The Vegetable and Small Fruit Gazette

Vol. 5, No. 4- April 2001

Horticulture Department
The Pennsylvania State University

In this Issue:

Tip for the Month: "People who do the world's real work don't usually wear neckties."

Comments from the Editor

Bill Lamont, Department of Horticulture

Winter seems to want to hang on this year but I am sure that spring is just around the corner. I know that growers are anxious to plant early sweet corn under plastic. Dr. Tim Elkner and I will be headed to India on April 7 and returning on April 17th. We are going to consult with our Indian counterparts on the potential to use of high tunnels as temporary housing for the recent earthquake victims and then they can use them to grow crops. It is an exciting project and we will report our experiences in future issues of the Veg and Small Fruit Gazette. I would encourage those that are interested in participating in these short term projects to make sure that your passport is up to date and if you have never had a passport to go ahead and get one. I can see more of these

opportunities arising in the future, so be prepared to travel outside the United States. I want to thank Tim Elkner for his excellent article on "A Possible Way to Increase Yields in High Tunnel Tomatoes ". Donít forget to check the schedule for Agent Articles listed below. 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

April	Scott Guiser
May	Laura McNutt
June	Tom Butzler
July	Dwane Miller and Jim Welshans
August	Eric Oesterling
September	Ron Hostetler
October	Mary Concklin
November	John Esslinger
December	Andy Muza

A Possible Way to Increase Yield in High Tunnel Tomatoes

Tim Elkner, Extension Agent, Lancaster County

Pollination is known to be very important in the size of individual vegetables and ultimately, yields of vegetable crops. Tomatoes are considered self-pollinating since pollen from an individual flower can fertilize itself and result in the development of a fruit. However, some mechanical method of shaking the pollen from the anthers is necessary to result in pollination. In the field wind accomplishes this task while in greenhouses either bumblebees or vibrators are used. What about pollination of tomatoes in high tunnels? You may have relied on wind to accomplish this task when the sides of the tunnels were rolled up for ventilation. However, a period of cool weather early in the season may result in the sides being kept lower, reducing or preventing wind pollination. Recent research conducted in Louisiana suggests a way to help the pollination process and potentially increase yields and tomato quality inside tunnels.

Studies were conducted in 1994, 1995 and 1997 in the field using an air blower to assist natural wind pollination of tomatoes. The cultivars *Celebrity, Sunny* and *Heatwave* were planted in the field at normal establishment time using standard cultural practices (black plastic, trickle, etc.). Air-blower treatments were started when the first flowers opened and continued for four weeks. Control plants received no treatment except natural wind pollination. The air blower was a standard portable unit with a gas engine. The blower treatments were applied every other day about noon on sunny days by using the blower (run at high speed) to vibrate the flower clusters. The end of the blower was held about 12 inches from the plants and the airstream was directed toward the clusters for about two seconds.

Tomatoes were harvested at the pink stage three times per week for three to four weeks. The fruit were sorted into marketable and non-marketable categories at each harvest. All the tomatoes were counted and weighed and then 50 fruit from each category were individually measured for weight and diameter. In 1997 the number of seeds per tomato was also determined on tomatoes in the 50 fruit sample.

Marketable and total yields of tomatoes were greater each year and culls were lower in 1994 and 1995 for all varieties in the air blower assisted treatment. Early yields were greater in 1995 and 1997 and fruit weight, diameter and number of seeds per fruit were greater all years for the air blower treatment as well. These results indicate that, under favorable conditions for pollination, there was still a beneficial effect on yields from vibrating tomato plants with an air blower. This effect could potentially be greater under conditions that would reduce natural pollination – such as the blocking of normal wind movement inside a high tunnel.

As the researcher noted, pollinating large fields of tomatoes with the handheld blower is not realistic. However, the smaller sized plantings of tomatoes found inside a high tunnel might benefit from this treatment, especially if early yields can be increased. Traditionally, the first tomatoes harvested bring the highest prices. This higher return should more than cover the increase in production costs associated with using a blower. I encourage you try this simple treatment on your high tunnel tomatoes this season to potentially increase fruit quality, yields and profit.

Websites for Sustainable Practices for Vegetable Production in the South

Bill Lamont, Department of Horticulture

These websites come from Dr. Mary Peet, North Carolina State University. They are excellent resources on sustainable and greenhouse production.

