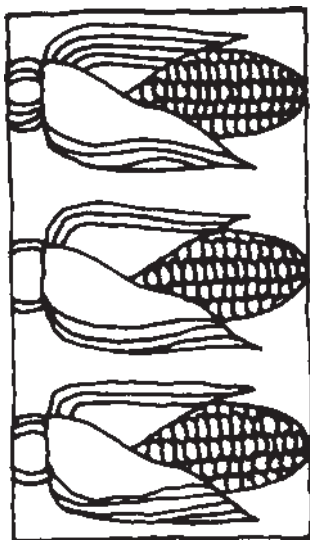


# PLANT & PEST ADVISORY

VEGETABLE CROPS EDITION \$1.50

MAY 18, 2005



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## Is Bt Sweet Corn Right for You?

*Raymond J. Samulis, Burlington County Agricultural Agent*

The biological control agent, *Bacillus thuringiensis* (Bt), has been successfully used in agriculture for more than 30 years. Despite this fact, some people are concerned that new varieties of sweet corn being developed could possibly be harmful to consumers or the environment. Virtually all of the scientific studies conducted by the EPA and others on the safety of Bt have concluded that there is little cause for concern.

Sweet corn growers have always known that controlling **earworm**, **corn-borer**, and **armyworms** is a challenge that is not only costly but more or less an expectation of the public who only wants worm free sweet corn. Bt is actually a naturally occurring soil bacterium that has been introduced into sweet corn to provide worm free corn. Contrary to public opinion, Bt sweet corn was not developed by some high tech gene manipulation, but rather by using standard old plant breeding techniques that have been around for decades.

Syngenta, Roger Brothers, and other seed companies now have white, yellow and bi-color varieties that have the Bt technology. For the past three years, I have incorporated some Bt varieties in my sweet corn evaluations. I did this for two reasons, one to assess the horticultural traits and degree of insect control, and number two to compare organoleptic (eating quality) of Bt varieties to traditional sweet corn. In 2003, I was able to produce 99.9% worm free sweet corn with no sprays. While it is not reasonable to expect this level of control all the time, none-the-less it did occur that year. What I did find, however, through regular scouting, was that the insect pressures shifted to other insects. While earworms were not a problem, extensive damage occurred from **rootworm beetle** adults by destruction of the silking tips. This resulted in some kernel fill problems. When I worked in Illinois, rootworms were the #1 corn pest, but in New Jersey sweet corn fields, they are not usually a problem under standard spray programs. Remember that I did not spray this corn at all and that with scouting and a few timely sprays; these new pests could be controlled. I also observed much higher pressures from **flea beetles** that continued past the normal early season window all the way through to harvest.

Another question to be answered is the eating quality of these newer Bt varieties. Seed breeding has come a long way in developing kernels that are tender. Many of these varieties are categorized as super sweets and these contain high levels of sugar many want. On the other hand,

*SEE Bt SWEET CORN ON PAGE 2*

## Watch the P:K Ratio in Your Soil

Steve Reiners, NYS Agricultural Experiment Station, Cornell University

*Reprinted from Vermont Vegetable and Berry News - May 15, 2005*

Phosphorus levels in many vegetable soils are in the high to very high range. Growers need to be aware that high phosphorus combined with low potassium levels can result in poor quality crops. A few years ago, a field of tomatoes experienced ripening problems - poor internal color with a mealy texture and off taste. Soil tests revealed that the soil had a phosphorus level in the excessive range while potassium levels were only moderate. In another case, a field to be planted to cabbage tested low for potassium and optimum for phosphorus. Although a high potassium fertilizer was applied through most of the field, cabbage growing in areas that apparently did not receive this application developed black petiole or midrib. It is believed that this condition is caused by an imbalance of high P and low K. High phosphorus levels in soils that are borderline in zinc availability (high pH, cool, wet soils low in organic matter) may also cause zinc deficiencies, especially in zinc sensitive crops like sweet corn and snap beans. □

### ***Bt SWEET CORN FROM PAGE 1***

consumers come into our sweet corn season after eating some very good southern varieties that have the same eating characteristics Bt varieties may have.

