

The Vegetable and Small Fruit Gazette

Vol. 5, No.7- July 2001

Horticulture Department
The Pennsylvania State University

In this Issue:

Comments from the Editor
Schedule for Agent Articles
Regional Sprayer Field Day
Penn State and PASA to Hold High Tunnel Field Day in July
2001 Pennsylvania Vegetable Growers Field Tour on August 3rd in Schuylkill and Columbia Counties
Keep Customers Smiling
Double Cropping with Plasticulture Systems
Bug vs. Bug- Biological Control of Two-Spotted Spider Mite
Small Fruit Research Update
Brigade Label for Caneberries
Potato Musings
Cornell Potato Field Day
Red, White and Blue Potatoes for the 4th of July
Silver Scurf on Potatoes
Upcoming Meetings

Tip for the Month: "Good Friends are hard to find, harder to leave, and impossible to forget"- Jamie Smith, Staff Assistant, Department of Horticulture

Comments from the Editor

Bill Lamont, Department of Horticulture

In trying to better coordinate the **in-service training** efforts in the department we are going to schedule an in-service training program for the **High Tunnels on September 20 with dinner and refreshments at Dr. Lamont's house that evening and then an in-service training program for Ornamentals on September 21. Participants for both the High Tunnel and Ornamentals in-services are invited to Dr. Lamont's cookout.** I want to thank Dwane Miller for his excellent article "Keeping Customers Smiling " and look forward to Eric Oesterling's article for the August issue. 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

August	Eric Oesterling
September	Ron Hostetler
October	Mary Concklin
November	John Esslinger
December	Andy Muza

Regional Sprayer Field Day

Laura McNutt, Berks County and John Berry, Lehigh County

Attention, everyone that uses a sprayer for crop protection!

Program:

Who: several area extension agents, Dr. Fleischer, Bill Hoffman, PDA and industry representatives

What: Regional Sprayer Field Day

When: July 25, 2001 from 1:00pm until dusk

Where: Kutztown Produce Auction and adjacent fields, Fleetwood, PA

Why: field demonstration of side boom, air blast, electrostatic, hydraulic, and backpack sprayers

We will be demonstrating sprayer calibration and crop coverage, in addition to offering extensive core and category pesticide update credits. There will also be a First-On-The-Scene farm safety training. Registration includes the world famous all-you-can-eat sweet corn dinner.

Mark your calendar and be sure to participate in this excellent educational opportunity! Registration materials will follow. Questions? Contact: Laura McNutt, 610-378-1327 or John Berry, 610-391-9840

Penn State and PASA to Hold Tunnel Field Day in July

Eric Burkhart, Graduate Student, Department of Horticulture
Kate Francis, Pennsylvania Association for Sustainable Agriculture

A field day is scheduled for Friday, July 20th at the Pennsylvania State University's High Tunnel Research and Education Facility at Rock Springs, PA. This event is being called "Use of Season Extension and Compost for Sustainable Production of Vegetables and Small Fruit," and will begin at 9 am with an introduction to high tunnels and the high tunnel research facility. It will continue through 3 pm with sessions on high tunnel design and maintenance, vegetable crop production (including culinary herbs), small fruit research, and cut flowers. In addition, special attention will be given to the use of compost and various integrated pest management tactics within tunnels. Ample time will be given both during and after the event for discussion.

Session leaders will include Dr. William Lamont, Dr. Michael Orzolek, Dr. E. Jay Holcomb, Dr. Nyambura Mbugua, Kathy Demchak, Eric Burkhart, Bruce Dye, and Dayton Reese. Lunch and refreshments will be provided, along with an informational packet containing high tunnel design blueprints and research summaries. There is no cost to participants and space is expected to be limited. Interested individuals should contact Kate Francis at PASA 814-349-9856 ext. 2 to RSVP. This event is a collaborative effort between The Pennsylvania State University and the Pennsylvania Association for Sustainable Agriculture (PASA) as part of the PASA 2001 field day series.

