The Vegetable and Small Fruit Gazette

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Horticulture Department
The Pennsylvania State University

In this Issue:

Tip for the Month: "Never put off until tomorrow, what you should do today"

Comments from the Editor

Bill Lamont, Department of Horticulture

I want to take this opportunity to wish everyone a Merry Christmas and a Joyous New Year. It is hard to believe that another year is about over, where did the time go!! This time of year is hectic with the holidays, deer hunting and a few winter meetings both in state and out-of-state. I want to thank all the agents who contributed articles this past year and a special thanks to Andy Muza for his excellent article on **"Tomato Pith Necrosis"** and I look forward to Steve Bogash kicking off the new year. I also want to thank all my colleagues who contributed articles throughout the year and I look forward to your continued support in 2003. 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.

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Schedule for Agent Articles

Bill Lamont, Department of Horticulture

January	Steve Bogash
February	Scott Guiser
March	Tim Elkner
April	Lee Young
May	George Perry
June	Tom Butzler
July	Eric Oesterling
August	Tom Ford
September	Cheryl Bjornson
October	Mary Conklin
November	John Esslinger
December	Andy Muza

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Tomato Pith Necrosis

Andy Muza, County Agent, Erie County Cooperative Extension

High Tunnels can provide ideal environmental conditions for the growth of tomatoes. Unfortunately, these environmental conditions can also be conducive to organisms which cause diseases. One little known disease, which was observed on tomatoes in a

high tunnel this season, is tomato pith necrosis.

Tomato pith necrosis, also called black pith, is a disease caused by the bacterium *Pseudomonas corrugata*. It can be a serious disease of greenhouse-grown tomatoes. In the field, infection rates have been reported as high as 10%.

This disease was first reported from greenhouse-grown tomatoes in England in 1978. About the same time, Dr. Felix Lukezic, Department of Plant Pathology, Penn State isolated the bacterium from symptomless roots of greenhouse-grown alfalfa plants. This was the first report of the occurrence of *P. corrugata* in the USA. In the early eighties the occurrence of tomato pith necrosis was reported from field-grown tomatoes in both California and Florida.

A combination of factors seem to favor the development of this tomato disease. These factors include: excessive plant vigor, under conditions of high humidity, during extended periods of cloudy weather. The first symptom of infected tomato plants is often yellowing of young leaves. More severe leaf symptoms include wilting and chlorosis. Infected stems have brown external lesions. Stems cut lengthwise may show internal symptoms, such as, brown discoloration of the pith and vascular system. (Pith is spongy tissue in the center of tomato stems. The vascular system is the conductive tissue, xylem and phloem, which transports water and nutrients throughout the plant). Progression of the disease causes a breakdown of the pith, which results in hollowing of the stem.

There is no effective treatment for infected plants. However, plants which are not severely affected can recover if environmental conditions improve (i.e. warm, sunny weather). Preventive measures to minimize the occurrence of this disease in high tunnels include: adequate ventilation to avoid high humidity levels, especially during periods of cloudy weather; and avoiding excessive nitrogen applications to prevent over vigorous plant growth.

Remember that different fungi and bacteria can cause similar disease symptoms on plants. Therefore, correct identification of diseases is important to avoid unnecessary or ineffective fungicide applications. Contact your County Extension Agent for assistance in identification of diseases or for a free Plant Disease Specimen Kit. The kit contains a Specimen Information Form and instructions on selecting, packaging and mailing plant disease material. Specimens should be mailed to:

Plant Disease Clinic
The Pennsylvania State University
220 Buckhout Laboratory
University Park, PA 16802

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Comments on Soil Tests and Soil Testing

Pete Ferretti, Department of Horticulture

The Penn State University soil test Summary of Commercial Vegetables for PA (2001-2002) reveals the following:

A) The top 10 most tested crops are:

1. Fresh Market Sweet Corn (475)
2. Mixed Vegetable Crops (344)
3. Other (293)
4. Pumpkin (233)
5. Fresh Market Tomatoes (pink ripe) (179)
6. Fresh Market-Sweet Peppers (165)
7. Snap Beans (81)
8. Fresh Market Tomatoes (greenwrap) (59)
9. Processing Tomato (direct seeded) (39)
10. Tie between Maintenance Asparagus and Garlic (34 each)

B) Although average summaries looked very good for all soil test values in the state, these specific categories are of major concern:

1. 130 soil samples with a pH greater than 7.5 - should cause major micronutrient problems and decreased yield and quality for all crops.
2. 459 samples with pH ranges of 7.1 to 7.5 - potential to real problems in both yield and quality for most crops.
3. Less than 30 ppm Phosphorus--- potential phosphate deficiencies, especially with root, tuber, and fruit vegetables (cucumbers, tomato, corn, etc.)

