# The Vegetable and Small Fruit Gazette

Vol. 6, No. 11- November 2002

Horticulture Department
The Pennsylvania State University

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**In this Issue:**



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**Tip for the Month**: "A chip on the shoulder indicates there is more wood high up" Unknown

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## Comments from the Editor

Bill Lamont, Department of Horticulture

The beautiful colored leaves that I talked about in last month's column did in a lot of trees, not to mention the electric lines, in State College and the surrounding communities this past week. It is not a good thing to get wet snow when a lot of leaves are still on trees. It really wrecked havoc on maples and a drive around the area reveals limbs pile along the sidewalks waiting for the chipper. Since we heat with wood, I was able to go around and load up on some of the wood and stack it up for next year. I felt like the wood trash man loading limbs into my pickup truck. It was hard to view trees that had struggled with the dry conditions this year, only to lose their limbs to the wet snow. I want to thank John Esslinger for his excellent article on **"Nitrogen Fertilization of Tomato"** and look forward to Andy Muza closing out 2002 with a great article in the December issue. I have listed the county and regional meetings coming up in 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. **Note: The date of the Western Pa. Vegetable and Berry Growers' Seminar held at the Days Inn in Butler has been moved to November 19, 2002. It has normally been held in December.**

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## Schedule for Agent Articles

Bill Lamont, Department of Horticulture

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| December | Andy Muza |

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## Heads Up on 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.

**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 an opportunity to share a meal and socialize on November 13th for participants of both groups to foster interaction and the concept of being part of a team. Please let Jim Sellmer or Bill Lamont know if you plan on attending the meal.

For information on the ornamental programs contact Dr. Jim Sellmer, 814-863-2250 e-mail: jcs32@psu.edu and for information the Vegetable and Small Fruit Roundtable contact Dr. Bill Lamont, 814-865-7118 or e-mail: wlamont@psu.edu.

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## Nitrogen Fertilization of Tomato

John Esslinger, County Agent, Penn State Cooperative Extension, Lackawanna County

Sometime around late June and early July many growers begin to wonder, "did I put

enough fertilizer on my tomato crop?". Often, a decision is made to add additional fertilizer just to be sure the crop doesn't run short. Current soil test recommendations tell growers to band just 50 pounds of nitrogen per acre of tomatoes, and if broadcasting fertilizer you need to double that amount. Is 50 pounds banded enough? Dr. Cyril Smith's research says 50 pounds is enough but what about the real world where crop yields can vary from year to year? Plant tissue analysis samples taken over the last three years from tomato fields in Northeastern Pennsylvania give us that answer. The grower banded 43 pounds of nitrogen per acre at planting. Residual nitrogen is low since tomatoes follow a non-fertilized grass sod. The level of nitrogen needed in tomato plant tissue to reach optimum yield is 3.1% to 4.5% dry matter. The average of 67 leaf analysis results over the last three years are as follows: 2002 results averaged 4.75%, 2001 results averaged 5.46% and 2000 results averaged 4.76%. The average for each of the last three years was well above the normal level. All individual fields were normal or higher. Over the past three years we experience above average yield and below average yield. Every year 50 pounds of nitrogen banded is enough nitrogen for your crop to reach it's potential.

What does it hurt if more than 50 pounds of banded nitrogen is applied? First, it is an expense (not insurance) that produces no economic return. Second, it can actually hurt tomato fruit quality and delay harvest. Finally, it provides an opportunity for nitrogen to escape into the environment where it can produce detrimental outcomes. In conclusion, cut fertilizer costs by banding all of your fertilizer. Band only 50 pounds of nitrogen per acre to produce high quality tomato crops.

