Horticulture

Since many of the vegetable crops have been harvested for 2003 in PA, it is time to start planning for 2004. What crops will I be growing?, what crop rotation should I consider?, and what was my most profitable crop in 2003?? The most profitable crop in 2003 may not be the most profitable crop in 2004 because of market value and marketable production potential. This is the time of year to contact your seed representative(s) and ask about what will be new in 2004 as well as order your current varieties that you are growing to insure that you will still have that variety in 2004. If however, there is a seed crop loss, than you will have time to research other varieties and order them before December. Some crops like onions are best grown from transplants started in early February, therefore, ordering seed early is a must.

Every year, seed companies release new varieties of vegetables that are more disease resistant, possibly insect resistant (i.e., Bt sweet corn), shorter or longer maturity, larger marketable yields, better post-harvest qualities and better taste or texture. Choosing the right vegetable variety for your specific market niche can increase profits and production while at the same time reducing costs. However be cautious, do not plant multiple acres of a new variety without trying it on a smaller percentage of the crop acreage at least one or two years before switching entirely to the new variety. Example, sweet corn – consider trying some new Bt sweet corn varieties on perhaps 20% of your current sweet corn acreage. While Bt sweet corn does help minimize damage from the “Worm Complex”, it still needs to be sprayed with insecticides less frequently than non-Bt sweet corn varieties. Trying the smaller acreage of Bt sweet corn in 2004 will allow you to get some experience producing the Bt sweet corn before you convert your entire sweet corn acreage to Bt sweet corn or some other new variety. October and November should be the time you are gathering information on new varieties and ordering seed before deer season and the Christmas Holidays.

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## Bug vs. Bug - Controlling Brown Soft Scale in Greenhouse Crops

Cathy Thomas, Integrated Pest Management Program  
Pennsylvania Department of Agriculture

Brown soft scale (*Coccus hesperidum* Linnaeus) is the most common scale found on indoor plants reported to feed on hundreds of species of plants. This family of scales (soft scales) is one of the three most common families of scale insects, the other two being the armored scale and the mealybugs. Soft scales are usually larger than armored scales ranging from 2 to 6 millimeters long.

### Damage

Feeding from brown soft scale can reduce the health of a plant, causing leaves to turn yellow and drop and may stunt new growth. As scales feed with their piercing-sucking mouthparts they secrete sticky honeydew that serves as substrate for sooty mold development. This sooty mold decreases the photosynthetic surface of leaf and also affects the aesthetic value of the plant. Female scales spend their adult life attached to the underside of leaves and along leaf veins and stems where sap flows.

### Life cycle

Adult female brown soft scales are pale yellowish green to yellowish-brown with nerve like brown markings on the dorsum. Older females appear brown. The male looks like a tiny two-winged wasp for fly. Eggs laid under the body of the female hatch into tiny active crawlers but remain under the body of the female for a short time before emerging. After emergence they select a feeding site to settle and complete their development. All stages are found throughout the year in greenhouses with a generation completed in about 60 days. Adult scales are protected from insecticides with a waxy covering, therefore, control measures should target the unprotected crawlers.

### Biological Controls - \* Accurately identify the pest before introducing a biocontrol

#### Predators

*Cryptolaemus montrouzieri* (Mealybug Destroyer) – a small predatory beetle used to control mealybugs and scales. They hide under leaves and in plant crevices where these pests are usually feeding. Their eggs hatch into voracious larvae with long, white, waxy projections looking somewhat like a mealybug. *C. montrouzieri* prefers a temperature range of 64 - 91°F with a relative humidity of 70% or greater.

*Harmonia axyridis* (Multicolored Asian ladybeetle) – this beetle is shipped to the grower as pre-fed, pre-mated adults and sometimes larvae. They lay their eggs among pest colonies, hatching into fierce predators that consume large numbers of prey. The larvae is similar in appearance to the common ladybeetle, *Hippodamia convergens*. The conditions for optimum performance are 70-85°F with a relative humidity of around

70%.

## Parasitoids

*Metaphycus helvolus* (soft scale parasitoid) – this tiny wasp, 1.3 mm, is best used as a preventive agent and is very effective when introduced at the proper time. *M. helvolus* is shipped to the grower as pre-emerged adults. Large amounts of honeydew may pose a problem for the wasp by trapping them. Syringe plants to remove honeydew before introducing a parasitoid or use a predator as a first choice. The wasp lays an egg inside the scale which hatches into a larva that consumes the scale from within. A new parasitoid emerges out of the empty scale cadaver after they pupate. The life span of this parasitoid is about 42 days in the immature stage and around 2 months as adults. The optimum environmental conditions are 73 - 87°F, with a relative humidity of around 50%.

