

## VEGETABLE AND SMALL FRUIT GAZETTE

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Tip for the Month: "Smile-it will brighten the world"

Comments from the Editor  
Bill Lamont, Department of Horticulture

It is hard to believe that the "Fourth of July" holiday is already here. It is a time of picnics and fireworks. It is also a time to pause and remember the sacrifices of the Signers of the Declaration of Independence and other founding fathers who laid it all on the line and those down through the years that have continued to lay down their lives that we may enjoy freedom here in this great country. It is also a great opportunity for marketing vegetables and small fruits, such as your "Patriotic Potatoes"- a bag of early red, white and blue spuds for the true patriot's potato salad. Don't forget to charge a good price for those special potatoes. High tunnels and other season extending technology can help you achieve early and late season production of vegetables and small fruits. Don't forget to check out Dr. MacNab's disease reminders, especially with the weather we have been having recently. The Vegetable and Small Fruit Gazette Team encourages your feedback so that we can better serve your needs and address your concerns.

Use of Genetically Modified Plants (GMP) in Crop Rotation Sequences with Vegetables  
M. D. Orzolek, Department of Horticulture

Within the last 3 years, availability of Genetically Modified Plants, especially field corn and soybeans, has been cited as a major advancement in the production of these field crops. Unfortunately, herbicide resistance of genetically engineered field corn and soybeans is not viewed as an achievement for vegetable growers in the state. Glyphosate (Roundup), imidazolinone (Pursuit, Scepter) and sulfonylurea (Classic, Accent, Beacon,

Harmony, Oust, Ally) resistant field corn and soybean varieties now being grown by many grain farmers can have dire consequences if placed in a rotation with vegetables. With regard to Roundup ready corn and soybeans, while glyphosate does not cause any residual problem, spraying the corn or beans on a windy day near sensitive vegetable crops can be disastrous and result in stunting of the vegetable crop, delay in maturity, reduced yield and in certain severe cases, plant mortality. Postemergence applications of Roundup must be planned in context to the total cropping sequence on your farm and the need to identify locations where significant economic loss can occur with drift from Roundup.

With respect to the postemergence application of sulfonylurea and imidazolinone herbicides, generally the off-target drift may not be as serious a problem as the residual effect from both of these herbicide families. Soil pH levels above 6.8 favor the persistence of sulfonylurea type herbicides that could affect some vegetable crops in rotation. In addition, sulfonylurea herbicides are applied at recommended rates of 0.5 to 6.0 ounces of active ingredient per acre. Any increase in the rates of sulfonylurea herbicides whether for insurance or miscalculation can cause serious residual problems on some vegetable crops. The imidazolinone herbicides will cause similar problems as the sulfonylurea herbicides with the addition that only legumes should follow legumes with the use of imidazolinone applied herbicides. Non-legume vegetables have demonstrated severe stunting planted after an imidazolinone ready soybean crop or after application of Pursuit to labeled crops like peas and snap beans.

Use of herbicide resistant agronomic crops requires more intensive and long range planning for vegetable growers who plant them in their crop rotation programs.

#### Bug Against Bug

Cathy Thomas, Integrated Pest Management Program  
PA Dept of Agriculture

#### Steps to getting started on a biocontrol program

To many greenhouse vegetable growers, the possibility of using biocontrols sounds great. It means that if done correctly he/she can greatly reduce pesticide use that reduces residues on the product, especially near harvest and is a good selling point to your customers. In addition, reduced pesticide applications make the greenhouse safer and allows employees to work in the greenhouse without being concerned about reentry intervals. However, making the transition from relying exclusively on traditional pesticides to a biological control program may seem too difficult. Many PA greenhouse growers are successfully making the transition to biocontrol. The change requires more knowledge of the pest and biocontrol species and a few shifts in management style, but the results are worth it! In the next growing season, consider these steps before initiating a biocontrol program. Managing pests with biological controls requires thoughtful, careful planning and the realization that every crop cycle may present a unique situation. Results are not instantaneous so patience is a must. Hopefully the issues discussed here will minimize some of the pitfalls and risks associated with the adoption of a biocontrol program.