2001 Pennsylvania Vegetable Growers Field Tour on August 3rd in Schuylkill and Columbia County

Bill Troxell, Executive

The 2001 Pennsylvania Vegetable Growers Field Tour sponsored by the Pennsylvania Vegetable Growers Association and Penn State Cooperative Extension will be on Friday, August 3 in Schuylkill and Columbia Counties. An interesting variety of farms, roadside markets, packing operations and farmers' markets are included in the one-day bus tour. The planned itinerary is as follows:

7:30	Tour check-in with doughnuts and orange juice at Exit 32 off of I-81 at Ravine. We will meet in the large parking lot across the road from the Raceway Truck Stop near the northbound entry to I-81. <u>We will leave at 8:00!</u>
8:30	Arrive at Rodichok's Farm and Market in Tower City operated by James Rodichok and

	<p>his family. This is a family owned operation growing diversified crops in the greenhouse and fields including perennials, vegetables, potatoes and grain. Plasticulture has been used for 11 years on muskmelons, peppers, tomatoes and watermelons. For seven years they have grown strawberries on plastic with raised beds and drip irrigation. During the field tour we expect to see a planting of 40,000 field mums and strawberries bedded on plastic. They should be picking sweet corn, tomatoes, peppers and cantaloupes. A nice roadstand will be in full operation.</p>
9:45	<p>Arrive at Sterman Masser Inc. operated by Keith and Helen Masser in Sacramento. We will tour one of the largest fresh potato packing operations in the country that handles about 3,500 truckloads per year.</p>
11:30	<p>Arrive at Shenandoah Farmers Market and get a quick tour. (This stop may be eliminated if time does not allow it.)</p>
12:00	<p>Luncheon</p>
1:15	<p>Arrive at B&R Farms in Ringtown operated by Barron and Robin Hetherington. We will see field pepper production, tomatoes in high tunnels and part of a Penn State statewide strawberry herbicide trial.</p>
2:00	<p>Arrive at Kemmerer Farms in Berwick owned by Alan Kemmerer. This large-scale, diversified vegetable operation grows, grades and packs peppers, snap beans, cucumbers, summer squash and peppers.</p>
3:30	<p>Arrive at Briar Creek Farms fresh processing facility owned by Dale Brophy and Alan Kemmerer in Bloomsburg.</p>

4:10	Arrive at Rohrbach's Farm Market and Gift Shop operated by Ronald Rohrbach and family. We will sample an ear of corn at their Corn Fest just before entering their extensive market and gift shop. Expect to see sweet corn, new red potatoes and early peaches for sale. Rohrbach's feature excellent service with well-organized displays that give a feeling of abundance.
5:30	Arrive back at Exit 32 in Ravine.

The cost for the Field Tour is \$25 per person for PVGA members, \$35 per person for non-PVGA members and \$20 per person for children 16 and under. Spouses, family members, employees and guests of members may attend at the member rate. This includes the bus fare, luncheon and refreshments. Reservations are due by July 24 but should be made as soon as possible so appropriate meal and transportation arrangements can be made. If you are interested in attending, please call PVGA at 717-694-3596 to let us know of your interest as soon as possible, especially if you mail your registration after July 20. Registrations should be mailed to: Pennsylvania Vegetable Growers Association, RR 1 Box 947, Richfield, PA 17086. Checks should be made payable to: Pa. Vegetable Growers Assn.

Overnight accommodations are available in the area. Call PVGA at 717-694-3596 for further information and possible group rates.

The bus will leave the starting point promptly at 8:00 a.m. Please allow enough time to be there by then.

Keeping Customers Smiling

Dwane Miller, County Agent, Monroe County

So many times I have seen farmers lose sight of a fundamental marketing principle: customer satisfaction. Whether you are involved in retail vegetable marketing at a farm stand or wholesale marketing, they are your lifeline, and it is important to keep them happy. What is a good customer worth? If good customers are worth having, they are worth your effort to keep them coming back. A certain amount of customer turnover is unavoidable. Some business people think they can afford to lose some customers because they can replace them with new ones. However, attracting and retaining new customers is expensive. Marketing research indicates that it can cost five times as

much to get a new customer as it does to keep an existing one!