Sustainable Practices for Vegetable Production in the South:
http://www2.ncsu.edu/sustainable/

Vegetable Crop Production HS431: http://www.cals.ncsu.edu/course/hs431/

Information Resources for Greenhouse Vegetable Production (HIL32-A):
http://www.ces.ncsu.edu/depts/hort/hil/hil-32-a.html

Propane Burner Source for High Tunnels

Mike Orzolek, Department of Horticulture

Master Sales, 1251 Mound Ave., Grand Rapids, MI 49504-2672 phone toll free1-888-917-2244 or FAX toll free at 1-800-791-8595 sells National Riverside Universal Portable Infra-red Radiant Heaters which are ideal for nighttime temperature management in high tunnels. Master Sales offers several models ranging from 11,000 to 44,000 BTUís/hr. at a cost ranging from $69.00 to $193.00. The models have either a single or up to a 4 burner heater which includes a tank rim mounting bracket, 30" hose and 28" WC regulator w/POL. The 22,000 BTU heater will burn for approximately 17 hours on a single 20 pound tank of propane. The-20 pound propane tanks are not included in the heater cost and have to be purchased separately. The Penn State Center for Plasticulture High Tunnel Research and Education Facility has purchased 6 of the 22,000 BTU units for evaluation this Spring.

Disease Control for High-Tunnel Vegetable Culture

Alan A. MacNab, Department of Plant Pathology

A. Introduction

Although a high tunnel is not a greenhouse, similarities between the two suggest that disease control programs should be similar for both. Successful management of disease on vegetables grown under high-tunnel culture must focus, as possible, on the same control techniques used in other systems. Specific control measures include crop rotation, use of resistant varieties, use of healthy seed and transplants, control of insect vectors and weed hosts, sanitation practices, manipulation of the environment, and the use of seed treatments, fungicides and soil fumigants. Some methods result in eliminating or reducing the amount of effective inoculum present at the beginning of a crop cycle. Other methods influence the number of disease-inoculum production cycles during the crop cycle. Since relative importance of the initial inoculum level, and the number of inoculum-production cycles varies with different diseases, relative importance of specific control measures also varies. In most cases, several appropriate methods must be used together if one is to attain a desired level of control.

B. Some Basic Control Methods

General: Provide the best conditions possible for plant growth. Any condition that slows growth of plants will favor disease by resulting in a longer time between plant establishment and final harvest. As this period of time increases, the chance for disease development increases.

Crop Rotation: Although relocation of high-tunnels to fresh ground likely will not occur often due to the effort and expense required, adequate rotation is important. If one has several high

tunnels, rotation of crops among the units may be adequate. If soil-borne pathogens reach an unacceptable level, it may become necessary to fumigate the soil or to move the high-tunnel to a new area.

Disease Resistant Varieties: Whenever possible, grow varieties that are resistant to diseases of concern. Sometimes use of resistance is the only practical method of control. At other times, resistance may slow disease development so that use of additional methods can result in acceptable control.

Disease-free Seed and Transplants: Do everything possible to start a crop with disease-free seed and transplants.

Insect Vectors and Weeds: Some disease pathogens survive in or on weed hosts, and some are spread to crop plants by insects. Therefore, eliminate weeds and minimize insect populations in and near high tunnels.

Sanitation Practices: Immediately remove and destroy diseased plant tissue, any tissue pruned from plants, and any cull fruit. Eliminate any unnecessary movement of workers between field production areas and high tunnels, and avoid moving from a high-tunnel containing a diseased crop to another high tunnel containing a disease-free crop that is susceptible to the disease. When harvest is complete, immediately pull plants including as much of the root system as possible; then remove and destroy all plant residue from the high tunnel. Do not allow volunteer plants and weeds to grow in the high tunnel at any time. These materials are a source of pathogens that could affect the next crop.

Manipulation of the Environment: Manage environmental conditions within high tunnels so that conditions that favor the plant are maximized, and conditions that favor disease are minimized. Try to minimize the length of time that relative humidity is above 90% since this condition promotes a number of diseases. To accomplish this, provide some ventilation as early and as late as possible during daylight hours. Sometimes it will be important to provide some ventilation to reduce relative humidity even though some heat, useful for crop growth, will be sacrificed. Insure adequate water drainage around high tunnels to make sure water does not flow or seep into the high tunnel. Flowing water can carry pathogens into a high-tunnel. And wet soil promotes development of some root diseases and blights.