Consumers will have to weigh their acceptance of new Bt types versus their desire to have less pesticide sprayed. These new varieties do control worms quite well, and that's something we all want. Past agricultural history and experience shows that when any crop gets easier or cheaper to grow, oversupply and downward pricing pressures are usually not far behind. □

## IPM Update

*Kristian Holmstrom, Program Associate in Vegetable IPM*

### **Sweet Corn**

As of this week, blacklight trap catches of adult **European corn borer (ECB)** have been very light (see ECB map). Data are incomplete from Burlington, Ocean, Monmouth, Middlesex, and Cape May Counties as we finish deployment and servicing of the trap network. There is enough information to indicate that the bulk of the ECB adult activity is in the Salem County area. Over the next 1-2 weeks, the adult ECB should become more active across southern NJ, as well as Mercer and Hunterdon Counties. As the flight progresses into mid-June, activity will increase throughout the northern counties. Many early sweet corn plantings are still in the seedling stage, and are not affected by ECB activity. Some of the earliest plantings, including those under plastic, will be at the vulnerable whorl stage. It is important to begin scouting these plantings within the next week or so, as ECB egg laying and injury may take place soon. Check 5 consecutive plants each in 10 random locations throughout the planting. Look for the characteristic groups of small holes ("shot-hole") in the leaves. Typically these holes will be found on the outer whorl leaves and also on consecutively younger leaves as the tiny ECB bore into the plant. Consider treating if 12% or more plants are infested with ECB. While plants are in the whorl stage, it is possible to allow the feeding to increase prior to treating, although it is advisable to use an insecticide prior to tassel emergence. After treating, continue scouting regularly to assess infestations levels at the pretassel and tassel stages. ECB larvae will be evident by the discoloration they cause in the tassels. Consider treating as long as the infestation remains over 12%. Be sure to make one insecticide application at the full tassel stage (when the tassel spreads just prior to silking) to clean up ECB larvae moving down the stalks. This is critical to minimize damage to ears. Current ECB activity is low, but should increase dramatically over the next 10-14 days. The highest average nightly ECB blacklight trap catches are:

|             |   |             |   |         |   |
|-------------|---|-------------|---|---------|---|
| Woodstown   | 2 | Folsom      | 1 | Shirley | 1 |
| Centerton   | 1 | Hammonton   | 1 |         |   |
| Cinnaminson | 1 | Little York | 1 |         |   |
| Elm         | 1 | Pennington  | 1 |         |   |

**Flea beetles** are causing injury on some seedling stage sweet corn plantings in the northern counties. Damage appears as scrape marks on the older leaves, and when heavy, causes those leaves to dry out. The appearance of heavy feeding often accompanies stretches of cooler weather. Under these conditions, the plants remain small, and beetles feed on the same leaves for prolonged periods. The action threshold for flea beetles is 6 per 100 seedlings if no soil insecticide has been used and the variety is susceptible to **Stewart's Wilt**. If these criteria are met, an insecticide application may be warranted. If the planting is to be irrigated (as is the case in some areas due to dry conditions), insecticides may be omitted as overhead irrigation will suppress flea beetles temporarily.

### **Peppers**

Peppers will be at some risk from **ECB** infestation soon, as the flight increases in southern counties. Although the first ECB flight is not commonly associated with fruit damage, they will lay eggs on young plants. The resulting larvae will tunnel into the main stem of the plant, causing death above the point of entry and delaying development. It is

**SEE IPM ON PAGE 3**

**IPM FROM PAGE 2**

advisable to scout the fields weekly, looking at 2 leaves per plant on 5 consecutive plants in 10 random locations. Consider treating if 2 or more plants are found to have ECB egg masses on them. The ECB egg mass is a flat, pale colored group of 15-30 eggs, and resembles fish scales. They will commonly be found on the underside of leaves.