## Getting Started

Start small – As with any new technology, start small. Learn the system in one greenhouse and expand as you gain confidence and knowledge.

No Pesticide Residues – Discontinue using insecticides with residual activity at least one to two months prior to introducing biocontrols. Pesticide residues on plants, and greenhouse coverings can be deadly to biocontrol agents. Consult biocontrol suppliers for information on specific products if you want to be certain about the compatibility of a compound that has been applied.

Soft Pesticides – Consider the use of “soft” or “reduced risk” compounds (i.e. insecticidal soap, ultra-fine horticulture oil, neem compounds) for treating hot spots or pests that are not being controlled biologically. Have products on hand before outbreaks occur. Some biocontrol suppliers sell these products, and can give you compatibility information. If you are unsure about the compound you want to apply, consult your biocontrol supplier before spraying. Some growers find it beneficial to have a sprayer designated for soft pesticides only, avoiding contamination with more toxic insecticides.

Sanitation – Weed management is critical to the success of a biocontrol program both before and during crop production. Weeds serve as reservoirs for pests and diseases and may upset the predator-prey balance you are trying to establish in the crop. It is also critical to maintain a weed free zone around the outside perimeter of the greenhouse for the same reason. Using a herbicide to quickly knock down a well-developed weed population will have pests scrambling for another food supply, which will probably be your crop. Remove weeds and destroy on a continuing basis.

Clean transplants – In many cases, serious pest and disease problems that plague growers throughout the growing season result from purchasing infested transplants. Selection of a reputable grower ensures a quality transplant. Inspect what you are buying! If you are growing your own transplants, follow strict sanitation procedures and inspect seedlings weekly for pest and disease development. Preventing a problem from becoming established can save a lot of time, effort and expense.

Start Early – Begin introductions of biocontrol agents when pest populations are at low levels so that the biocontrol species is not overwhelmed. This can be determined by weekly crop inspection. For example, even though *Encarsia formosa*, a tiny parasitic wasp, is an excellent control for whiteflies, the wasp will not be as effective if it is released too late. This is because high populations of whiteflies produce sticky honeydew that will interfere with the parasitoid’s walking and searching speed and may even cause them to become trapped and die.

In the next issue, I will be discussing biocontrol producers, suppliers, shipping and quality control of biocontrols. Please contact me if there are specific issues you would like to see addressed in this column.

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July Disease Reminders  
Alan MacNab, Plant Pathology Department

Some vegetable diseases will begin to appear in July. Others will get started then although symptoms may not appear until August. In addition to the following notes, controls are presented in the "Commercial Vegetable Production Guide". Identification information is available in the colored publication, "Identifying Vegetable Diseases" which is available from the Penn State Campus at University Park and from most Extension Offices.

#### ASPARAGUS

Rust: Apply fungicide to young plantings, whether "resistant" or susceptible. During the years before harvest is started, and when fern growth becomes heavy relatively early, fungicides can be especially important because of the dense growth.

#### BEANS

Mosaic Viruses: Use resistance to BV-1. Provide good weed control; weeds are a source of bean viruses. Do not plant near clovers; they are a source of bean viruses. Do not make successive plantings in adjacent strips or fields; the few diseased plants that appear in early plantings act as an important virus source for later adjacent plantings.

White Mold and Gray Mold: Recent wet weather will promote this disease in early plantings. Apply protective fungicide sprays where needed. Wet conditions immediately before and during bloom promote disease development. Ronilan provides excellent control. Additional fungicides listed in the Vegetable Guide are Benlate, Topsin M, and Rovral.

#### BEANS, LIMAS

Downy Mildew: During wet weather, when conditions favor disease, use fungicides. See the Vegetable Guide for details.

## BEETS

Leaf Spots: Use fungicides where disease usually occurs.

## CABBAGE:

Fusarium Yellows: This disease is favored by hot weather. When possible, avoid susceptible varieties.

Clubroot: Wet conditions sometimes promote development. Where present, it is too late to apply controls for this year. Determine the source if possible. Then plan rotation, pH adjustment, or Terraclor use (WP only) for next season.