C) Fall and anytime in early winter when soil is not frozen is the best time to apply the lime required according to earlier soil test results. Both Dr. Cyril Smith's 40+ years of testing in PA and Pliny the Elder's writings (over 2000 years ago) agree on this. They also both agree that if the spring crop to come is really dependent upon a substantial rise in pH, then the finest ground limestone should be applied. If a major, quick pH change is not required and/or the land is not rented annually, then a moderately fine limestone (which is cheaper) should be applied in the fall.

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Remove Asparagus Fern

Pete Ferretti, Department of Horticulture

As soon as the fern begins to die (when yellow/brown) mow with a sickle bar at soil level, rake, and remove the brush for composting or burning. This will remove a natural growth suppressant (alleopathy) and help minimize *Rust, Purple Spot, Asparagus*

Beetles, and *Japanese Beetles* next season.

If the field is not sheltered or minimal snow cover is predicted, consider mulching 4" deep with a long-grain straw or better yet strawy manure. If lime and/or Boron is needed, consider applying just before mulching.

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Consumer Evaluation of Three Edamame Cultivars

Kathleen M. Kelley and Elsa S. Sánchez, Department of Horticulture

A sensory evaluation, was conducted at the University Park Campus, Pennsylvania State University, on October 30, 2002 to determine what edamame cultivars consumers prefer based on taste. One hundred-thirteen consumers were recruited from the university community to taste three edamame cultivars and rate the beans on firmness and overall appeal and ranked the beans in order of preference. Edamame used in the evaluation was harvested from plots at Russell E. Larson Research Center, Rock Springs, PA during the month of August and stored in a -20ºC freezer until the day of the sensory evaluation. Throughout the evaluation period, frozen edamame pods were placed in pots and boiled with salt water for five minutes. Edamame was then shelled and placed into individual, two-ounce serving containers. Each participant received a sample of each of the three cultivars: Early Hakacho, Green Legend and Kenko. These cultivars were chosen based on germination rates and marketable yields as well as a prescreening evaluation for taste conducted by the investigators and members of the Sensory Evaluation Laboratory at University Park.

Responses from participants indicated that consumers preferred the cultivar Kenko compared to the other two cultivars. Although the overall appeal and ranking of Early Hakacho was not significantly different from Kenko, participants rated Kenko as having a "just about right" firmness. More participants rated Early Hakacho and Green Legend as being too firm and Green Legend was also ranked as being the least appealing overall. Taking in consideration germination, marketable yields and sensory evaluation data, Kenko and Early Hakacho will be evaluated again in future production and marketing studies.

Participants were also asked about their experiences with edamame. Seventeen percent were familiar with or had heard of edamame prior to the sensory evaluation, while 12% had eaten edamame before. After tasting the three edamame samples, 89% of the participants indicated they would be likely to purchase edamame from a store and serve it in a meal. Verbal comments from participants after the evaluation indicated that they were interested in knowing which retail outlets sold edamame in the State College, PA area.

Eight-seven percent of participants were the primary food shoppers in the household

and female. Education level varied with 24% of the participants being high school graduates, 40% having some college/technical school education, 10% having an associate/technical school degree, and 26% having a bachelor's degree. A majority of participants lived in households without children (74%), but lived with at least one more adult (89%). Though gross income for 2001 varied, a majority of the participants (52%) reported having a gross income between $30,000 and $79,999.

The authors would like to thank the USDA Federal State Marketing Improvement Program for supporting current and future edamame marketing and production studies conducted by Kathleen M. Kelley and Elsa S. Sánchez.

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Weed Control: Methods and Practices

Michael D. Orzolek, Department of Horticulture

Effective weed control in vegetable production involves more than the use of herbicides. An effective weed management program includes the use of both cultural and chemical practices. There are several cultural practices that help to suppress both annual and perennial weeds including: liming, band application of fertilizer, moldboard plowing, cultivation(s), crop rotations, and use of black or colored polyethylene mulch.
Weed prevention is the most basic and easiest methods for successful weed management in your vegetable crop. Avoid weed establishment in all your fields by not allowing weeds to go to seed (reproduce) and eliminate all individual weed survivors. In addition, identifying and mapping weed infestations in all your fields, especially perennial weeds, and maintaining accurate records over many years will help you make both crop production as well as effective weed management decisions in the future. It is also very important to recognize and eliminate new weeds before they multiply and establish.