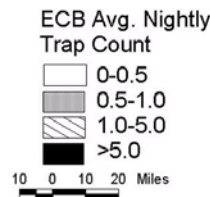
**Tomatoes**

Field plantings of tomatoes in the RCRE scouting program in the northern counties have been largely pest free over the past 1-2 weeks. It is likely that some aphid colonies will begin to appear soon, however. When deciding whether or not to treat for aphids, consider the age of the plant and the presence of predators and parasites. Aphids are often controlled naturally by syrphid fly (flower fly) maggots and *Aphidius* wasps. The former is a colorful maggot that may be found feeding among the aphid colonies, and the latter causes the aphids to become bloated and golden in color as parasitism occurs. If these antagonists are found among aphids, control may be delayed as long as fruit are not affected directly by aphid droppings. Later in the season, as fruit begin to size, large aphid colonies will affect fruit quality as their droppings fall on the fruit surface. If this condition is occurring, treatment should not be delayed.

**Bacterial canker** has been identified in one high tunnel planting in Hunterdon County. This infection almost certainly originated from infected seed, as new materials had been used in production, and the seed had not been heat treated. Bacterial canker is typically associated with field plantings, where moisture on the leaf surfaces contributes to rapid spread throughout the field. Initial symptoms of bacterial canker are dark margins of older leaves accompanied by a tight upward curl at the edges. If the organism is present when plants

are pruned or tied, there is a chance the infection will become systemic, resulting in the loss of entire branches and significant yield loss. This early appearance of bacterial canker serves as a reminder that all precautions should be taken to prevent or minimize infections in the field. Management practices include heat treatment of seed (if possible), sterilization of reused stakes, transplant containers, and tying and pruning tools with bleach as described in the *2005 Commercial Vegetable Production Recommendations*. Follow recommendations in the guide regarding the use of antibiotics and copper during and after transplant production. Avoid working in fields when the foliage is wet.

**Distribution of Adult European Corn Borer for the Week Ending May 18, 2005**



Data collected and processed by: Kris Holmstrom, Marilyn Hughes  
Rutgers Cooperative Extension & Center for Remote Sensing

**Weekly Weather Summary**

*Keith Arnesen, Ph.D., Agricultural Meteorologist*

Temperatures averaged above normal north, near normal central and below normal south, averaging 62 degrees north, 61 degrees central and 60 degrees south. Extremes were 86 degrees at Belvidere on the 10th, and 33 degrees at Charlotteburg on the 13th. Weekly rainfall averaged 0.32 inches north, 0.00 inches central, and 0.04 inches south. The heaviest 24 hour total reported was 0.61 inches at Charlotteburg on the 12th to 13th. Estimated soil moisture, in percent of field capacity, this past week averaged 72 percent north, 71 percent central and 53 percent south. Four inch soil temperatures averaged 58 degrees north, 58 degrees central and 59 degrees south.

| Weather Summary for the Week Ending 8 am Monday 5/16/05 |            |       |       |             |                 |     |           |            |     |                  |  |
|---|------------|-------|-------|-------------|-----------------|-----|-----------|------------|-----|------------------|--|
| WEATHER STATIONS  | RAINFALL   |       |       | TEMPERATURE |                 |     |           | GDD BASE50 |     | MON %FC          |  |
|   | WEEK       | TOTAL | DEP   | MX          | MN              | AVG | DEP       | TOT        | DEP |                  |  |
| BELVIDERE BRIDGE  | .46        | 9.54  | -.11  | 86          | 37              | 62. | 2         | 236        | 81  | 76               |  |
| CANOE BROOK   | .00        | 9.09  | -1.55 | 84          | 35              | 62. | 3         | 265        | 131 | 70               |  |
| CHARLOTTEBURG   | .72        | 12.01 | 1.53  | 83          | 33              | 61. | 4         | 184        | 108 | 77               |  |
| FLEMINGTON  | .02        | 10.95 | .83   | 84          | 39              | 62. | 2         | 226        | 81  | 67               |  |
| NEWTON  | .41        | 9.95  | .62   | 82          | 36              | 61. | 3         | 204        | 103 | 73               |  |
| FREEHOLD  | .00        | 11.25 | 1.18  | 82          | 40              | 62. | 1         | 254        | 66  | 70               |  |
| NEW BRUNSWICK   | .00        | 9.26  | -.56  | 81          | 42              | 62. | 1         | 244        | 31  | 76               |  |
| TOMS RIVER  | .00        | 9.97  | -.12  | 81          | 39              | 59. | -2        | 193        | 20  | 57               |  |
| TRENTON   | .00        | 8.29  | -.82  | 80          | 41              | 62. | 0         | 249        | 8   | 49               |  |
| CAPE MAY COURT HOUSE                                    | .12        | 7.63  | -1.21 | 74          | 40              | 56. | -5        | 139        | -73 | 48               |  |
| DOWNTOWN  | .02        | 8.98  | -.11  | 81          | 37              | 60. | -2        | 218        | -34 | 51               |  |
| GLASSBORO   | .00        | 9.89  | .26   | 80          | 48              | 63. | 1         | 292        | 51  | 44               |  |
| HAMMONTON   | .01        | 8.83  | -.54  | 82          | 38              | 60. | -2        | 232        | -1  | 39               |  |
| POMONA  | .01        | 8.59  | -.23  | 79          | 38              | 57. | -4        | 168        | -23 | 54               |  |
| SEABROOK  | .05        | 9.43  | 1.18  | 80          | 44              | 63. | 0         | 327        | 70  | 45               |  |
| SOUTH HARRISON  | .01        | 9.64  | .29   | 79          | 45              | 61  | NA        | 281        | NA  | NA               |  |
| WES KLINE — GDD BASE 40 PINEY HOLLOW                    | Last Week* |       |       | 74          | (Ending 5/9/05) |     | This Week |            | 143 | (Ending 5/16/05) |  |