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## Evaluating at Your Pumpkin Crop

Tim Elkner, Extension Agent, Penn State Cooperative Extension, Lancaster County

Harvest is always a good time to evaluate the successes and/or failures of your crop production practices. Take a few minutes now to look back at your pumpkin crop for this season. How did you do? Obviously the drought had a large effect on the crop, especially if you did not have any way to irrigate. How did your handles look? What about the amount of rot that you saw in the field and after harvest? How about the stand of the crop in the field - were there many skips? What caused those vines to die? Let's look at some of the factors affecting pumpkin yields and quality.

In order to have the greatest yields from a field, you need to have the field covered with pumpkin vines. If you had a poor stand, hopefully you took some time to determine the cause. Did you have poor germination? Was it from bad (old) seed or was your planter not set properly? Either of these factors needs to be corrected before planting next season.

Did you loose vines after germination? If so, why? I visited and talked with several growers this season that had very high cucumber beetle pressure in their fields. These beetles, as you remember, spread bacterial wilt. Normally bacterial wilt is not much of a problem in pumpkins but the high beetle pressure seems to have resulted in more diseased and dead vines in the fields this year. I saw one grower that lost over 10% of his stand. In addition, the beetles lay their eggs at the base of the vines and the larvae feed on the pumpkin roots. While you will rarely see a vine die because of this feeding, it will still be weakening the vine. If you did not have good beetle control this year, again begin planning for next season. Remember - Admire treatments only last a few weeks and then you will need to switch to foliar sprays to control the beetles that move into the fields later in the season.

Dr. Brent Loy, the pumpkin breeder at the University of New Hampshire, has noted that semi-vining types of pumpkins are not as drought-tolerant as the older, more vigorous types are. He reports that premature dieback of vines can occur in semi-vining types of pumpkins under conditions of stress, especially if the vines are carrying a heavy fruit load. Our switch to the newer cultivars that are semi-vining probably has made the pumpkin crop more susceptible to the recent summer droughts. Perhaps you should consider having part of your crop in an older or more traditional vining-type cultivar as a bit of "insurance" against a dry summer.
Did you know that most of the growth of face-type pumpkins is completed by 15 to 20 days after pollination and fruit set? This means that the period of flowering and fruit set is the most important time to have adequate moisture and fertility in your pumpkin crop. During this period of rapid fruit growth even slight amounts of water stress will reduce the final fruit size.

After a pumpkin reaches maximum size (in face-type pumpkins) the handle begins to harden. This process occurs from 20 to 35 days after fruit set. During this period of time the pumpkin flesh is accumulating starch. By 30 days after pollination the fruit may begin to show orange color and by 40 to 45 days after pollination the pumpkins of many varieties will appear ripe or fully colored. So what does it mean to have shriveled handles at harvest or shortly after? Poor handles are an indication that the plants were stressed during the period of time when the handles were being developed and once the fruit is colored it cannot "go back" and finish hardening the handle.

So does this mean that you can ignore your pumpkin vines from 40 days after fruit set until harvest? No, because development is not actually complete until 60 to 70 days after pollination. After 40 days (when the fruit can be fully colored) the seeds are still accumulating energy in the form of fats and proteins. This seed-filling process is completed 55 to 60 days after pollination but under some conditions may take up to 70 days. If the vine dies after the fruit has colored but before the seeds are mature, the energy reserves in the flesh are then used to complete the development of the seed. This process will result in poor flesh quality (especially for eating purposes) as well as lighter pumpkins because some of the stored energy is lost during the moving process. Therefore - healthy vines during the entire pumpkin development cycle are necessary for the best quality fruit and greatest yields per acre from your farm.

How was your disease control this season? One advantage that I can think from a dry season is

that there are generally less disease problems. However, if you stopped spraying once your pumpkins were mature but several weeks before harvest you might have allowed disease to take advantage of the rains in September to infect your fruit. I recently spoke with Dr. Alan MacNab, the vegetable disease specialist at Penn State, about black rot in pumpkins. He noted that black rot could infect fruit but take up to 4 weeks to show any symptoms. So the fruit that you sell may look fine but when your buyer puts it on his market stand it may "suddenly" start to show disease symptoms.