Impressions Last a Long Time

Nearly everything you do makes an impression on a potential or current customer. Your overall goal should always be to service your customers. Building a successful, positive image with your customers enhances credibility. Living up to that image creates valuable word-of-mouth publicity. Do your best to keep your physical facilities clean and safe, and try to keep equipment and supplies organized neatly. When expanding or remodeling a business, make it as attractive as possible. Anything less gives an unprofessional image. Train your employees on customer relations practices whether they are dealing with people in person or over the telephone.

Handling Complaints

Develop a procedure for handling customer complaints. Consider customer complaints to be constructive criticism, which you can use to make improvements.

Steps for Effective Complaint Management

- Listen to your customers and acknowledge their complaints. Customers who register complaints expect action
- Show concern for the customer. Ask questions to identify and analyze the problem. Obtain the customer's ideas concerning possible alternative solutions.
- Resolve the complaint according to policy. Decide in a fair manner what you are responsible for. When it cannot be immediately resolved, keep the customer informed of progress and notify him or her when a settlement has been reached.
- Keep a record of complaints and action for resolution. This can be accomplished simply by requiring salespeople to write complaints handled that day on an index card.

What is it Worth to Keep Customers Satisfied?

According to consumer surveys, a person who has had an unpleasant experience with a business will tell 9 or 10 other people. About 13 percent will tell more than 20 other people. This negative word-of-mouth publicity can be very harmful to a business. More consumers are basing their purchasing decisions on the advice of people they know. An unhappy customer cannot be kept quiet. However, you can regain customer support by solving complaints quickly, and in a fair manner. Such customers not only may come back but also will spread positive talk on to others. Always keep in mind that without your customers; you would not be in business!

Double Cropping with Plasticulture Systems

Mike Orzolek, Department of Horticulture

Since the use of plasticulture (raised beds, plastic mulch and drip irrigation) allows earlier crop establishment in the spring and somewhat earlier maturity compared to bare ground, growers should consider multiple cropping of horticulture crops. Non-degradable, embossed plastic with a thickness of 0.6 to 1.0 mil will generally last 8 to 12 months in the field, especially in Pennsylvania. Careful planning of crop rotations in the

same field will allow for the planting of a second crop after the initial crop has been harvested. Cucumbers can be planted after tomato, broccoli after pepper, leafy greens after cantaloupe and spinach after squash. Regardless of the second crop you plant, be sure you have a **MARKET** for that crop before it's planted in the field. Plants from the first crop can be bush hogged, chopped with a flail mower or burned down with a contact herbicide. If you are mechanically removing the plant material with a mower, be sure the mower is set high enough so that it will not cut the plastic on top of the bed. Either seed or transplants can be placed in new holes punctured in the plastic because of spacing requirements, or if most of the vegetation from the first crop is gone, the original punched holes could be used for the second crop providing there are the correct spacing for the second crop. CAUTION, do not puncture the drip irrigation tape or water excess and deficiency problems will develop in the mulched, raised bed. All nutrient requirements for the second crop can be injected into the drip tape at weekly intervals (5 to 7 lbs/A) or larger amounts at longer intervals (12 to 15 lbs/A at 14-18 day intervals). There should be some residual fertility from the first crop; do not over apply nitrogen since high tissue nitrogen can delay crop maturity at a time when temperatures will be getting colder. Insect and disease problems may not be serious depending on the crop and date planted. Scouting or monitoring the crop for insects or diseases at least once a week will help produce a quality crop with appropriate intervention when necessary to control pests. Application of a contact herbicide between the mulched beds with appropriate shield prior to planting the second crop will control most volunteer weed problems. Additional weeds between rows should not be a problem, but cultivation may be the most effective and efficient way of controlling them. Since mulch color will affect specific crop responses, try to use the most effective color for both crops. Examples; cucumber/tomato recommend green IRT or black, broccoli/pepper recommend silver or black, leafy greens/cantaloupe recommend silver or blue, and spinach/squash recommend silver or black. As soon as the second crop is harvested, suggest immediate lifting of plastic mulch and drip tape off beds before the plastic mulch becomes too brittle and unable to be removed from the field.