Downy Mildew and Leaf Spots: These diseases become most important late in the season. Where anticipated and warranted, fungicides provide some control. For downy mildew, Ridomil Gold/Bravo 81W (1.5 to 2 lb/A) can be applied at 14-day intervals until 7 days before harvest. Other fungicides for both diseases include Bravo and maneb. Aliette is very good for downy mildew but does not control Alternaria leaf spot.

## CARROTS and CELERY

Leaf Spots: Continue fungicide sprays; they are most important for the remainder of the season.

## CUCURBITS

Bacterial Wilt: Where present, it may be too late to attain control this year. For plants that are free of disease, continue control of the cucumber beetles (bacteria carrier) as long as necessary.

Leaf Spots, Blights, and Powdery Mildew: Use regular fungicide sprays unless varieties are resistant to the diseases of concern. Leaf diseases are of major importance on muskmelons (cantaloupes) during late season. Quadris is a new fungicide that provides especially good control of powdery mildew, downy mildew, and some other diseases; when used, Quadris must be alternated with other fungicides with different modes of action. The following fungicides may be helpful as materials to alternate with Quadris: Bravo provides good control where coverage is good, but since it is not systemic, control can be weak on undersurfaces of leaves. Nova is an excellent material to alternate with Quadris, since Nova also is highly effective for powdery mildew.

Scab: For susceptible varieties, use fungicides when conditions are cool and wet. For cucumbers, use resistant varieties for next year.

Mosaic Viruses: Use resistant varieties. When resistant varieties are

not available, control perennial weeds, plant in large fields, and control aphids.

**Fusarium Wilt:** It is too late to apply controls for this year. For future years, try rotation, resistance when available (eg. Athena has resistance to Races 1 and 2), and if necessary, soil fumigation.

#### EGGPLANT

**Verticillium Wilt:** Follow rotations that avoid susceptible crops for as many years as possible. Where present yearly, consider fumigation where crop value warrants the expense.

#### ONIONS

**Leaf Spots:** Apply fungicides on a regular schedule, especially for those planned for storage.

#### PEPPER

**Mosaics and Virus Spots:** It is too late to affect control for this year. For future years, use TMV resistance, plant in large fields, control aphid vectors, and eliminate perennial weeds near fields.

**Bacterial Spot:** When possible, grow varieties with resistance to bacterial spot. Some varieties are resistant to more than one race.  
Resistant to Races 1, 2, and 3: Boynton Bell, Comendant, Enterprise, X3R Camelot, and X3R Wizard.

Resistant to Races 1 and 2: Admiral

Resistant to Race 2: King Arthur

Resistant to unspecified race: Renegade.

Where present, determine bacterial spot source. Did it come on plants? If present, Spray weekly with a tank mixture of basic copper plus maneb. Plan to rotate to fields not recently planted to tomatoes or peppers.

#### PUMPKIN and SQUASH

**Powdery mildew:** Powdery mildew has been important in recent years. Some new varieties are being developed with various levels of resistance. When powdery mildew is present, fungicides are suggested for summer squash, and for winter squash and Halloween pumpkins. Quadris is a new fungicide that provides especially good control of powdery mildew, downy mildew, and some other diseases; when used, Quadris must be alternated with other fungicides with different modes of action. The following fungicides may be helpful as materials to alternate with Quadris: Bravo provides good control where coverage is good, but since it is not systemic, control can be weak on undersurfaces of leaves. Nova is an excellent material to alternate with Quadris, since Nova also is highly effective for powdery mildew.

## SWEET CORN

Leaf Spots and Rust: Bravo, maneb, and mancozeb are helpful. Where rust is a major concern late in the season, Tilt is the most effective material, followed closely by mancozeb or maneb.

Maize Dwarf Mosaic (MDM): Aphid vector control may help in large fields. Where MDM is present, plan to try tolerant varieties in future years.

## TOMATOES

Bacterial Speck and Spot: If spots are a yearly problem, and symptoms appear on leaves, continue sprays with basic copper plus maneb/mancozeb. Next year, rotate to new fields, use pathogen-free seed, and spray seedlings regularly with streptomycin before transplanting.