There are two options you have in protecting your fruit from disease once it is mature. First - maintain a fungicide program until harvest. You are no longer protecting the leaves from diseases but the fruit still needs protection. Second - harvest the fruit and store it in a cool, dry location until you sell it. This might mean handling the fruit an extra time but if field conditions favor disease development it could be worth the extra labor cost.

Another proven method to help reduce diseases in pumpkin fruit is to use a no-till production system. Having a plant residue over the soil will protect the fruit from rain-splashed fungal spores as well as reducing infection by fusarium since the fruit is not in contact with the soil. This can increase yields by lowering the number of fruit lost to rot diseases. In addition, your fruit will be cleaner at harvest and weed control can be easier. Growers in southeast PA still have a little time to establish a cover crop to use a no-till growing system next season. Unfortunately, growers in other parts of the state will have to wait until next fall to get the necessary good establishment of a cover crop prior to cold weather. I encourage you to give this system a try for pumpkin production in the future.

Make some notes now on observations of this season's pumpkin crop so that you can make any necessary changes next season to potentially improve yields and fruit quality. Making a few changes in your production practices has the potential to result in higher income from your pumpkin crop. In addition, a high quality pumpkin will result in satisfied buyers and more return business in the future.

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## Non-chemical Weed Control in Cabbage

Mike Orzolek, Department of Horticulture

Early weed infestation in vegetable crops reduces both early and total marketable yield and quality. Even if escape weeds (12" tall or larger) are later killed by a postemergence herbicide application, their skeletons can cause yield loss due to competition for light, temperature modification within the plant canopy, and interference with fungicide and insecticide applications. In addition, weeds can also serve as a reservoir for insect and disease organisms, especially viruses. Experiments in nonchemical weed control in cabbage were conducted at the Horticulture Research Farm, Russell E. Larson Research Center, Rock Springs, PA from 1993 to 1995. In addition to weedy and hoed

check plots, flaming weeds at 2 to 4 leaf stage of growth with propane gas burners and planting annual ryegrass (Lolium multiflorum) between the rows of cabbage, as a living mulch, were evaluated during 3 years. The cabbage cultivar 'Rio Verde' was transplanted generally between June 15 and July 1 during each year. Both flaming and living mulch treatments produced yield and head quality similar to the hoed check. Management and timing of ryegrass planting in relation to cabbage establishment is very critical for success with living mulch. Flaming requires straight rows of cabbage or other crop, tractor with driver that can maintain a straight line, and burners that are aligned to burn weeds and not the crop. Estimated cost of flaming weeds is approximately $10.00/A/ application.

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## Results are in! Ag Progress Day Survey Participants Eat Ethnic Produce

Elsa Sanchez and Kathleen Kelley, Department of Horticulture

Much has been written recently about how ethnic consumers are the food shoppers that deserve growers' and marketers' attention. Not only do ethnic shoppers demand quality produce to meet their families' dietary needs, they also spend a majority of their food dollar in the produce department. Produce options need to be authentic for example a Mexican-American consumer may look for and purchase products such as long green or red chiles that are used in traditional dishes such as chile rellenos and enchiladas, where as a Taiwanese-American consumer may look for Thai chile as an ingredient for traditional Thai soups and curries. Producers can capitalize on the opportunity to meet these consumers' needs and generate profits, as these ingredients are not readily available as there are no substitutes.

A survey was conducted from August 20th to the 22nd, 2002 at the visitor's tent at Ag. Progress Days, Rock Springs, PA. The goal of the research was to determine how often consumers prepare meals with ethnic produce and what produce items they have difficulty finding at a retail outlet. Four hundred consumers were self-selected to participate in the study and were given annual plants of their choice when they turned in the completed survey. Survey results were then tabulated for analysis.