Use of Soil Fumigants and Fungicides: Adequate rotation, use of resistant varieties, and good sanitation should minimize the need for soil fumigation and for most fungicides. Fungicides likely will be needed to control a few diseases such as powdery mildew of cucurbits, and may be needed to control powdery mildew and late blight of tomatoes.

C. How important will disease be under high-tunnels?
Most foliar and fruit diseases should be less severe under high-tunnel culture than under outdoor culture. This is because, under the tunnel, the time period that leaves and fruit are wet is considerable shorter than for plants grown in field-culture. Night-time dew formation is minimized because radiational cooling of plant surfaces is slowed by the tunnel material. And most disease pathogens require water on plant surfaces in order to get established in the plant

tissue.

In contrast to most foliar and fruit diseases, the powdery mildew diseases will be more important under high tunnels than outdoors. These diseases are favored by dry plant surfaces. Although powdery mildew development still is encouraged by high humidity, some powdery mildew fungi can penetrate plant tissue when relative humidity is as low as 46%. In regular field culture, the powdery mildews can be discouraged by presence of water on plant surfaces so since this occurs less under high tunnels, the powdery mildews are expected to appear earlier and become more severe under high tunnels.

D. Powdery Mildew on High-Tunnel Crops

For high-tunnel vegetables, two powdery mildews that should be anticipated are cucurbit powdery mildew and tomato powdery mildew. Even though they have the same common name (powdery mildew), they are caused by different fungi which are specific for cucurbit-related plants or for tomato-related plants.

Several fungicides are labelled for control of powdery mildew on these crops. Where systemic fungicides are used, the best programs will involve alternating materials that have different modes of action.

E. Cucurbit Powdery Mildew Control

For control of powdery mildew on cucurbits, especially on susceptible varieties, it likely will be necessary to follow a strict preventive program. For cucurbit powdery mildew, considerable concern has been expressed regarding the potential for the fungus to develop resistance to some fungicides. Three currently labelled fungicides that appear to be most effective for powdery mildew control are two strobilurin fungicides (Quadris and Flint) and the unrelated fungicide, Nova. Each of these three fungicides has some systemic properties, and this results in improved control, especially on the lower leaf surfaces. To minimize the chance for development of fungicide resistance, it is imperative that growers follow fungicide resistance management strategies listed on the labels. When these fungicides are used, applications should begin as soon as the threat of disease occurs (when powdery mildew is anticipated or has been detected nearby), one of the strobilurin fungicides (Quadris or Flint) should be alternated with an unrelated effective material such as Nova, and no more than 7 days should be allowed between the applications. Note that Bravo, a fungicide that provides good protection for powdery mildew when coverage is adequate, acts as a protectant in a non-systemic manner, and is labelled for use for field-grown cucurbits. The label notes that Bravo is NOT to be used on greenhouse-grown crops.

F. Tomato Powdery Mildew Control

For tomato powdery mildew, little concern has been expressed about development of resistance to fungicides; however, fungicide resistance could develop, and therefore, it is important that growers follow all fungicide resistance management practices listed on labels. For tomato powdery mildew, growers must be vigilant for early symptoms so that a control program can be started as soon as disease first appears. If the disease is determined to appear the same time each year, control will be most successful if started just before disease is expected to appear.

G. Some Fungicide Label Information

For convenience, some critical information about some fungicides, and safe use of these fungicides, is summarized in the accompaning table. If fungicides are applied, we stress that sides of the tunnel must be open to facilitate adequate ventilation, and that the applicator move from the down-wind to the up-wind area of the tunnel during the application.

Crop, disease and fungicide	Post-Harvest Interval in days (PHI)	Re-entry interval in hours (REI)	Rate/A/applic. (1A= 43,560 sq. ft.)	Total amount /A/season	Plant-back Interval for non-labeled crops**	Personal protective equipment**
Curcurbit powdery mildew						
Flint*	0	12	1.5-2 oz	8 oz	30-day	Clothing Footwear WP-Gloves
Nova*	0	24	2.5-5 oz	1.5 lb	30-day	Clothing Footwear CR-Gloves Eyewear
Quadris*	1	4	11-15.4 fl. oz.	1.92 qt.	45-day	Clothing Footwear WP-Gloves
Tomato powdery mildew						
Nova*	0	24	2.5-4 fl. oz.	1.25 lb.	30-day	Clothing Footwear CR-Gloves Eyewear
Quadris*	0	4	5-6.2 fl. oz.	1.0 qt.	45-day	Clothing Footwear WP-Gloves

* Alternate Flint or Quadris (related strobilurin materials) with an unrelated material such as Nova.