Early blight: If early blight is bad, rotate and insure adequate fertility for next years crop; in most cases, fungicides should begin not later than first appearance of early blight symptoms. Quadris is an exciting new fungicide now labelled for use on tomatoes; rates are listed in the Commercial Vegetable Guide. Quadris provides outstanding control of early blight and Septoria leaf spot. Where used, Quadris should be alternated with fungicides having modes of action that are different from those of other materials in the fungicide program.

Late Blight: As of June 30, 2000, to my knowledge, late blight has not appeared in any PA plantings of tomatoes or potatoes. However, late blight was verified on June 23 in one field in New York state. Weather conditions have been very favorable for late blight development. If hotter dryer weather does not occur soon, I expect that late blight could appear in many locations within a couple of weeks. Check the 1-800-PENN-IPM toll free phone line for updates regarding this disease situation. All plantings throughout the state should be protected now with fungicide. Fungicides for late blight are listed in the Commercial Vegetable Guide. For tomatoes, Bravo was especially effective in our 1997, 1998, and 1999 tomato trials.

That's a Berry Good Question!!!

Kathy Demchak, Department of Horticulture

Q. Is anthracnose on strawberries becoming more of a problem than it used to be? (Eric Vorodi, Dauphin Co. Coop. Ext.)

A. Anthracnose in PA has been a problem only in a few cases in past years, and was diagnosed in only a couple of cases this year so far. It's difficult to say whether the

problems found in these cases were simply due to a combination of more moisture than usual together with the use of plasticulture, or whether this could be the start of a trend. Germination of the spores of the disease organisms that cause anthracnose requires nearly 100% humidity. The sometimes-nearly-constantly wet conditions here this year, together with the warmer microclimate of black plastic may have been enough to get the problem going. See the related article below for more information on anthracnose.

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.

#### Anthracnose on Strawberries

Kathy Demchak, Department of Horticulture

Anthracnose is primarily a problem in rainy, warm harvest seasons, and is a much larger problem in the southeastern United States than it is in Pennsylvania. The disease can be caused by several different *Colletotrichum* species, which cause a fruit rot, a crown rot, and a leaf spot, as well as lesions on petioles and runner stolons. Symptoms of anthracnose fruit rot are light brown spots on the fruit which typically turn dark brown or black, then enlarge. Flowers and flower buds can also become infected, and appear to dry out. Symptoms of anthracnose crown rot are rarely noticed until the plants collapse or die, usually in the fall or spring following transplanting during warm weather. When the crown is cut through lengthwise, a brownish horizontal V shape can be found, originating near the base of a petiole. Symptoms of the leaf spot either resemble ink spots, or cause irregular lesions at the tips or margins of the leaves, depending on the species causing the infection. On the runners and petioles, lesions begin as small red streaks, and then turn dark, sunken, and elongated.

The primary source of the disease is infected transplants from the nursery. The plants normally don't show symptoms until after being transplanted to the production field. Inoculum overwinters mainly in infected plants and plant debris. The inoculum is primarily disseminated by splashing water.

Mulching with straw, and using drip irrigation rather than overhead can decrease the spread of inoculum. The use of raised beds on plastic mulch seems to increase the incidence. There is no satisfactory method of chemical control.

#### Potato Musings

Bill Lamont, Department of Horticulture

#### Potato Harvest in the High Tunnels

Seedpieces of two red skin white-flesh potato varieties Dark Red Norland, an early red skin variety and W8475 a specialty red skin potato that only produces B sized tubers were hand planted into a raised red plastic mulched bed with drip irrigation on March 16<sup>th</sup>, 2000 inside a 17' by 36' high tunnel. Fertilizer was broadcast prior to laying the plastic mulch and drip irrigation tape with the small plastic laying machine. The soil temperature at planting was 60 degrees F. The seedpieces were planted 8 inches apart in

straggered double rows on each of four beds. A floating row cover, Tytar was spread over half of the four rows. The row cover was removed approximately four weeks after application. Water was applied through the drip irrigation tape and no disease or insect problems were encountered. Two rows of the potatoes were vine killed on June 16<sup>th</sup> or 90 days after planting to see the effect on growth and skin set of the potatoes. The potatoes were harvested on June 26<sup>th</sup> and weighed.

