



Great Lakes Fruit, Vegetable & Farm Market Expo
DeVos Place Convention Center
Grand Rapids, MI
December 9-11, 2003



Vine Crop

Tuesday afternoon 2:00 pm

Where: Gallery Overlook Room A-B (upper level)

Summary: Pest management, variety selection and other crop management topics are included on this popular program.

Recertification credits: 1 (Private, 1A, 1B)

CCA Credits: IPM(1) CM(1)

Moderator: Michael Brewer, IPM Programs, Michigan State University

2:00 p.m. Disease Management in Vine Crops

- Mary K. Hausbeck, Michigan State University

2:40 p.m. Pollination for Vine Crops

- Zachary Huang, Michigan State University

3:00 p.m. Pumpkin Variety Trials in Ohio

- Robert Precheur, Ohio State University

3:40 p.m. Weed Management in Vine Crops

- Bernard H. Zandstra, Michigan State University
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Disease Management in Vine Crops

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Powdery Mildew

Powdery mildew is a major foliar disease of cucurbits, easy to identify because of the whitish, talcum-like, powdery growth. It develops first on close-set plants on the shaded lower leaves and can infect leaf surfaces, petioles, and stems. Infected leaves usually wither and die. Premature loss of foliage often reduces the size or number of fruit and the length of the harvest period. The fungus can multiply and spread quickly under favorable conditions, because the length of time between infection and symptom appearance is usually only three to seven days. A large number of spores that can infect healthy tissue can be produced in a relatively short time. Spores may be transported rapidly over long distances by air currents.

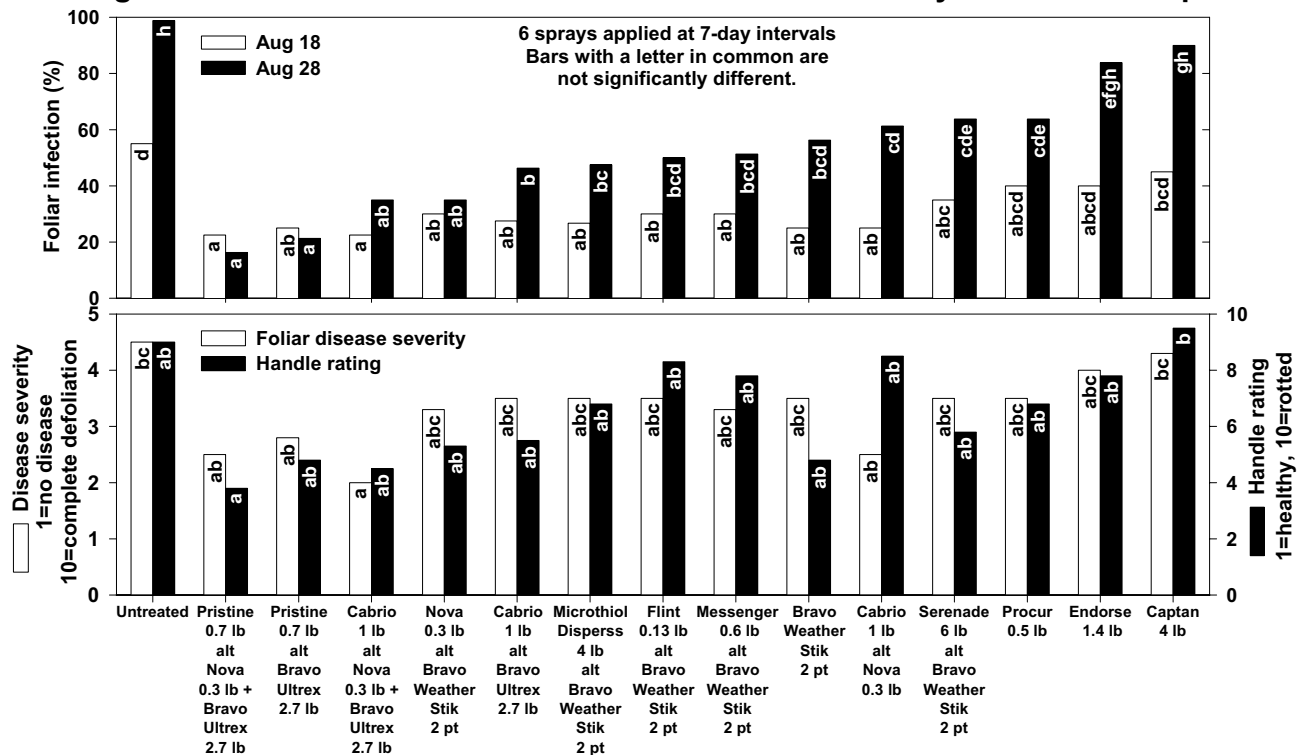
Market quality can also be reduced because of sunburning of the fruit and premature or incomplete ripening, resulting in poor flavor or rind color (pumpkin). In addition, powdery mildew infection predisposes plants to other diseases, such as gummy stem blight. Resistant cultivars are commercially available only for cucumber, cantaloupe, and some pumpkins. Currently, fungicides are the primary control practice for this disease.