** Crops not listed on the pesticide label can not be planted in an area treated by the pesticide until the "plant-back interval" has expired. Vegetable, small fruit, and herb and spice crops currently on pesticide labels mentioned here are as follows:

Flint: Cucurbits.

Nova: Asparagus, blackberry, cucurbits, currant, gooseberry, peppermint, raspberry, spearmint, snap beans, strawberry, and tomatoes.

Quadris: bulb vegetables

(garlic, leeks, onions, bulb onions, green Welch onions, shallots), carrots, celery, corn, cucurbits (cantaloupes, chayotes, Chinese waxgourds, cucumbers, gourds, honeydews, melons, bitter melon, balsam apple, muskmelons, watermelons, pumpkins, squash, zucchini), leafy vegetables (amaranth, arugula, cardoon, celery, chervil, edible chrysanthemum, coriander leaves (cilantro), corn salad, cress, dandelion, dock, endive, fennel, lettuse (head and leaf), orach, parsley, purslane, radicchio, rhubarb, spinach, Swiss chard), potatoes, tomatoes, root and tuber crops not noted previously [beets, burdocks, cassavas, celeriac, chervils (turnip rooted), chicory, dasheen (taro), ginseng, horseradishes, parsley, parsnips, radishes, rutabagas, salsafies, skirrets, sweet potatoes, taniers, turnips, and yams (true and bean)], and tuberous and corm vegetables not noted previously [arracacha, arrowroot, artichokes (Chinese and Jerusalem), canna, chufa, ginger, leren, turmeric].

*** Personal protective equipment:
Clothing = Long-sleeved shirt and long pants.
Footwear = Shoes plus socks
WP-Gloves = Waterproof gloves.
CR-Gloves = Chemical-resistant gloves made of any waterproof material.
Eyewear = Protective eyewear.

H. Conclusion
A vegetable disease control program for high-tunnel cultural systems must include methods including crop rotation, use of resistant varieties, use of healthy seed and transplants, control of insect vectors and weed hosts, sanitation practices, manipulation of the environment, and the use of seed treatment fungicides and soil fumigants. Many foliar and fruit diseases should be less severe under high tunnels than on crops grown in field-culture. One major exception will be cucurbit powdery mildew, which is expected to be more challenging to control under high tunnels.

Biological Control of Aphids with *Aphidius ervi*

Cathy Thomas, Integrated Pest Management Program
Bureau of Plant Industry, Pennsylvania Department of Agriculture

The aphid that is usually found to infest vegetable crops, especially tomatoes (Solanaceae crops) is potato aphid (*Macrosiphum euphorbia*). Other species such as green peach aphid or melon aphid are also pests, especially if tomatoes are grown with ornamental crops.

An effective biological control for potato aphid is *Aphidius ervi* (Aphelinidae), a parasitic wasp that attacks larger species of aphids. *Aphidius colemani*, another aphid parasite can be used for control of green peach aphid. Aphid parasites are host specific. In other words , identify the aphid species in your crop in order to apply the appropriate biocontrol!

Aphidius ervi can be introduced as a preventative method when the crop is installed, or begin introductions as soon as aphids appear. *Aphidius* is very efficient at searching for isolated

colonies of aphids. Crop monitoring for pest and disease development should begin at the seedling stage and continue weekly until the end of the crop cycle. Detect and treat hot spots on a timely basis to prevent rapid colonization of aphids.

Life cycle of *Apidius ervi*

Aphidius ervi is a long (4 , 5 mm), slender, and black parasitic wasp. When the female wasp has found a suitable host, she bends her abdomen under her legs and injects an egg in the aphid with her ovipositor. Aphids may continue feeding and reproducing for several days, until the egg hatches. When the egg hatches, the *Aphidius* larvae starts to eat the aphid from the inside and the larva completes its life cycle in the aphid body. Effective parasitization is obvious when the aphid swells and hardens into a leathery, brown colored "mummy". The parasite completes the life cycle by emerging as an adult through a round hole at the rear of the mummy. Mummies can usually be seen 14 , 21 days after the first introduction is made. Development time is dependent upon the temperature and other environmental factors. One female wasp lays about 350 eggs in a lifetime. Most of these eggs are laid in the first five days after introduction.