Of the participants, 82% were female while 18% were male. Half of the participants were high school graduates and over the age of 50. Thirty-six percent of households had gross incomes of more than $50,000. Seventy-eight percent of the participants lived in households with two or more adults and 67% lived in households without any children under the age of 18. Participants were asked to indicate whether they lived in an urban, suburban or rural area. Only 6% were urban residents, 18% lived in suburban areas, while 76% lived in rural areas. When considering what retail establishments these participants shop at for their produce items, since a majority of participants are living in rural areas, their options for purchasing ethnic produce items maybe limited.

Eighty percent of respondents indicate they were the primary food shoppers and food prepares for their families. Participants also indicated which other household members influenced their decisions to purchase produce items. Six percent of children, 34% of spouses/significant others and 7% of other family/household members contributed to the decision. With several family members helping decide what produce items to purchase on a shopping trip, 77% of participants indicated that they purchase ethnic produce. When deciding where to shop for this produce, 70% purchase their items at a grocery store, 25% purchase items at a farmer's market, 10% from a farm stand, 17% from a specialty store, and 2% obtain ethnic produce from other sources, including their own garden. Participants were asked to indicate how often they prepared meals with ethnic produce. Forty-one percent prepared meals with ethnic produce on occasion, 24% one to two times a week, 11% daily, 10% three to four times a week, 3% five to six times a week, while 11% of participants do not prepare meals with ethnic produce.

Participants were asked to list produce items that they have difficulty finding to purchase at retail outlets. Asian produce items listed include edible soybeans (edamame), Asian herbs, bok choi, Japanese eggplant, daikon radish, and Korean kimchi. Hispanic produce items that were difficult to find included fresh cilantro, habañero and serrano peppers, pinto beans and tomatillos. Results from the survey indicate that though consumers are becoming more aware of ethnic produce and the flavors they have to offer, the availability of these items is still limited. An opportunity exists for producers to meet these needs by investigating production techniques and using fundamental marketing strategies.

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## Bug vs. Bug - Managing Plant Diseases with Biofungicides

Cathy Thomas, Integrated Pest Management Program
Pennsylvania Department of Agriculture

Diseases in greenhouse vegetables and floriculture crops can be managed effectively with biological fungicides (biofungicides). A biofungicide is composed of beneficial microorganisms, such as specialized fungi and bacteria that attack and control plant pathogens and the diseases they cause (USDA). These specialized fungi and bacteria are microorganisms that normally inhabit most soils. Biofungicides can be a viable alternative to chemical fungicides and can be used as part of an integrated disease management program to reduce the risk of pathogens developing resistance to traditional chemical based fungicides.

An example of a widely used commercial biofungicide in the greenhouse industry is *Trichoderma harzianum* (TH) strain T-22 (PlantshieldÔ). TH protects plant roots from pathogens such as *Pythium, Rhizoctonia, Fusarium, Sclerotinia*, and *Thielaviopsis*. TH will also suppress foliar diseases such as Botrytis and powdery mildew.
To optimize the effectiveness of TH or any other biofungicide, apply before the onset of

disease development (preventative treatment) since they will not "cure" pre-existing pathogens. Early application of the biofungicide protects the roots against bad fungi, allowing for better development of root hairs. Always use biofungicides in conjunction with standard disease cultural controls including sanitation, and weekly scouting.

How do biofungicides supress diseases?

There are four mechanisms by which a biofungicide controls other microorganisms.

**Direct Competition** - Before root infection can occur, pathogens must gain access to the zone closely associated with the root called the rhizosphere. A biofungicide "shields" the root by growing a defensive barrier around the roots, thus preventing the harmful fungi from attacking the root.

**Antibiosis** - the biofungicide produces a chemical compound such as an antibiotic or other toxin that kills the target organism.

**Predation or Parasitism of the target organism** - the biofungicide attacks and feeds on the pathogen. For this mechanism to be effective, the biofungicide must be present in the rhizosphere at the same time or before the pathogen appears.