\* February total base 40 equals 32 units

## Pest Notes

Gerald M. Ghidui, Ph.D., Specialist  
in Vegetable Entomology

### Spring Insect Activity

Cool temperatures during both the evening and the daytime are perfect conditions for the maggot complex activity and survival. **Seedcorn maggots**, **root maggots**, and **onion maggots** thrive under the current weather conditions, and oviposition and maggot survival will be at a maximum while evening temperatures are cool and day temperatures are moderate. Many crops can be protected with various seed treatments, seed coatings, at-plant insecticide treatments or post-plant insecticide applications. See the *2005 Commercial Vegetable Production Recommendations for New Jersey* for more information on specific crops and maggot control in general.

IPM specialist Joe Mahar reports that the first **European corn borer moths** were caught in traps in several areas throughout southern New Jersey during the past few days. Although only a few moths were caught, it is likely that the moth counts will increase as evening temperatures increase. The temperatures are still behind normal for this time of the year, but as heat units increase, so will borer activity.

**Colorado potato beetle** emergence is still low, likely because of the cool soil temperatures. This will change rapidly once the soil heats up. Daytime temperatures are warm enough for beetles to feed and deposit egg masses, so walk the field edges and scout for increasing beetle activity and number of egg masses, especially if no at-plant insecticides were used.

Low numbers of **flea beetles** have been reported in several vegetable crops. For radish, eggplant and other crops, monitor flea beetle damage and adult activity especially during the seedling stage when crops are most susceptible. □

## Vegetable Disease Update

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology  
and Wesley Kline, Ph.D., Cumberland County Agricultural  
Agent