Application

- Reduce or eliminate the use of toxic or residual pesticides before introducing *Aphidius* or any other natural enemy.
- Release *A. ervi* on a preventative basis or introduce at higher rates (curative) when aphids are first found.
- When aphids are first observed, introduce *A. ervi* at a curative rate for 3 introductions at a 1 week interval.
- Monitor weekly for the brown mummifed aphids. When 80% of the aphids are parasitized, a parasite/prey balance has been achieved and no further introductions are needed. Augment with further introductions as required since migration from outside may occur in warmer months.
- When pruning leaves, check for parasitized aphids (brown mummies). If mummies are present keep these leaves in the greenhouse until new parasites hatch.
- Discuss release rates with your biocontrol advisor.
- When aphid populations are heavy, the production of honeydew can interfere with the searching ability of the parasite. Heavy aphid populations can be reduced with soft, compatible compounds or by using ladybeetles.
- Release wasps between leaves (or near hot spots) in the morning or evening, not in direct sunlight.
- Protect parasites from ants. Ants feed on honeydew and thus protect the aphid colonies from natural enemies. Install traps for ants.
- Activity of parasites is reduced at high temperatures (above 86°F).
- *Aphidius* can stored up to two days at 42 to 46° F, in the dark.

Aphidius ervi products

Aphidius is usually shipped as adults or mummies.

Kopperts , ERVIPAR, www.koppert.nl , 734-641-3763
Biobest , Ervi , system, www.biobest.be or www.bugsandbees.com , 303-661-9546
Syngenta , Aphiline e, Syngentabioline.com, 805-986-8265

Benefits

- Long lasting form of aphid control
- Can be introduced preventatively
- Excellent searching ability

In the next issue of Bug vs. Bug, I will be discussing another parasitic wasp, *Aphelinus abdominalis*. If you have comments or other issues you would like to see addressed in this column please phone or email me.

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

That's a Berry Good Question

Kathy Demchak, Department of Horticulture

Q. Last month, you updated some information on conventional pesticides for small fruits. Could you also cover information on some of the newer pesticides, such as Oxidate, that could be used by organic growers? (paraphrased from a conversation with Richard T., North Slope Farm, PA.)

A. Unfortunately, for many of these materials, there simply is little information from studies published by sources other than the companies. So, I must make it clear that I have little data on how well most of these products work. If anyone would like to offer comments in that regard based on their experiences, please send them to the address below. If you're a certified organic grower, please check with your certifying agency before use to make sure these materials are allowable. Only materials that have come on the market for small fruits relatively recently are covered here. I won't cover materials that are strains of bacteria or fungi, as that could take up the entire newsletter.
OxiDate (hydrogen dioxide, BioSafe Systems) is labelled for use on all small fruit crops for control of Botrytis, downy mildew, fruit rot, leaf blight and powdery mildew. According

the label, it can be used both curatively at a 1:100 dilution for 1 to 3 consecutive days, then on a 5 to 7 day schedule after that. For preventitive use, use a 1:100 dilution on a 5-day schedule starting when the plants are small, then continue with a 1:300 dilution.
Armicarb 100 (potassium bicarbonate, Church & Dwight) is labeled for use on all small fruit crops. The main benefit of this material seems to be in the area of powdery mildew control, though the label lists a number of other diseases. The rate is 2.5 to 5.0 lbs per acre, applied at 1-2 week intervals. According to a company representative, attempting to cut down on costs by cutting the rate will result in compromised control, and the material should be reapplied if washed off. It works by contact, so good coverage is a must.
Valero (cinnamaldehyde, Mycotech Corp.). This label was expanded to include strawberries, raspberries, blackberries, blueberries and currants for control spider mites and powdery mildew. It works by contact, so good coverage is necessary. If the material dries too fast, control is negatively affected, so the manufacturer recommends spraying early or late in the day when humidity is higher, and also recommends spraying a small portion of the planting first to check for phytotoxicity.
Surround (kaolin, Engelhard Corp.) is for processing brambles and blueberries for use as a repellent and protectant against Japanese beetles, leafhoppers, and thrips. The rate is 12.5 to 50 lb/acre at 7-21 day intervals (depending on crop growth rate), starting after fruit set.
Neemix (azadirachtin, Thermo Trilogy) is labeled for all small fruit crops for control of whiteflies, aphids, leafminers, leafhoppers, and leafrollers. Rates and timing intervals vary with the insect. It interferes with molting, and therefore kills the larval stages only. It also can repel and deter the adults from feeding, but in some cases this effect was temporary.
Trilogy (neem oil extract, Thermo Trilogy) contains a number of compounds with some activity against a ranges of insects, mites, and diseases. It is best used before outbreaks occur. Rates vary with the target.
Messenger (harpin protein, Eden Bioscience) binds with the plant leaf surface, making it behave as though it is under attack by a disease, thereby triggering its defenses and affecting other physiological processes as well. It is labeled for use on all small fruit crops at rates of 2.25-13.35 oz/acre.