**Induced Resistance to the host plant** - the biofungicide triggers the plant to turn on its own defense mechanisms.

**Biological fungicide products**

Biofungicides like chemical fungicides must be registered by the EPA. Growers must read and follow the label to determine if the intended use has been approved. Always read the label. Here are a few examples of biofungicides used in the greenhouse industry.

AQ10 ™

- Biocontrol organism - *Ampelomyces quisqualis* isolate Q-10
- Target Pathogen - powdery mildew
- Crops - apples, cucurbits, grapes, ornamentals, and tomatoes
- Manufacturer - Ecogen, Inc. www.agrobiologicals.com

Companion™

- Biocontrol organism - *Bacillus subtilis* GB03 bacteria
- Target Pathogens - *Pythium, Rhizoctonia, Phytophthora*, and *Fusarium*
- Crops - bedding plants, foliage plants, woody ornamentals
- Manufacturer - Growth Products, www.growthproducts.com

Mycostop™

- Biocontrol organism - *Streptomyces griseoviridis* strain K61
- Target Pathogens - *Fusarium* spp., *Alternaria brassicola*, *Phomopsis* spp., *Botrytis* spp., *Pythium* spp. and *Phytophthora* spp.
- Crops - field, ornamental and vegetable crops
- Manufacturer - Kemira Agro Oy, Distributor - AgBio Development Inc. www.agbio-inc.com.

Plantshield™

- Biocontrol organism - *Trichoderma harzianum* strain T-22
- Target Pathogens - *Pythium* spp, *Rhizoctonia solani*, *Fusarium* spp, *Sclerotinia*, and *Thielaviopsis*
- Crops - trees, shrubs, transplants, ornamentals, cabbage, tomato, cucumber
- Manufacturer - Bioworks, Inc. www.bioworksbiocontrol.com

Soilgard™

- Biocontrol organism - *Gliocladium virens* GL -21
- Target Pathogens - *Rhizoctonia solani*, and *Pythium* spp.
- Crops - ornamental and food crops grown in greenhouses, nurseries, homes and interiorscapes.
- Manufacturer - Certis, Inc. www.certisusa.com

A list of commercially available biological fungicide products can be found at this web site, www.oardc.ohio-state.edu/apsbcc/productlist.htm.

Advantages of using biofungicides

- Reduces the use of chemical fungicides
- In most cases are safer to use and have a lower re-entry interval.
- Many products can be used by organic growers (Listed by the Organic Materials Review Institute, OMRI, http://www.omri.org)
- In most cases, they are less phytotoxic
- Many products can be used in rotation with chemicals (fungicides, insecticides, fertilizers, rooting compounds).

Disadvantages of using biofungicides

- Biofungicides do not eradicate the disease or "rescue" the host plant from infection.
- Biofungicides may have shorter shelf life than chemical controls.

Look for more of these biological fungicides to be developed and registered for the greenhouse industry. In recent news, investigators at Penn State were awarded grant monies from the PA Dept of Agriculture research funds to study plant elicitors. These naturally occurring compounds activate the plant's own defenses against a broad spectrum of insect, mite, and plant pathogen pests. Most of the research will be focused in greenhouse tomato production.

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

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## That's a Berry Good Question!

Kathy Demchak, Department of Horticulture

Q. I have some plants that show symptoms of being infected with a virus, yet they test negative when sent in for a virus screen. Any ideas what might be going on? This is fairly expensive, so I don't want to send in samples repeatedly, yet I'm not sure what else to do.