Use of sanitary procedures to prevent the spread weeds and their seeds will long term reduce the number of weed seeds in your field's soil. Clean all field equipment between sites or infestations. Cleaning in this case refers to the washing or steaming of all tillage equipment after use between different field locations; especially land that is rented. It is recommended that you examine all transplants, seed, and imported soil or media for potential weed as plants or seed contamination. If found, remove all weeds and seed from either transplants or media before establishing the crop in the field. Screen irrigation water where weed seed contaminates surface water transported in canals and rivers or stored in lakes or ponds. This can be a major source of weed seed contamination over time. Control weeds and seed sources around the all production fields and/or plant production sites.

Liming fields to maintain a soil pH of 6.0 to 6.8 will help reduce the carryover of triazine herbicides and increase the activity of other types of herbicides. In addition, soil pH will affect the activity of soil microorganisms that help breakdown herbicides. In general,

bacteria and actinomyces are favored by soils having a medium to high pH, and their activity is seriously reduced below pH 5.5. Fungi tolerate all normal soil pH values. In normal soils, therefore, fungi predominate at pH 5.5 and below. Above pH 5.5, the fungi are reduced through competition with bacteria and actinomyces. Thus a warm, moist, well-aerated, fertile soil with optimum pH is most favorable to microorganisms that can rapidly decompose organic herbicides.

Banding of fertilizer will help to maintain an actively growing and healthy vegetable crop and reduce nutrient availability to weeds growing between the crop rows. In addition, normal recommendations are that you would band half the recommended broadcast fertilizer application. Example, if your soil test recommended the application of 100 - 200 - 200 lbs./A of N-P-K broadcast, than the recommended banding rate would be 50 - 100 - 100 lbs/A of N-P-K. Not only are you reducing the nutrients that weeds would have available for growth, but you would also cut your fertilizer bill by 50%.

Moldboard plowing will physically uproot weeds, especially perennial weeds with large taproots, resulting in damaged roots, low carbohydrate reserves, and desiccation of the weed. Additional cultivation after plowing during the winter if possible will increase the level of desiccation that weeds will be exposed to during the winter.

After crop establishment and during the growing season, cultivation either once or several times in the field will uproot weed seedlings (especially if they are under 2"), increase soil aeration and reduce soil surface crusting. The only disadvantage of relying solely on cultivation to control weeds is that wet soil conditions could prevent the use of a tractor and cultivating equipment due to the potential of soil compaction and the ability of plants to recover in moist soil after physically being uprooted.

Select manageable fields (identify weeds and choose crop according to feasibility of weed management strategies; e.g., avoid planting onions into perennial weeds). Rotate crops (disrupt weed life cycles or suppress weeds in competitive crop followed by planting a noncompetitive crop).

Plant winter cover or competitive fallow crops in rotation to improve soils and crop management (specific cultivars are being evaluated). Consider legumes to supplement nitrogen requirements. Consider specific varieties of cereals with natural plant toxins (allelopathy); vegetation must remain uniform on soil surface; either perennial or large-seeded crops can be planted through undisturbed mulch. Consider crops or cultivars that winter-kill after vigorous growth during fall to avoid springtime controls.

Transplant slow-growing vegetable crops, especially a crop like cabbage.

Place and time fertilizer, especially nitrogen. Band or spot fertilizer beside plant or seed (reduces availability to surface-germinating weeds). Time additional side-dressings for maximum crop growth or to minimize weeds. Encourage the development of crop canopies that shades weeds, suppresses weed germination. Select crops or varieties that form a canopy quickly. Space plants in equidistant (triangular) arrangements and vary density depending on crop management constraints or harvest requirements (e.g., product quality). Combine broadleaf and taller, narrowleaf crops (corn or beans with pumpkins). Relay plantings or harvest short-duration crops within longer maturing crops (bush beans with corn; cucumbers with peppers; tree crops with vegetables). Manage

appropriate living mulch (grass or legume) between perennial crop rows. Improve pasture management by reseeding and/or fertilizing with or without control measures to reduce weed infestation (weeds often are a symptom of poor management).