Bug vs. Bug--

Biological Control of Two-Spotted Spider Mite

Cathy Thomas, Integrated Pest Management Program

Bureau of Plant Industry, Pennsylvania Department of Agriculture

A population of two - spotted spider mite (*Tetranychus urticae*) can increase rapidly especially during hot, dry periods. Whether you are using chemical or biological control, treatment must start at low densities for effective control. Two -spotted spider mite, the most economic spider mite in greenhouse crops, can infest many crops including tomatoes, peppers, eggplants and ornamental plants. 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. 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.

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 control is not effective.

Monitoring

Mites usually develop on the undersides of leaves and are often found at certain spots in the greenhouse. These areas have a more favorable climate for development (dry, warm). Inspect plants for mite development near heaters, doors and vents. It is important to have at a 16x hand lens to monitor for this pest. If you have difficulty-detecting mites on leaves, tap the leaves over a sheet of white paper. This technique dislodges mites (and other pests) and provides for easier identification.

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!

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.

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.

The next issue of Bug vs. Bug will focus on the application of these predators in vegetable production.

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

Cathy Thomas
Integrated Pest Management Program
Bureau of Plant Industry/Rm. 100
2301 N. Cameron Street
Harrisburg, PA 17110
717/705-5857
E-mail: c-cthomas@state.pa.us

Small Fruit Research Update

Kathy Demchak, Department of Horticulture

Here's an update on what's going on in small fruit research, both across the state and at Rock Springs. If any of you are planning on coming to Ag Progress Days this year, and would like to stop by and visit the experiments at Rock Springs, please feel free to do so.

Herbicides for the Establishment Year of Strawberries. This was a project that was conducted statewide. We started out with experiments at 7 sites, and ended up collecting yield data from 5 of the sites. Data on weed populations were collected from all 7 sites earlier this season and season-long last year. Herbicides tested, which were applied at planting, were Devrinol, Dacthal, Dual Magnum, and Prowl. My thanks again to the following agents and grower cooperators for their assistance in making this project possible. Listed west to east, they are: in Erie Co., Frank Antalek and Andy Muza; in Indiana Co., Herb Pollock and Bob Pollock; in Lycoming Co., Tom Styer and Tom Murphy; in Schuylkill Co., Boots and Robin Hetherington and George Perry; in Lancaster Co., John Yocum, Tom Becker and Tim Elker; in Lackawanna Co., Rich Pallman and John Esslinger; and in Bucks Co., Ken and Judy Bupp and Scott Guiser. Final conclusions won't be reached until the yield data is collected and analyzed.

Strawberry Plasticulture. This experiment is being conducted at Rock Springs and

evaluates the effect of cultivar and planting date on yields of plasticulture strawberries. 'Chandler', 'Camarosa', and 'Sweet Charlie' plugs, and 'Avalon', 'Allstar', and 'Latestar' mother plants were planted in mid-August, late August, and mid-September of 2000. Yield data has not yet been analyzed, but some preliminary conclusions are that the earliest (mid-August) planting date was definitely the best for the plug plants, while it appeared that by using mother plants you could 'buy some time' in the fall if planting were delayed, as planting date made less of a difference with mother plants. The latest planting date resulted in the earliest, but lightest, yields. 'Avalon' was very early, with berries ripening at about the same time as for 'Sweet Charlie'. 'Avalon' had excellent appearance and flavor, but the yield is on the light side, similar to 'Sweet Charlie'. 'Chandler' still seems to be the best overall, with yields of 'Camarosa' and 'Allstar' being intermediate. 'Latestar' yields were very high, but the flavor and size were really lacking in this cultivar.