✓ **Cole crops – Downy Mildew and Alternaria** – Symptoms of Downy Mildew include purple to yellowish-brown spots on upper leaf surfaces. A grayish-white spore mass will develop and cover the underside of leaves under ideal temperatures (night temperatures of 46 to 61°F and day temperatures below 75°F). Downy mildew can kill young plants. Heavily infected leaves may drop providing entry points for bacterial infections (Black rot and Soft rot). Symptoms of Alternaria on infected leaves include small, expanding circular lesions with concentric rings that may have a ‘shot-hole’ appearance as lesions age. Heavily infected seedlings may result in damping-off. Control of Downy mildew and Alternaria begin with preventative fungicide applications. Use one of the following at the first sign of disease and continue every 7 to 10 days (Please refer to the pesticide table on page F17 of the *NJ Commercial Vegetable Production Recommendations* to determine which fungicide is labeled for each specific crop.): Amistar (azoxystrobin, 11) at 2.0 to 5.0 oz 80 WDG/A (Alternaria only; labeled for use on leafy greens only), or Bravo, Echo, Equus (chlorothalonil, M4) at 1.5 pt 6F/A or OLF, or maneb (M2) at 1.5 to 2 lb 80WP/A or OLF, or Ridomil Gold Bravo (mefenoxam + chlorothalonil, 4 + M4) at 1.5 lb 76.5WP/A (14-day schedule), or Switch (cyprodinil, 9) at 11 to 14 oz 62.5WG/A (Alternaria only). For downy mildew only, apply Actigard (acibenzolar-S-methyl, P) at 1 oz 50WG/A (begin applications 7-10 days after thinning and re-apply every 7 days for a total of 4 applications per season.), or Aliette (fosetyl Al, 33) at 3 to 5 lb 80WDG/A (on 14-day schedule). For more information please see *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✓ **Lettuce – Bottom Rot/Drop – Reports of lettuce drop have increased this past week**, growers should take precautions to help control Bottom rot (*Rhizoctonia*) and Lettuce drop (*Sclerotinia*) which may cause potential problems. For Bottom Rot, Endura 70W (boscalid, Group 7) at 8 to 11 oz/A, or Rovral 50WP (iprodione, 2) at 1.5 to 2 lb/A or OLF should be applied one week after transplanting or thinning and 10 and 20 days later. For Lettuce drop, the biological Contans 5.3WG at 2 to 4 lbs/A pre-plant can be incorporated at a depth of 1 to 2 inches; or Ronilan 50DF (vinclozolin, 2) at 1 to 2 lbs/A or OLF, or Rovral 50WP at 1.5 to 2 lb/A beginning one week after transplanting or thinning and again at 10 and 20 days later. For more information on control of Bottom rot and Lettuce drop and other important diseases of lettuce please see the *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✓ **Parsley – Septoria Blight /Bacterial (blight) leaf spot** – Leaf spots caused by **Septoria blight** are easily distinguished by small, angular to round leaf spots with grayish-brown centers with a definitive dark, brown margin. Numerous black fruiting bodies develop and are visible in the center of lesions. Spread of Septoria blight is by wind-driven rain, heavy dews and overhead irrigation. Workers and equipment may also spread the disease during wet conditions. Best management practices include i) proper crop rotations of at least 2 years and by using clean or treated seed ii) scout fields early for symptom development iii) keeping workers

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#### DISEASES FROM PAGE 4

and equipment out of fields with wet foliage iv) plowing under residue of harvested crop and avoid planting in fields adjacent or near previously infected fields. Applications of azoxystrobin (Amistar or Quadris) and fixed copper can be alternated every 7 days for control. Bacterial leaf spot (*Pseudomonas syringae*) of parsley shows up at the same time as Septoria blight. Leaf spots caused by Bacterial blight appear as small brown to black spots on the leaves. It does not have the grayish brown centers or brown margins like Septoria. The pathogen can be soil or seed borne and develops during cool, moist weather. The disease spreads during cool rainy periods or under sprinkler irrigation; and a high plant density. The same control measures listed for Septoria will assist in preventing the spread of Bacterial leaf spot as long as fixed copper is included with azoxystrobin. If Oxidate is used, follow the label carefully.

#### ✓ Spinach (Downy mildew and White rust) –

**Reports of Downy mildew have occurred this past week.**

The use of Ridomil Gold (mefenoxam, 4) at 1 to 2 pt 4E/A or Ultra Flourish (mefenoxam, 4) at 2 to 4 pt 2E/A at planting for damping-off control will provide early season control. Beginning 2 to 3 weeks after emergence (and prior to symptom development), apply the following on a 7 to 10 day schedule (do not use if temperature is high). Actigard (acibenzolar-S-methyl, P) at 0.75 oz 50WG/A, or Amistar (azoxystrobin, Group 11) at 2 to 5 oz 80WDG/A, or OLF. For downy mildew control use a minimum of 4 oz of Amistar 80WDG/A and do not make more than one consecutive application. Rotate to one of the following fungicides: Aliette (fosetyl Al, 33) at 3 lb 80WDG/A, or Kocide (fixed copper, M1) at 2 lb 61DF/A (Copper containing fungicides may cause some phytotoxicity), or Ridomil Gold Copper (mefenoxam + copper, 4 + M1) at 2.5 lb 70WP/A (on 14-day schedule). For more information please see the *2005 New Jersey Commercial Vegetable Production Recommendations Guide*.