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Bug vs. Bug - Managing Plant Diseases with Biofungicides

Cathy Thomas, Integrated Pest Management Program
Pennsylvania Department of Agriculture

A new class of biopesticides called plant elicitors, offers growers a new tool for an IPM program. A group of Penn State investigators recently received grant monies through the Pennsylvania Department of Agriculture, Agriculture research program to study the use of plant elicitors in greenhouse tomato production. Plant elicitors are unique compounds that send a message to the plant to mobilize its defense mechanisms against pests. These biopesticides offer a distinct advantage over traditional pesticides because they are naturally occurring, are active at very low doses and have no direct toxicity to pests, natural enemies or other non target organisms.

Penn State investigators will be focusing their research on four compounds - the EPA registered elicitors: harpin (Messenger®), methyl salicylate, methyl jasmonate and ethylene will be tested; each is a natural product that activates the plant's own defenses against pests. These (elicitors) will be tested individually and in combination with natural enemies (predators and parasitoids), for control of major greenhouse tomato pests, emphasizing control of whiteflies, spider mites, and powdery mildew. Investigators anticipate that the management recommendations that result from this work for control of pests of greenhouse and high tunnel tomatoes will be adaptable to other greenhouse ornamental and vegetable crops and perhaps even field crops, especially plants that are known to be inducible using elicitors including peppers, eggplant (flea beetles), and potatoes.

The plant elicitor, Messenger™, is a commercially available product from Eden Bioscience Corporation (www.edenbio.com). Messenger™ contains one of a group of proteins called harpins. Harpins are produced in nature by bacterial plant pathogens and when applied sends a message to the plant to mobilize its defense mechanisms. This product will stimulate the plants pest suppression system as well as enhancing plant growth. Messenger may be used for crops in greenhouse, shadehouse, nursery and field production (consult label for list of crops). Nearly 500 field trials have been conducted worldwide on more than 40 crops, including high value crops such as tomatoes, peppers, cucumbers and strawberries; traditional agronomic crops such as wheat, rice, citrus, cotton and tobacco; and ornamental crops such as roses. In addition to disease control comparable or superior to conventional fungicides, Messenger increases seed germination, promotes earlier flowering and fruit maturation, and has been shown to increase fruit quality and yields (Diana Horne, EPA).

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

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Cabrio for Berry Crops

Kathy Demchak, Department of Horticulture and J. W. Travis, Dept. of Plant Pathology

Cabrio EG (pyraclostrobin) from BASF is now labeled for use on strawberries, blackberries and raspberries, blueberries, gooseberries, currants and other minor berry crops for control of a number of diseases. On berry crops except for strawberries, Cabrio is labeled for control of Alternaria, anthracnose, leaf spot and blotch, phomopsis, powdery mildew, various rusts including orange rust, and spur blight. On strawberries, Cabrio is labeled for use against anthracnose, leaf spot, and powdery mildew. On all of these crops, however, Cabrio is to be used only for suppression of gray mold. Cabrio is in the same chemical group as Quadris/Abound (azoxystrobin), and therefore cannot be alternated with this chemical as a resistance management tool. Supplies of Cabrio are expected to be available in January of 2003.

Cabrio has a 0-day pre-harvest interval, but a 24-hour reentry interval. Rates are 12-14 oz/acre for strawberries, and 14 oz/acre for other berry crops. Cabrio should be applied in only 2 sequential applications before switching to a material with another mode of action. See the label for other restrictions on use.

Growers will notice that in the upper right corner of the label the words "Group 11 Fungicide" appear. This is in accord with EPA-recommended labeling that, in part, groups pesticides according their modes of action. Group 11 fungicides include those in the strobilurin group. An article with more information on these pesticide groups as they pertain to berry production will appear in next month's issue.

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2003 Mid-Atlantic Winter Brambles Conference

Kathy Demchak, Department of Horticulture

The "North American Bramble Growers Association - mid Atlantic region" and Virginia Cooperative Extension will sponsor a Bramble meeting February 7 & 8, 2003 at the Holiday Inn at Carradoc Hall in Leesburg, Virginia.

The conference has a focus on subjects most currently critical to the production of bramble fruit and factors affecting the viability of individual farms and the growing industry.

Key topics include season extension, irrigation in heat and drought, nutrition, in-depth cultivar discussion, specifics of insects pests - diseases - virus' - & nematodes, direct marketing, wholesale marketing, and grower profiles.