For questions on biological control methods and to locate suppliers of biological controls, a helpful source is the Association of Biocontrol Producers at this website: <http://www.anbp.org/>

## Factors to consider when using biocontrols

- Always use biocontrols as a preventive treatment, not curative
- Release biocontrols on a regular basis to prevent outbreaks and keep scale populations at manageable levels
- Follow release recommendations from biocontrol suppliers
- Release biocontrols immediately upon delivery
- Inspect stems and leaves of plants on a weekly basis to determine if biocontrols are effective in reducing populations

## **Other IPM control methods**

- Inspect new or introduced plant material for scales looking for shiny spots of honeydew on tops of leaves
- Use yellow sticky cards to trap winged males (use less cards when introducing biocontrols since they may be attracted to yellow)
- Dispose of infested plant material immediately
- Prune vines to prevent infestations from spreading
- Control over-fertilizing
- Syringe plants with water to remove scales and honeydew (sooty mold) deposit

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## **Pristine Label for Berries**

Kathy Demchak, Department of Horticulture

Pristine fungicide from BASF has been approved for use in crops in the berry crop grouping (blueberries, currants, gooseberries, currants, huckleberries, blackberries or raspberries, and their hybrids) and strawberries. Pristine is a mixture of two active ingredients. One is boscalid, which is also found in Endura, recently labeled for grapes and other crops, while the other is pyraclostrobin, the active ingredient also found in Cabrio. Boscalid is a group 7 fungicide (anilide group), which puts it in a unique group for small fruit fungicides. Pyraclostrobin is in group 11, which contains the strobilurins. Quadris/Abound is also a Group 11 fungicide, and therefore these two materials should not be considered resistance management tools for each other.

The re-entry interval for Pristine is 24 hours on caneberries and bushberries, and 12 hours on strawberries. The minimum time from application to harvest (PHI) is 0 days on all of the above crops. Pristine can be used for a number of diseases, including gray mold, anthracnose, common leaf spot, and powdery mildew on strawberries, mummy berry and phomopsis on blueberries, and anthracnose and various rusts on caneberries. Please see the label for a listing of other diseases for which it can be used.

I had an opportunity to trial this material through work funded by IR-4. It provided very good control against gray mold (at least as good as Ronilan or better) and common leaf spot on strawberries, and against gray mold, Septoria leaf spot, and various other diseases on raspberries.

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## **Potato Musings**

Bill Lamont, Department of Horticulture

## **Potato Storage Management**

Bill Lamont, Department of Horticulture

(This article first appeared in Bill Bohl's, Extension Educator's newsletter, the Spudvine, and was written by Nora Olsen and Gale Kleinkopf from the University of Idaho). It is a good article and worth reprinting again as we start to put potatoes into storage. We will be having Michael Mager, Technical Consultant with Arctic Refrigeration Co. of Batavia talk at our 1 day potato session at the Mid-Atlantic Fruit and Vegetable Convention on January 28, 2004.

Placing problem potatoes into storage can't make them better, but properly managed storages can help maintain quality and minimize deterioration of good quality potatoes. Managing storages includes making sure your storage has proper ventilation and temperatures and no condensation problems. Other concerns are sprouting, pressure bruise potential, sugar development, and disease problems.

Unless there is a need to dry out wet or rotting potatoes, always humidify ventilating air. To help avoid condensation, make sure the ventilating air is slightly cooler than tubers at the bottom of the pile. Free water on potatoes will initiate or accelerate and water rot problems in tubers.

Since uniform air distribution with the storage is needed for maintaining tuber quality, eliminate as much dirt and debris as possible as the potatoes are being placed in storage. Remember, however, that excess ventilating air can lead to tuber dehydration and increased shrinkage. This can result in lost tonnage and decreased tuber quality. To minimize tuber weight loss and reduce the chances of having pressure bruise in your potatoes, maintenance of proper ventilation, temperature and humidity are important. Humidity levels should be above 90 percent and preferably at 95 percent or more.

To determine if your storage will properly keep potatoes, check out this brief list of overall basics of storage management.