✓ **Strawberry – Anthracnose fruit rot** - Strawberry anthracnose can be extremely destructive during warm, wet weather causing significant fruit rot. Symptoms of Anthracnose include blackish-brown circular spots on maturing green fruit and soft, sunken (flat) circular lesions on ripe fruit. On ripe fruit, lesions can expand rapidly and are often covered with a pinkish-orange spore mass. Spores are spread from infected to healthy fruit with splashing water. Control of Anthracnose always begins with a 7 to 10 day preventative spray program no later than 10% bloom and/or prior to disease development. For control apply the following combinations:

#1) captan (M3) at 4 lb 50WP/A plus Pristine (pyraclostrobin + boscalid, 11 +7) at 18.5 to 23.0 oz 38WG/A

#2) captan 5(M3) at 4 lb 50WP/A plus Abound (azoxystrobin, 11) at 6.2 to 15.4 oz 2.08F/A, or Cabrio (pyraclostrobin, 11) at 12 to 14 o 20EG/A

#3) Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A

For subsequent applications, alternate:

captan (M3) at 4 lb 50WP/A plus Abound (azoxystrobin, 11) at 6.2 to 15.4 oz 2.08F/A, or Cabrio (pyraclostrobin, 11) at 12 to 14 oz 20EG/A with

captan (M3) at 4 lb 50WP/A, or Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A

To help manage fungicide resistance development, do not make more than 2 consecutive applications of either Pristine (pyraclostrobin + boscalid, 11 + 7), Cabrio (pyraclostrobin, 11) or Abound/Quadris (azoxystrobin, 11) before switching to another fungicide chemistry.

✓ **Strawberry – Botrytis (Gray Mold) and Blossom blight** – can cause serious losses in strawberry plantings if not controlled properly. Development is favored by moderate temperatures (59 to 77 F) with prolonged periods of high relative humidity and surface wetness. Control of Gray mold begins with preventative fungicide applications. Apply at 5 to 10 percent bloom and every 10 days until harvest. During periods of excessive moisture, spray intervals of 5 to 7 days may be necessary. Alternate fungicide chemistries to aid fungicide resistance management.

Application #1: captan (M3) at 4 lb 50WP/A plus Topsin M (thiophanate-methyl, 1) at 1 lb 70WP/A or Switch (cyprodinil, 9) at 11-14 oz. 62.5WG/A

Application #2; Elevate (fenhexamid, 17 - See restrictions) at 1.1 to 1.5 lb 50WDG/A, or Pristine (pyraclostrobin + boscalid, 11 + 7) at 18.5 to 23 oz 38 WG/A

Application #3: captan (M3) at 4 lb 50WP/A plus Topsin M (thiophanate-methyl, 1) at 1 lb 70WP or Switch (cyprodinil, 9) at 11 to 14 oz. 62.5WG/A

For subsequent applications, alternate:

Captan (M3) at 4 lb 50WP/A, or Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A, or Switch (cyprodinil, 9) at 11 to 14 oz. 62.5WG/A or Pristine (pyraclostrobin + boscalid, 11 +7) at 18.5 to 23 oz 38 WG/A, or Thiram (M3) at 4 to 5 lb 65WSB/A

✓ **Tomato – Bacterial spot and speck** – Both bacterial diseases can cause serious problems in the field if infections begin in the greenhouse prior to transplanting. Symptoms of spot and speck look very similar on infected leaves. Lesions are small, circular, blackish-brown and with time develop a halo, or yellowing of tissue surrounding the lesion. As lesions develop they can coalesce

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## 2005 Conservation Security Program

Farmers in the Cohansey Maurice Watershed have until Friday, May 27 to apply for the 2005 Conservation Security Program (CSP).

For program information, contact Janice Reid, Assistant State Conservationist for Programs [janice.reid@nj.usda.gov](mailto:janice.reid@nj.usda.gov) or 732-537-6088.