The use of the row cover definitely speeded up emergence of the potatoes, similar to observations in field studies. The row cover also protected the potatoes from cold temperatures experienced early in the season. The potatoes could have been harvested the beginning of June but we chose to wait until 90 days. The skins were set on all the potatoes, so vine killing at least at this stage did not make that much difference. The results are presented in the table below. The yields would be equal on 36-inch row spacing in the field to 296 cwt. In the tunnels one is looking for high value potatoes for direct sales, thus the “Patriotic Pack” for the Fourth of July”. With the high tunnel this is quite possible. Based on this year’s results we feel that it is possible to even plant earlier in the season and use some of the very thin clear plastic that we have used for sweet corn to really warm the soil up and allow the potatoes to grow right through it. Our total yield was 256 lbs and if one really marketed them and charged \$3.00/ lb that would be \$768 gross or at \$4.00/lb that would be \$1,024. The crop following the potatoes will be ornamental gourds for the Halloween market that will be planted on raised red plastic mulched beds with drip irrigation which will be followed by at late fall crop of spinach.

| Cultivar      | Treatment | Cover     | Yield in lbs | Totals |
|---------------|-----------|-----------|--------------|--------|
| W8475         | vine kill | no cover  | 13.3         |        |
| W8475         | Green     | no cover  | 15.7         |        |
| W8475         | Green     | row cover | 16.4         |        |
| W8475         | vine kill | no cover  | 12.1         |        |
| W8475         | vine kill | row cover | 15.6         |        |
| W8475         | green     | no cover  | 16.8         |        |
| W8475         | green     | row cover | 18.1         |        |
| W8475         | vine kill | row cover | 16.4         | 124.4  |
| D Red Norland | vine kill | no cover  | 17.4         |        |
| D Red Norland | vine kill | no cover  | 17.2         |        |
| D Red Norland | green     | no cover  | 16.5         |        |
| D Red Norland | green     | row cover | 13.1         |        |
| D Red Norland | green     | row cover | 17.1         |        |
| D Red Norland | green     | no cover  | 19.8         |        |
| D Red Norland | vine kill | row cover | 16.3         |        |
| D Red Norland | vine kill | row cover | 14.9         | 132.3  |
| Grand Total   |           |           |              | 256.7  |

Overall plot lengths

2 east rows at 32 feet  
 2 west rows at 31 feet  
 Average row length 31.5 feet  
 Overall yield/ row foot 2.04 pounds per

is

foot

#### Late Blight Alert

Alan MacNab, Department of Plant Pathology

Late Blight: As of June 30, 2000, to my knowledge, late blight has not appeared in any PA plantings of tomatoes or potatoes. However, late blight was verified on June 23 in one field in New York state. Weather conditions have been very favorable for late blight development. If hotter dryer weather does not occur soon, I expect that late blight could appear in many locations within a couple of weeks. Check the 1-800-PENN-IPM toll free phone line for updates regarding this disease situation. All plantings throughout the state should be protected now with fungicide. Fungicides for late blight are listed in the Commercial Vegetable Guide. For tomatoes, Bravo was especially effective in our 1997, 1998, and 1999 tomato trials.

#### Upcoming Meetings

Bill Lamont, Department of Horticulture

#### Local

August 14, 2000. Vegetable and Small Fruit Field Day, Horticulture Research Farm, Rock Springs, PA. Contact: Mike Orzolek: 814-863-2251

August 15-17, 2000. Ag Progress Days, Ag Progress Day Site, Russell E. Larson, Research Center, Rock Springs, PA. Contact: Bob Oberheim 814-692-5262.

#### Regional

January 30-Feb. 1, 2001: Mid-Atlantic Fruit and Vegetable Growers Convention, Hershey, PA. Contact: Bill Troxell (717) 694-3596.

#### National

September 23-26, 2000: 15th International Agricultural Plastics Congress and the 29th National Agricultural Plastics Congress, Hershey, PA. Contact: Pat Heuser, Executive Secretary, American Society for Plasticulture (814) 238-7045.