### **Facility Preparation**

Repair all insulation materials to minimize the potential for condensation.

Clean plenum and duct ports thoroughly.

Replace worn humidity equipment and high-pressure nozzles.

Check for corrosion on all surfaces that may limit the life of the storage facility.

Service the air system and check all fans for proper balance.

Check the air delivery system by adjusting all ports or ducts for optimum and consistent airflow.

Repair or replace worn components on air louvers, both fresh air and exhaust.

Calibrate all computerized sensors that are used for control functions.

Service the relative humidity supply systems-check for mineral deposits and eliminate clogged flow paths.

Operate your storage for conditioning before the potato crop is delivered.

Know the quality of the incoming potatoes and the potential problems that might arise in storage. Protecting the quality of the stored tubers is the goal of all storage management.

### **During Potato Delivery**

Tape all duck seams to improved system performance-open seams will reduce air delivery consistency.

Harvesting and handling operations should deliver a minimum of 75 percent bruise-free potatoes for both short and long term storage.

Check pulp temperatures of potatoes going into storage-ideal temperature range is a minimum of 48oF to a maximum of 60o F. Suspend harvest operations, whenever possible, until pulp temperatures in the field are in this temperature range.

Limit potato pile height to 16 to 18 feet to minimize pressure bruise. Remember that pressure bruise can be variety dependent.

Operate fan and humidity systems as soon as the first ducts are covered. This early operation helps to remove pulp temperature differences between fields, truckloads and time of day.

Clod and debris removal from the incoming loads is important to achieve optimum air circulation performance in the pile from the ventilation system.

Fill each storage facility with potatoes destined for similar end uses.

Close storages as soon as filled to rapidly achieve temperature equilibration of the pile.

Maintain pulp temperatures at 50 to 55o F for 2 to 3 weeks for proper wound healing.

Relative humidity of 95% is always recommended for wound-healing period and for continued short or long term storage.

Reduce pile temperatures slowly, approximately 2 to 3o F per week, to a holding temperature of 45 to 48oF for processing, 42 to 45oF for fresh pack, 50 to 52oF for chipping stock.

Continue to monitor the storage daily for operational continuity and for any potato problem that might occur. Air circulation times should be set to maintain the pile temperature less than 2oF difference from bottom to top. Continuous fan operation at reduced airflow or speed is capable of maintaining the desired temperature control of the pile while reducing energy costs of fan operation.

Sprout control should be done by certified applicators. The type of inhibitor or time of application may vary with different varieties.

## **During Unloading**

Maintain storage air supply during storage unloading to minimize quality losses.

Remember that good storage management during the unloading operation includes adjustment of duct airflow to maintain consistent supply to all parts of the remaining pile.

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## **Potato Bruising**

Sara May and Dr. Barbara Christ, Department of Plant Pathology

On the surface, potatoes appear to be a pretty tough vegetable. The hardy tubers don't seem to need the careful handling that their more fragile relatives, tomatoes and peppers, require. However, potatoes are actually damaged very easily. Bruises and wounds can occur from only slight bumps and from drops that are only a few inches. This damage not only reduces the quality of the tubers, but it also makes them more susceptible to storage rots. With the extremely wet season that we've had this year we are already expecting to see a lot of rots, such as soft rot and pink rot. One of the best controls we have to combat the spread of these diseases in storage is to reduce the amount of wounds and bruising that occur during harvesting and handling.

Bruising is a physiological disorder in potato tubers that is a result of a force or pressure on the tuber or some sort of impact. There are several different types of bruises and over the years they have been grouped many different ways and may also have multiple names. This has made understanding bruising very confusing which has made deciding how to manage the problem difficult for many growers. Determining what factors cause which types of bruises can simplify the problem and help choose management practices. The four major factors that contribute to the type and severity of a bruise injury are listed below:

- 1) Moisture level and temperature of the soil at harvest.
- 2) Moisture and temperature of the tuber.
- 3) Equipment maintenance and operation.
- 4) Magnitude of the tuber impact.

The first two factors play a large role in determining what types of bruises will be more common during harvesting and handling. The next two factors effect the severity and the amount of bruising that may occur. In addition to these factors there are also known differences in bruise susceptibility between varieties.