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.

Error about Ronilan on Raspberries

Kathy Demchak, Department of Horticulture

Error.....Error.....Error.... Ronilan on Raspberries
Oops, apparently I was living in the wrong year. In last month’s newsletter, I made the statement concerning Ronilan "Ronilan can no longer be used on raspberries. Even though you may have a package labelled for use on raspberries, it can no longer be used on raspberries." Well, that would be true if this were 2002, but it isn’t yet. Ronilan can be used on raspberries until Sept. 30, 2001. Thanks to Gar Thomas of BASF for

catching this. I'm glad someone's watching. My apologies for any confusion.
Updates to Pesticide Tables in Commercial Berry Production Guide, 2000-01.

Changes to the Pesticide Tables in the Commercial Berry Production and Pest Mgt. Guide for 2000-01

Kathy Demchak, Department of Horticulture

Here are changes to the Pesticide Tables in the Commercial Berry Production and Pest Mgt. Guide, 2000-01. You can write these in, if you have the guide, or get updated tables from your county extension office. The new tables will be mailed out to county extension offices around the middle of April. As always, consult the label before making pesticides applications.

Table 7. Pesticides for strawberry disease and insect control.
1) For leaf spot, and powdery mildew, add Nova 40W at 2.5-5.0 oz/acre, applied up to the day of harvest.
2) For cyclamen mites, the current label for Kelthane 50WSP lists the rate on strawberries as 3-4 lb/acre, not 3-4.75 lb/acre as when the guide was written.
3) Diazinon was deleted from the label for strawberries in an agreement between EPA and Syngenta. Existing stocks already labeled for strawberries may be sold and used.
4) For strawberry root weevil adults, Malathion 8F is labeled for the use as listed, but not the 57EC formulation. For strawberry root weevil larvae, however, the Malathion 57EC label does have the use for pre-plant incorporation as listed.
5) For sap beetles, add Danitol 2.4EC at 16-21.3 oz/acre, with a 2-day PHI.
6) For two-spotted spider mites, add Savey 50WP at 6 oz/acre, with a 3-day PHI. Use only once per year.

Table 8. Pesticides for strawberry weed control.
1) Select (clethodim) was recently labeled for post-emergent grass control on strawberries. I don't yet have information on the rates and timing, but will pass this along when I get it.
2) Part A. The transplant year. The timing of treatment for Dacthal should read "at transplanting".
3) Same section, add Devrinol 2E at 1-2 gal/acre for the use "After adequate numbers of runners have rooted or in late fall."
4) Part B. Established strawberry beds. The timing of treatment for Dacthal should simply read "Fall or early spring".

Table 16. Pesticides for bramble disease and insect control.
1) For the period from prebloom to bloom, add for orange rust, Nova 40W at 1.25-2.5 oz/acre. The timing of treatment should read "While orange pustules are visible, on a 10-14 day schedule until temperatures are above 75 degrees." This is purely a protective treatment for plants that are not infected. Plants which already have these pustules are infected, cannot be cured, and should be removed. A second infection period occurs when temperatures start to decline in late summer through frost, so treatment may be repeated then. Because this is the only currently labeled material for

this use in PA, resistance development is of concern. More details on orange rust will be presented in next month's newsletter. The above is condensed from information written by Mike Ellis at Ohio State.
2) Under Bloom-Diseases, for powdery mildew control, add Nova 40W at 1.25-2.5 oz/acre, applied up to the day of harvest.
3) Ronilan can be used on raspberries only until Sept. 30, 2001 if the package you have is labeled for that use.

Tables 17. Pesticides for bramble weed control.
No changes.