Table 1. Products used in fungicide trial.

| Product | Active ingredient | Labeled | Company |
|--------------------------|---|---------|--------------------------------|
| Bravo Ultrex 82.5WDG | chlorothalonil | yes | Syngenta Crop Protection, Inc. |
| Bravo Weather Stik 6SC | chlorothalonil | yes | Syngenta Crop Protection, Inc. |
| Cabrio 20WG | pyraclostrobin (strobilurin) | yes | BASF Ag Products |
| Captan 50WP | captan | no | Arvesta Corporation USA |
| Endorse 2.5WP | polyoxin D zinc salt | no | Arvesta Corporation USA |
| Flint 50WG | trifloxystrobin (strobilurin) | yes | Bayer CropScience |
| Messenger 3WDG | harpin protein | yes | Eden Bioscience |
| Microthiol Disperss 80WG | sulfur | yes | Cerexagri, Inc. |
| Nova 40WP | myclobutanil | yes | Dow AgroSciences LLC |
| Pristine 38WG | pyraclostrobin + boscalid (strobilurin) | yes | BASF Ag Products |
| Procur 50WP | triflumizole | yes | Crompton/Uniroyal Chemical |
| Serenade 10WP | <i>Bacillus subtilis</i> | yes | AgraQuest, Inc. |

Many products were tested in 2003 for their ability to control powdery mildew (see Table 1). To avoid the development of fungicide resistance in the pathogen, fungicides (especially the strobilurins) should be used in alternation. Disease pressure was severe in this trial, with the untreated control having 98.8% of the foliage infected on the last rating date (Figure 1). Treatments that included Pristine in alternation with Bravo Ultrex and/or Nova were very effective and limited foliar infection to <25%. Treatments that limited foliar infection to <50% included Bravo Weather Stik alternated with either Microthiol Disperss, Flint or Nova. Disease was also limited by Cabrio alternated with either Bravo Ultrex alone or Bravo Ultrex + Nova. All other treatments with the exceptions of Captan and Endorse significantly reduced infection compared to the untreated control. Only Cabrio alternated with Nova + Bravo Ultrex (rating=2.0) received a disease rating (1=no disease, 10=complete defoliation) significantly better than the untreated control (rating=4.5). Treatments of Pristine, and Cabrio alternated with Nova limited disease severity to <3.0. Since pumpkin handles are important to the fresh market, treatments were evaluated for their ability to keep the handles healthy. Although no treatments were significantly better than the untreated control (handle rating of 9.0), Pristine alternated with Bravo and/or Nova, and Cabrio alternated with Nova reduced handle rot severity to <5.0. No phytotoxicity was observed by any treatment in this trial.

Figure 1. Evaluation of Fungicides for Control of Powdery Mildew of Pumpkin



Phytophthora Blight

Phytophthora crown, root, and fruit rot is a complex disease caused by the fungus, *Phytophthora capsici*. There are many factors to this disease which makes it a serious threat to the production of many vegetable crops in Michigan (Table 2). Recognizing disease due to *Phytophthora capsici* is not always easy; often the only visible symptom of infection, especially for cucumber plants, is stunting. Because the disease often occurs in the low areas of a field where water accumulates, many growers assume that the stunting is due to the 'water logging' of the roots. Squash and pumpkin plants may have more obvious symptoms, with plants permanently wilted or collapsed prior to dying. Infected plants often have brown to black discolored roots and crowns. The disease is more easily seen on infected fruit, initially as dark,

water-soaked lesions which may develop a distinctive white ‘powdered sugar’ layer of spores on the surface of the fruit. Fruit infection is especially troublesome because the infection may occur days before the symptoms become visible.