A. First, there are other causes of symptoms that may be similar to those that a virus would cause, so those causes should be ruled out first. For example, poor pollination can cause crumbly bramble fruit, as can a boron deficiency. Insect feeding, and over application of boron can cause leaves to be crinkled. So, a careful inspection, and consideration of other factors about the planting (age of the planting, proximity to wild hosts, previous amounts of aphid or leafhopper feeding, pattern of infected plants in the field, perhaps a tissue analysis) will help to determine whether a virus is a likely cause of symptoms. If you unable to find another cause of viral symptoms, then submitting a sample for a virus screen is the next logical step. It is possible to receive a 'false negative', meaning that the tests do not detect a virus, even though a virus might be present in the plant. The time of year that the sample was taken may be a factor. Viruses are most likely to be detected in samples taken in the spring, with fall the second best time for taking a sample, and summer being the time when viruses are most likely to be missed. Also, the viruses replicate in actively growing tissue, so the younger leaves are where they are most likely to be detected. So, when possible, send in tissue that actually shows the symptoms, or if there are no leaf symptoms, send in the newest fully unfolded leaves. When possible, plants should be sampled the same day as the sample is sent, preferably via a next-day express service. Finally, there are additional viruses that plants can get besides those in the screen, so it's possible that the plant may be infected by a virus other than those for which it is being tested. My thanks to Dr. Joseph Poorman at the USDA Germplasm Repository in Corvallis, Oregon, Mike Tiffany at Agdia, Inc., and Dr. Jim Travis at PSU for providing information.

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.

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## Potato Musings

Bill Lamont, Department of Horticulture

## Potato Session at Western Pennsylvania Vegetable and Berry Grower's Seminar

Bill Lamont, Department of Horticulture

A session on potatoes will be offered at the AnnualWestern Pennsylvania Vegetable and Berry Grower's Seminar, on November 19, 2002 held at the Days Inn, Rt. 8 South, Butler, PA.

Program

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| 9:00AM | "Potato Variety Update"- Dr. William Lamont Jr., Department of Horticulture, Pennsylvania State University |
| 9:30AM | "Update on Potato Disease Control"- Dr. Steve Johnston, Rutgers University. |
| 10:00AM | "Update on Potato Insect Control"- Dr. Gerry Ghidiu, Rutgers University. |
| 10:30AM | "Update on Potato Seed Piece Treatments"- Dr. Steve Johnston, Rutgers University |
| 11:00AM | "Weed Control and Vine Killing in Potatoes" - Dr. Mike Orzolek, Department of Horticulture, Pennsylvania State University |
| 11:30AM | "Potato Quality Management"- Dr. Matt Kleinhenz, Ohio State University |
| 12 Noon | |

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## Disease Report-Potato Wart

Barb Christ and Sara Mahoney, Department of Plant Pathology

Also known as: black scab, black wart, cauliflower disease, potato tumor, wart, and warty disease.

Potato wart has been found on potatoes in Asia, Africa, Europe, North America, New Zealand, and South America. This disease has been eradicated from the United States, but recent outbreaks of this disease on Canada's Prince Edward Island in 2001 and again in September of 2002 have raised concerns and brought about restrictions to keep the disease out of the United States. Potato wart is on the list of disease problems that fall under the Plant Quarantine Act of 1912. Currently only potatoes determined to be free of potato wart are certified as eligible to be shipped to the United States. The Canadian Food Inspection Agency (CFIA) is working to control the problem on Prince Edward Island using the following approaches.

1) Establishing a management plan to eradicate the fungus from the field where it was found.
2) Restricting soil movement and production in a regulated area around the infested field.
3) Conducting surveys and inspections to determine where the infection may have come from.

The fungus *Synchytrium endobioticum*, which attacks potato stem tissue, causes potato wart. This is a soil borne fungus that spreads by the movement of contaminated soil that adheres to carriers such as tubers and equipment. The resting stage of this pathogen can remain viable in the soil for at least 40 years. The sporangia can survive digestion by animals and can be found in manure. *S. endobioticum* is only known to attack plants in the Solanaceae family. Potato is the only cultivated host that becomes infected.