Fungicides for Strawberries and Raspberries. These projects are with IR-4 and evaluate some new fungicides for efficacy and phytotoxicity. Two new (not labeled) fungicides from BASF, plus a mixture of the 2, and a biofungicide called 'Serenade' are being evaluated on strawberries. Data is being collected on their effects on leaf spots and grey mold. These same fungicides from BASF and also Quadris are being evaluated on fall-bearing raspberries.

High Tunnel Production of Raspberries and Strawberries. Last year, 'Autumn Britten' and 'Heritage' raspberries and 'Triple Crown' thornless blackberries were planted in both containers and in the ground. Fall yields of 'Autumn Britten' were very high, while much of the potential 'Heritage' yield went unharvested. This year, 'Heritage' is being grown both as a summer-bearer and fall-bearer and 'Autumn Britten' will be harvested only as a fall-bearer. 'Triple Crown' is growing and blooming very well and the first year's data will be collected this summer. A new experiment was established in the tunnels this spring which will evaluate, from the cooperative NJ-MD-VA-WI breeding program, the fall-bearing raspberry cultivar 'Josephine', a fall-bearing raspberry numbered selection 'ND-f1' and a Wyeberry numbered selection 'QDE-1'. 'Heritage' is being grown as a standard. An experiment identical to this one was also established in the field for comparison. 'Chandler', 'Camarosa' and 'Sweet Charlie' strawberries were planted in mid-August and mid-September of 2000. Plants in the high tunnels began yielding 3 weeks earlier than the plasticulture field planting. Data on yields is still being compiled. Spider mites were problematic, and probably negatively affected yields.

Bridage Label for Cranberries

Kathy Demchak, Department of Horticulture

Brigade (bifenthrin, FMC Corp.) is labelled for use against leafrollers, orange tortix, root weevils, and spider mites on cranberries. While the first 3 are not typically pests in cranberries in PA, spider mites can be, especially with some of the more susceptible cultivars such as Taylor.

Caneberries refers to raspberries, blackberries, and their various hybrids. For spider mites, the use rate is 16 oz. per acre. The PHI is 3 days, but the REI is 4 days.

Potato Musings

Bill Lamont, Department of Horticulture

Cornell Potato Field Day

Bill Lamont, Department of Horticulture

Dr. Don Halseth, Department of Horticulture, Cornell University, informs me that the Empire State Potato Growers, Inc. is sponsoring this field day at the Thompson Vegetable Crops Research Farm, Freeville, NY on July 11, 2001, including the bus, lunch and BBQ dinner. **This meeting and social is FREE**, Don just asked that you RSVP to Don Halseth at 607-255-5460 or e-mail deh3@cornell.edu so as to help in estimating bus and meal needs.

Directions to the Thompson Vegetable Crops Research Farm, Freeville, NY, which lies 10 miles east of Ithaca, NY: From the west, take Rt 13 east out of Ithaca towards Dryden. One mile past the large NYSEG building (on your right) take Rt 366 to the left through the hamlet of Etna and into Freeville. On the east side of Freeville there will be a four-way stop with Rt 38 (left [north] to Groton 6 miles and right [south] to Dryden 3 miles). Continue straight ahead (east) at this intersection on Fall Creek Road for 0.7 miles. The Thompson Lab will be the brown metal building on the left at the first intersection. From the east take Rt 13 out of Cortland to Dryden and then Rt 38 into Freeville. Turn right (east) at the four-way stop in Freeville onto Fall Creek Road and arrive at farm in 0.7 mi.