The most well known bruise on potato is blackspot bruise. There are usually no external signs of damage with blackspot bruise, however when a tuber is peeled or sliced the brown, gray, or more commonly blue-black spots of blackspot will be revealed. This bruise occurs more frequently when tuber temperatures are warmer and tubers are more dehydrated or flaccid. This is usually the case when the weather is warm and soils are dry at harvest. Blackspot has also been linked to low potassium levels and is associated with lower drop heights and lower impact velocities. It really only takes a slight impact for blackspot to occur, the cell walls in the tuber do not even need to be broken for the damage to appear. When a tuber is dropped smaller membranes within the cells may be damaged causing the contents inside those membranes to spill out and mix together. When this happens and a substrate called tyrosine comes in contact with an enzyme called PPO, the pigment melanin is formed and this is what causes the discoloration in the tuber tissue.

A bruise that is similar to blackspot is called crush bruise. This occurs when cell walls are damaged due to the impact and the tuber tissues are crushed. When the potato is sliced there is the typical blackspot discoloration but also holes in areas where cell damage has occurred. White spot or white knot is a bruise that is believed to be a crush bruise, but instead of a discoloration, the water that was released when the cells were damaged is absorbed by surrounding tissue leaving a dehydrated white spot where the damage occurred. So crush bruise and white knot are very similar to blackspot. They occur under the same conditions and the same management practices can be implemented to control them.

One final bruise that is similar to blackspot is called pressure bruise. This bruise occurs when tubers are stored with inadequate humidity. The tubers become dehydrated and

flaccid and the weight of the potato pile causes a blackspot type of injury to occur on tubers that are low in the pile. The damaged tubers will often have a flattened area on the surface and below this you frequently find the typical blackspot discoloration.

When conditions at harvest include lower temperatures and tubers that are more hydrated, shatter bruises are more likely to occur. These bruises are especially more common from higher drop heights and stronger impacts. These bruises appear as small cracks in the tuber tissue and may be brown or blue-black in color. Blackspot type bruises will also occur under these conditions, but they are usually not as common as when tubers are warmer and more flaccid.

Skinning is another common problem during harvesting and handling. It occurs frequently on immature tubers and creates a wound that can be invaded by pathogens if not healed properly. Cracks are the worst kind of damage that can occur during harvesting and handling. They are long and narrow and are often due to impacts from high heights onto a hard surface. Drops and damage this severe are rare unless there is a major problem with equipment and the handling system.

Bruise management practices depends on many factors including environmental conditions, soil conditions, variety, and harvesting and storage procedures. Bruise prevention practices can be implemented throughout the entire season. Below are some general suggestions for bruise management:

- 1) Select fields that are free from excessive rocks.
- 2) Choose rotation practices that promote high organic matter.
- 3) Avoid tillage practices that create clods that may last until harvest.
- 4) Use a balanced fertility program.
- 5) Vine kill and allow skins to set properly.
- 6) Maintain and operate machinery to reduce bruising.
- 7) Manage storage humidity to prevent drying out and pressure bruise.

More specific detail on bruise management can be found in a publication called "Preventing Potato Bruise Damage". This publication was put together by the National Potato Anti-Bruise committee which was part of the Potato Association of America. Copies of this publication can be obtained through the University of Idaho's potato publication website at <http://info.ag.uidaho.edu/potato>. This site lists all of the potato publications available from the University of Idaho. Some of these publications, including the one on potato bruise prevention, are available on the web as PDF files that you can print easily on your personal computer.

#### **References:**

Baritelle, A., Hyde, G., Thornton, R., Bajema, R. 1999. A Classification System for Impact Related Defects in Potato Tubers. For the Proceedings of the 38th Annual Washington State Potato Conference & Trade Fair. Retrieved from [http://www.bsyste.wsu.edu/gmhyde/impact-pdfs/pdf\\_mss\\_impact\\_properties/bruise\\_classification.pdf](http://www.bsyste.wsu.edu/gmhyde/impact-pdfs/pdf_mss_impact_properties/bruise_classification.pdf)

Thornton, M., Bohl, W, Eds. 1998. Preventing Potato Bruise Damage. University of Idaho, Moscow, Idaho.

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## **Upcoming Meetings**

Bill Lamont, Department of Horticulture

### **Local**

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](mailto: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](mailto:sandemoore@juno.com))

### **Regional**

September 4-5, 2003. First High Tunnel Workshop for Extension Specialist, Agents, and Vocational 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](mailto: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](http://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](mailto:wt.pvga@tricountyi.net)

### **National**

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](http://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](http://www.nationalpotatocouncil.org).

### **International**

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