The symptoms include galls that are produced on the stem base, stolon bud, and tuber eyes. Galls may also form on the upper stem, leaves or flowers. These above ground infections are rare and symptoms usually do not appear except for possible reductions in plant vigor.
The galls are usually only 1-8 cm in diameter, but can become larger than this. The growths that form above ground are green to brown in color but then turn black as they mature and decay. Below ground, the galls are white to brown as they begin to form but then turn black as they decay. Tubers may be disfigured or completely replaced by galls. Galls may not be evident until harvest and can occasionally develop after harvest. Plant roots are not infected with this disease. Symptoms of powdery scab and bud proliferation can be similar to early symptoms of wart disease and can be easily mistaken for it.

Previously the development of "immune" varieties played a large role in protecting potato crops. However, new strains of the fungus, capable of attacking potato varieties that were previously resistant, have developed in several European countries. Currently the major way this disease is being managed is through quarantines to control disease spread and exclude the pathogen from infesting new areas. Research has found that amending wart infested soil with crushed crab shells aids in suppressing the disease. At

this time there are no chemical controls available that are effective in managing this fungus.

References:

Potato Wart found in P.E.I. 2002. Canadian Food Inspection Agency. http://www.inspection.gc.ca/english/plaveg/potpom/wartgalee.shtml

Potato Wart Disease. 2001. Department for Environment Food and Rural Affairs. http://www.defra.gov.uk/planth/pestnots/pwd.htm

Stevenson, W.R., Loria, R., Franc, G.D., Weingartner, D.P. 2001. Compendium of Potato Diseases. 2nd Ed. The American Phytopathological Society. St. Paul, MN.

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## Upcoming Meetings

Bill Lamont, Department of Horticulture

### Local

November 19, 2002: Western PA Vegetable and Berry Growers Seminar, Butler, PA. Contact: Eric Oesterling (724) 837-1402.

January 11-18, 2003: Pennsylvania Farm Show, Harrisburg, PA. Contact: Dr. Pete Ferretti, (814) 863-2313.

January 17, 2003: Morrison's Cove Produce Auction Meeting, Martinsburg, PA. Contact: Tom Ford (814) 693-3265

January 20, 2003: New Holland Vegetable Growers Day, New Holland, PA. Contact: Tim Elkner (717) 394-6851.

January 21, 2003: Tri-County Vegetable and Small Fruit Meeting, Penn Township Community Bldg., Shippensburg, PA. Contact: Steve Bogash (717) 263-9226

January 23, 2003: Susquehanna Regional Vegetable Meeting, Mifflinburg, PA. Contact: Jeff Mizer (570) 837-4252.

February 11, 2003: Cambria and Somerset Regional Vegetable and Potato Meeting, Ebensburg, PA. Contact: Mike Harteis (814) 472-7986

February18, 2003: Northeast Vegetable Growers Meeting, Thompson's Dairy Bar, Clarks Summit, PA. Contact: John Esslinger (717) 963-4761

March 4, 2003: Schuylkill County Regional Vegetable Growers Meeting, Extension Office, Pottsville, PA. Contact: George Perry (570) 622-4225

March 5, 2003: Lehigh/Schuylkill County Potato Growers Meeting, Schnecksville Grange in Neffs PA. Contact: Bob Leiby (610) 391-9840

March 5, 2003: Southeastern Vegetable Growers Meeting, Heritage Restaurant, Franconia, PA. Contact: Mary Conklin (610) 489-4315

March 6, 2003: Kutztown Vegetable Auction Growers Meeting, Fleetwood Grange Hall, Kutztown, PA. Contact: John Berry, Lehigh County Extension Office (610) 391-9840 or Laura McNutt, Berks County Extension Office (610) 378-1327

March 18, 2003: Central Vegetable Meeting, Pleasant Gap, PA. Contact: Tom Butzler, (570) 726-0022

March 19, 2003: Erie County Potato and Vegetable Growers Meeting. Contact: Andy Muza (814) 825-0900

March 20, 2003: North Central Vegetable Producers Conference, Emporium, PA. Contact: Tom Butzler (570) 726-0022

**Regional**

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.

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

**National**

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