Red, White and Blue Potatoes for the 4th of July

Bill Lamont, Department of Plant Pathology

For the roadside or direct marketer having "new" or fresh potatoes for his/her customers can mean the opportunity to make some pretty good money early in the season. If the potatoes are sold in conjunction with fresh garden peas and pearl onions you have the potential for some really big bucks. With that thought in mind we have pursued the use of plasticulture (high tunnels, plastic mulches, drip irrigation and row covers) to provide early potatoes for the direct marketer. As part of the research efforts at the High Tunnel Research and Education Facility we are developing cropping schemes that include double and triple cropping in the high tunnels. This spring we planted potatoes in one of our 17' by 36' high tunnels on April 6th. We chose Red Pearl (W8475-R), a red-skin/white flesh that only makes B size potatoes from the Wisconsin Potato Breeding Program; Eva- a white skin/white flesh from the Cornell Potato Breeding Program; and Michigan Purple- a purple skin/white flesh from Michigan State Potato Breeding Program in order to have some red, white and blue skinned potatoes for the 4th of

July.

The ground was prepared, and fertilizer was broadcast at the rate of 1,200 lbs. of 13-13-13 per A and incorporated prior to laying four rows of red plastic mulch with drip irrigation using a small plastic mulch/drip irrigation applicator mounted on a 21 HP tractor. The drip tape was placed down the center of bed and buried 3 inches deep. The beds were spaced 44 inches apart and the top of the bed was 18 inches wide. The potatoes were hand-planted on double-rows 13 inches apart, with the potatoes spaced 8 inches apart in the row. The high tunnel was divided in thirds, so each variety had 4 rows with 30 plants per row or a total of 40 feet of row. Potatoes were irrigated as needed and were never sprayed with any pesticides.

The potatoes were dug by hand on June 27, 2001 so as to be ready for the 4th of July market. The soil temperature at time of digging was 79o F. Red Pearl yielded 120 lbs. of potatoes, the Eva yielded 100 lbs. of potatoes and Michigan Purple yielded 139 lbs of potatoes. There was less than 10 tubers that had any defects. Red Pearl yielded 375 tubers/30 plants or 12.5 tubers per plant. Eva yielded 112 tubers/30 plants or 4 tubers per plant and Michigan Purple yielded 90 tubers/30 plants or 3 tubers per plant.

The skin colors were excellent on all varieties. To take advantage of the skin colors of the potatoes and the 4th of July holiday we constructed an American flag (3' wide by 5' long) and took pictures of it. We also had the photographer from the College of Agriculture come out and take some pictures of the flag. These potatoes lend themselves to marketing in small baskets, in attractive displays, in poly bags, and can command a high price. If a person had a 17' by 96' high tunnel and grew these varieties alone in 4 rows at the same spacing the yields would be Red Pearl-1,104 lbs. of potatoes, Eva- 920 lbs. of potatoes and Michigan Purple- 1,278 lbs. of potatoes. The price of specialty potatoes at the food stores, according to a chart presented by the National Potato Promotion Board was .86/lb. I believe in the local direct markets that 1.50/lb. would be reasonable. If we use that figure then the gross return would be for Red Pearl-\$1,656, Eva-\$1,380 and Michigan Purple-\$1,917.

Once the potatoes are harvested then a cucumber crop could be planted, followed by a fall broccoli crop. One could even do a late season crop of potatoes in the high tunnels. Have a great 4th of July. I bet that Thomas Jefferson used a high tunnel in order to have red, white and blue potatoes for his 4th of July gathering.

Silver Scurf on Potatoes

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

Description and Symptoms

Silver scurf is a disease caused by the fungus *Helminthosporium solani*. It attacks only the skin on potato tubers, causing unattractive blemishes. Silver scurf does not attack the vine or roots of the plant. The disease can result in losses in quality of fresh market products, and the increased water loss in storage makes the hard to peel tubers unacceptable for processing.

The disease is considered to be mostly seed borne. Lesions are usually not detected on seed at planting because cold storage temperatures inhibit the growth of the fungus. Lesions are noticeable at harvest on the stem end of tubers, which supports the theory

that the disease is transferred from infected seed.

The first disease symptoms on the daughter tubers begin as small tan or brown spots that expand and develop a silvery sheen. The silvery appearance occurs when periderm cells die and create air pockets in these cells. Eventually the outer cell layers slough off giving the tuber surface a "scurfy" appearance.