Table 2. 10 Reasons why *Phytophthora* blight threatens the Michigan’s vegetable industry.

1. Oospores of the fungus are long-lasting (10 years or more) in Michigan soils. Once soils become infested with the fungus they are taken out of production.
 2. *Phytophthora* has been found in irrigation ponds, a creek and a river, and may be spread readily by water.
 3. *Phytophthora* is favored by warm temperatures and rain, common weather for Michigan.
 4. On many farms, *Phytophthora* has become resistant to a key fungicide used for control.
 5. There are few registered fungicides that can be used. They offer only limited help and add considerable cost.
 6. *Phytophthora* has successfully colonized a number of geographical locations in the state.
 7. Crop resistance has not been identified. Over 200 varieties have been tested.
 8. Methyl bromide, used by fresh market growers for disease control, is scheduled to be phased out in 2005.
 9. Fruit that appear healthy at harvest can break down during transit or on the grocers’ shelves.
 10. Growers for the processing industry cannot invest in high cost management practices.
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Many growers report major crop losses. Integrated control strategies are recommended (Table 3). Fungicides are most effective used with appropriate rotation among products with differing modes of action. Fungicides that may be helpful in protecting plants against crown and fruit rot include Aliette 80WDG, Ridomil Gold/Bravo 76.5WP, Acrobat 50WP, and Gavel 75WP (Gavel is labeled for cucumber, melon, summer squash, watermelon). If the *Phytophthora* has become resistant to Ridomil-based fungicides, than growers should use the other products suggested. Studies have indicated that Acrobat and Gavel can be helpful against fruit rot but should be applied early and frequently, especially when conditions favor disease development (rainy and humid conditions). Excellent coverage of the fruit is critical to ensure maximum disease control. When using Acrobat or Gavel, add in a full rate of copper hydroxide to enhance disease protection. Planting any of the susceptible vegetable crops into a field with a history of *Phytophthora* is risky.

Table 3. Recommended control strategies for *Phytophthora blight*.

| Preplant |
|---|
| Consider a pre-plant banded fungicide application for fields with known problems with <i>Phytophthora capsici</i> . |
| Plant susceptible crops in well drained fields. |
| Utilize raised beds (6" minimum) whenever possible. |
| Do not plant in low-lying areas of the field. |
| Do not irrigate a field with water that contains runoff from fields with a history of <i>Phytophthora</i> disease. |

| Production |
|---|
| Monitor fields for disease, including damping off, plant stunting, root and crown rot. |
| Irrigate conservatively and, if possible, do not irrigate prior to harvest. |
| Plow under portions of the field with diseased plants, including healthy plants that border diseased areas. |
| Remove diseased fruit from the field. |
| Never dump culls or diseased fruit from other fields or farms into production fields. Once <i>Phytophthora capsici</i> is introduced, it may remain indefinitely. |
| Apply fungicide preventively, especially for known problem fields. |
| Rotate the types of fungicides used. |

| Postharvest |
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| Harvest fruit as soon as possible from problem fields. |
| Keep harvested fruit dry and cool. |

Cucurbit Yellow Vine Decline

Cucurbit yellow vine decline was diagnosed on Michigan-grown hubbard squash this field season. This disease has been reported on pumpkin, watermelon, squash and muskmelon in other states. Symptoms include a yellowing at the crown of the plant followed quickly by plant wilting, usually just before fruit are harvested. The youngest leaves often stand up in a vertical position and curl inward at the leaf margins. The disease can be fairly easily identified in the field by cutting straight across the crown (the white part of the root, not the green stem). The phloem tissue of the stem will be discolored, appearing as a honey-brown arc or ring surrounding the central core of the stem.

This “new” disease is caused by the bacterium, *Serratia marcescens*, which may be vectored by squash bugs. Squash bugs overwinter as adults in Michigan, so could be a source of inoculum for the next growing season. Control of squash bugs is difficult, but a season-long program aimed at limiting squash bug populations could be an important management option. Row covers and trap crops (squash bugs prefer summer squashes over pumpkins and melons) may have promise as a cultural control method for small growers.