Table 22. Pesticides for blueberry disease and insect control.
1) Under Bloom - Insects. Add cherry fruitworms and cranberry fruitworms, Confirm 2F at 16 oz/acre (14-day PHI). This is another material that can be used during bloom, besides Bt.
2) Repeat this under Post-pollination - Insects, with the timing of "At petal fall".
3) Add Confirm 2F (same rate) to controls for leafrollers.
See the label for additional details concerning timing of use for Confirm.

Table 24. Pesticides for blueberry weed control.
No changes.

Potato Musings

Potato Sessions at the Mid-Atlantic Fruit and Vegetable Meeting

Bill Lamont, Department of Horticulture

Mark down the dates on your long-range planner for next years Mid-Atlantic Fruit and Vegetable Convention as January 29, 30 and 31, 2002. The potato sessions will be organized similar to this year starting at 1:30 PM on January 29th and then running all day on January 30th. See you next year in Hershey. If you have suggestions for topics for next year, contact Dr. Bill Lamont, Program Chair for the Potato Program.

Handling Potato Seed

Bill Lamont, Department of Horticulture

When it is time to cut seed, warm it up to 55-600 F before handling it (a few degrees per day to prevent condensation on the tuber surface). This minimizes bruising of the seed tubers, which can lead to increased d rot and stand establishment problems. Do not begin the cutting process until all seed handling and cutting equipment is thoroughly washed and disinfested. Quaternary ammonium compounds, sodium hypochlorite (household bleach) and calcium hypochlorite are all effective disinfectants. The activity of disinfectants greatly reduced if soil or organic matter is not removed from the surface before treatment. Donít forget to clean trucks and conveyors used to handle seed. Cleaning the equipment between seed lots may seem to be a waste of time. However,

the cutting process is a very efficient way to spread diseases from one seed lot to another, and it may not be obvious that a seed lot has a disease problem until it is too late. If you come across a disease problem in the seed while cutting, shut down the cutting operation and clean the equipment, then discontinue the use of that seed lot or attempt to grade of diseased tubers before cutting. Above all, donít mix seed lots during the cutting and planting process. Maintaining the integrity of the seed lot is essential, not only to minimize disease losses, but also to allow you to obtain compensation if there is a problem.
Planting practices can also affect the losses associated with seed decay problems. Seed planted into warm, well-drained soil will emerge faster. Planting shallow and lightly cultivating to break up compacted soil will also increase the temperature and improve the oxygen levels around the seed piece, which will speed plant establishment.

Useful Websites for Potatoes

Bill Lamont, Department of Horticulture

Dr.Alexander D. Pavlista, from the University of Nebraska, UNL-PREC, 4502 Avenue I, Scottsbluff, NE 69361, phone: 308-632-1240, fax: 308-632-1365, and e-mail: apavlista@unl.edu has two websites that would be of special interest to county extension personnel and to growers. His Nebraska Potato Eyes website http://www.panhandle.unl.edu/peyes.htm has been around for several years and is an excellent newsletter. Alex recently launched a new website for Potato Educational Guides located at http://www.panhandle.unl.edu/potato/. He will be adding to this site and it will be a really useful site for finding a wide variety of information on potatoes. I would encourage you to check out both these sites. Additional websites are listed below:

Global Potato News - http://www.potatonews.com
International Potato Center- http://www.cipotato.org
Maine Potato Board- http://www.mainepotatoes.com
Michigan State University- http://www.msue.msu.edu/msue/imp/modc4/51795003.html
National Potato Council - http://www.npcspud.com
Oregon State University - http://www.orst.edu/dept/botany/epp/guide/index/P.html
Oregon State University, Potato Research & Extension , http://www.css.orst.edu/coarc
Potato Association of America - http://www.potato.tamu.edu/variety/paa.htm
Potato Engine - http://www.potatoengine.com/thinkpotato.html
Potato Information Exchange - http://www.css.orst.edu/potatoes/main.htm
Potato Research Online - http://www.potatoresearch.com
University of Idaho - http://www.uidaho.edu/ag/plantdisease/plbstem.htm
European Association for Potato Research (EAPR) -http://www.agro.wau.nl/eapr

---

Monsanto Abandons Potato Research

Bill Lamont, Department of Horticulture

ST. LOUIS, March 21 (UPI) -- Monsanto Wednesday said it has suspended its research into genetically modifying potatoes to concentrate research on four other crops. Spokesman Loren Wassell said potatoes are grown only on 1 million acres in the United States, a far smaller crop than either corn, oilseeds, cotton or wheat.

Upcoming Meetings

Bill Lamont, Department of Horticulture

Regional

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