The lesions remain small while in the soil, but they can enlarge and spread under the right conditions in storage. After the mixing of healthy and infected tubers has occurred during harvest, new infections will appear in storage especially under warm, moist conditions. The new symptoms begin as black circular lesions on the tuber that eventually spread and coalesce, disfiguring the appearance of the potato. Unlike the infections that occur in the field, these lesions may produce spores or conidia allowing for further spread of the disease in storage.

Concerns

Silver scurf has become more of a substantial disease in potato production since research has now proved that most isolates are resistant to the most common control method TBZ (thiabendazole) fungicides. The ineffective control measures, lack of resistant potato cultivars, and higher quality standards have led to the increased importance of this disease. Although there are currently no cultivars resistant to silver scurf several breeding programs are underway to develop more resistant plants using traits found in wild potato species.

Current Control Practices

Seed treatments at planting are an effective control and there are several fungicides registered for use on potatoes against silver scurf. Some of them include Dithane, Tops MZ, and Maxim MZ. Research is also being done to determine the possibilities of more chemical controls. There are several cultural methods that can be used to control silver scurf spread. Contaminated seed is the main source of infection but the silver scurf fungus can survive from season to season in dead and decaying material in the soil. It is not known to survive for more than one year though, so crop rotation can help to eliminate any infection from the field. When the possibility of seed borne infection exists, it is important not to plant too early or harvest too late. Delayed harvest after vine kill will increase the severity of the disease. At harvest the mixing of healthy and infected tubers rapidly spreads the disease. Frequent cleaning of harvesting and handling equipment, especially between fields, can also reduce disease spread.

Storage areas should be thoroughly disinfected and dried out before harvest. Free moisture should be eliminated as much as possible since this promotes growth and spread of the fungus. Lower relative humidity and good ventilation is key early in storage. By using a combination of these methods the severity of silver scurf can be reduced, and the spread of the disease can be controlled.

References:

Errampalli, D., J.M. Saunders and J.D. Holley. 2001. Emergence of silver scurf (*Helminthosporium solani*) as an economically important disease of potato. Plant Pathology 50:141-153.

Haux, C.S. 1998. Integrated Management Practices Control Scurf. Valley Potato Grower. Secor, Gary. Silver Scurf of Potato.

http://www.ndsu.nodak.edu/instruct/gudmesta/lateblight/image3_3.html

Shetty, Kiran K., Mary Jo Fraiser, Gale E. Klein Kopf, Phillip Nolte. Silver Scurf.
<http://www.kimberly.uidaho.edu/potatoes/ssmanage.htm>

Upcoming Meetings

Bill Lamont, Department of Horticulture

Local

August 20, 2001: Cambria County Regional Potato Field Day. Ron Hostetler, 814-472-7986.

Regional

August 3, 2001: Pennsylvania Vegetable Growers Association In-State Tour. Contact: Bill Troxell (717) 694-3596

January 29-31, 2002: Mid-Atlantic Fruit and Vegetable Growers Convention, Hershey, PA. Contact Bill Troxell (717) 694-3596.

July 20, 2002: Pennsylvania Association for Sustainable Agriculture (PASA) Fruit Day, Horticulture Research Farm, Penn State University, Rock Springs PA. Contact Kate Francis (814) 349-9856.

National

July 8-10, 2001: Potato Marketing Association of North America Summer Meeting, Loyalist Country Inn, Summerside, Prince Edward, Canada. Contact: 800-361-2668,

July 11-14, 2001: National Potato Council Summer Meeting, Loyalist the Best Western Lakeway Inn, Bellingham, WA. Contact: Amy Sherman (303) 773-9295.

July 22-25, 2001: American Society for Horticultural Science 98th Annual Conference and Exhibition, Sacramento, CA. For more info cal 703-836-4606.

August 19-21, 2001: North America Strawberry Growers Association Summer Tour, Nova Scotia, Canada. For more info call 517-548-4990.