Speakers include Dr. Richard Funt of Ohio State University, Dr. Harry Swartz of the University of Maryland, Bryan Butler of Maryland Cooperative Extension, Dr. Doug Pfeiffer and Dr. Tony Bratsch of Virginia Tech, Dr. Bill Cline and Dr. Zvezdana Pesic-VanEsbroek of North Carolina State University, Dr. John Halbrendt of Pennsylvania State University, Mike Droney of the Virginia Department of Agriculture, and discussions with individual growers.

Information including conference schedule and registration can be obtained at http://www.ento.vt.edu/Fruitfiles/HotBramble.html and will soon be posted at http://www.nabga.com; or by contacting Jason Murray at jamurray@vt.edu & 703-737-8978, or Richard Fagan at rfagan@mindspring.com & 301-724-4085.

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Potato Musings

Bill Lamont, Department of Horticulture

Potato Mop-top Virus (PMTV)

Sara R. Mahoney and Dr. Barbara Christ, Department of Plant Pathology

Until recently PMTV had only been reported in northern and central Europe, the Andean region in South America, and in China, Israel, and Japan. Within the past year the virus was found in the United States. It is now a concern for growers, as the virus-infected plants will produce unmarketable potatoes. PTMV is spread in the soil by *Spongospora subterranean* f.sp. *subterranea*, the organism that causes powdery scab on potatoes. For this reason, the virus is a considerable concern in the U.S. where powdery scab is a

widespread disease and occurs commonly in the northern climates. PMTV cannot be transmitted by aphids or other vectors.

PMTV can be easily introduced into previously uninfested geographic regions by planting seed infected with powdery scab and the virus. PMTV, within the powdery scab vector, has been found to persist in fields for up to 18 years even without the presence of potatoes. Pennsylvania is not one of the states thought to have PMTV however; testing is being done to look for the virus. Growers in the U.S. now need to be aware of the possible presence of PMTV in seed lots and plantings.

Mop-Top Symptoms

Symptoms will vary with cultivar and environment. Initial infections from inoculum in the soil may or may not show symptoms on the tubers and rarely become systemic in the plants. These initial infections on the tubers may appear as:

- Raised rings that develop on the tuber surface.
- Necrotic dark brown arcs that form in the tuber flesh
    - These arcs are referred to as spraing
    - This symptom is similar to and often confused with corky ringspot caused by the Tobacco rattle virus, a disease commonly found in warmer growing regions.
    - The development of these necrotic arcs caused by PMTV in the tubers is induced by sudden changes in temperature and is especially severe in cool-weather potato production regions.

When infected tubers are planted, foliar symptoms will develop. This occurs particularly under cool conditions. Symptoms may appear as:

- Bright yellow blotches, rings, or diagnostic chevrons, and V-shaped yellow markings mostly on lower leaves.
- Pale V-shaped markings may also appear on upper leaves.
- Stems may be stunted and internodes may be shortened on some or all of the stems of a plant creating a "mop-top" appearance.

Powdery Scab Symptoms

Symptoms are found only on below ground portions of the potato plant: roots, stolons, young shoots, and tubers. Powdery scab infects through the lenticels or tuber eyes and begins as purplish-brown lesions, which may be sunken. The lesions then develop into a tan, pimple-like swelling. The periderm eventually ruptures and appears as tan, wart-like outgrowths full of powdery masses of the spore balls of the pathogen. Infection by powdery scab is favored in cool moist soil.

Management

PMTV is most effectively managed by controlling the powdery scab vector. In the absence of powdery scab, virus infected plants often become "cured" of PMTV after several generations. This is due to the instability of transmission of the virus from seed tubers to new tubers. Check

seed during cutting for virus and powdery scab symptoms. Scout fields regularly to look for suspicious virus infected plants. Any potentially infected plants should be rouged out and tested for PMTV.

Powdery Scab Management

- Plant certified seed that is symptomless and was produced in a disease free area.
- Avoid planting in fields that are already contaminated.
- Avoid poorly drained soils.
- Do not use manure fertilizers from animals that have ingested infected seed tubers as the digestion process does not destroy the powdery scab pathogen.
- Rotate out of infested fields for at least 3-10 years.
- Avoid planting tomatoes in rotations.
- Control Solanaceous weeds such as nightshade
- Manage irrigation to avoid overly moist soils and to prevent excessive drying out between periods of high moisture as this promotes disease development.

References:
Calvert, E.L., and Harrison, B.D. 1966. Potato mop-top, a soil-borne virus. Plant Pathology 15:134-139.

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

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Upcoming Meetings

Bill Lamont, Department of Horticulture

Local

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

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