Information on available funding to farmers via the 2005 Conservation Security Program from the Natural Resources Conservation Service has been posted online at [www.pestmanagement.rutgers.edu/NJinPAS/postings/nrcsCSP05.pdf](http://www.pestmanagement.rutgers.edu/NJinPAS/postings/nrcsCSP05.pdf). □

### TOMATO FROM PAGE 5

(join together) and can cause premature death. Since sources for these diseases include weed hosts, volunteer plants and contaminated wood (benches or stakes) make sure production or holding areas are disinfested, weed free and clean prior to introducing transplants, and inspect all seedlings prior to holding and transplanting. Infections can occur on all parts of the tomato plant and can easily be spread during transplant trimming with contaminated equipment and by workers' hands. Tomato plants with suspected symptoms can be treated with streptomycin (Agri-Mycin 17, Agri-Strep, 25) at 1 lb/100 gallons, or 1.25 teaspoon per gallon prior to transplanting every 4 to 5 days. After transplanting apply Actigard (P) at 0.33 oz 50 WG/A, or fixed copper (M1) at 1 lb a.i./A *plus* a mancozeb (Dithane, Manex II, Manzate, Penncozeb, M3) at 1.5 lb 75WP or OLF, or ManKocide (M1 + M3) at 2.5 to 5.0 lb 61WP/A, or Cuprofix MZ (M1 + M3) at 1.75 to 7.25 lb 52.5 DF/A on a 7 day schedule. □

## Growers Guide to Understanding Protectant (FRAC M) Fungicides

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

The past few weeks the growers guide has focused on understanding fungicides with specific MOA's and higher risks for fungicide resistance development. This week we'll focus on the protectant fungicides which fall into FRAC code M. Group M includes fungicides with multi-site modes-of-action (MOA's) and kill by direct contact. Protectant fungicides interrupt fungal growth by inhibiting spore germination and/or fungal growth on the plant surface prior to infection. Most protectant fungicides work against fungi at more than one site (remember FRAC 3 and 11 had specific MOA's) and most importantly, *have very little or no risk* for fungicide resistance developing. Actually, there are 9 number groups within FRAC M (M1 to M9) based on the different chemistries which include the inorganics (copper, M1 and sulfur, M2), dithiocarbamates (mancozeb, maneb, M3), phthalimides (captan, M4), and chloronitriles (chlorothalonil, M5). Each numbered *M group controls fungi* slightly differently, but *all kill by contact and must be applied preventatively!* Unlike other FRAC groups, protectant fungicides have no translaminar or systemic activity (some may volatilize) and therefore have no curative, or after infection activity. Therefore, it is extremely important to have excellent coverage of protectant fungicides and to keep up a regular maintenance program to keep any newly developing foliage protected. *Protectant fungicides should always be the backbone of any weekly fungicide program.* Protectant's can be tanked mixed with each other to improve efficacy and/or with other fungicide chemistries. This is especially important when fungicides with higher risks for fungicide resistance developing are used in the same program. Therefore, *protectant fungicides should always be tank mixed with fungicides in FRAC groups with high risks for fungicide resistance developing (i.e. FRAC Groups 3, 4, 7, 9, 11).* Tank mixing will help reduce the chances for the development of fungicide resistance in fungicides with more specific MOA's.

### Strobilurin (QoI) insensitivity found in cucurbit Downy mildew

Strobilurin (FRAC group 11) insensitivity was found in cucurbit Downy mildew this past winter and early-spring in the southern United States. Strobilurin insensitivity (SI) in Downy mildew was detected in FL, GA and NC. What does this mean? Along with ideal weather and heavy disease pressure in many areas, insensitivity to the QoI fungicides was detected. This does not automatically translate to the failure of all QoI products used last year for Downy mildew control and for any use this upcoming season. Last year, Downy mildew was extremely destructive on cucurbit crops grown up and down the East Coast and many growers in different areas had difficulty in controlling the disease. Unfortunately, a busy 2004 hurricane season helped to spread Downy mildew northward much faster than normal and weather remained constantly favorable in many areas for the development of the disease. *The detection of SI in cucurbit Downy mildew should be seen as a warning sign* for the upcoming season. Growers should take every precaution to mitigate the chances for Downy mildew resistance developing this coming season. Recommendations for the 2005 season *include tank mixing all QoI fungicides (FRAC group 11) for Downy mildew and/or Powdery Mildew control* on cucurbits with non-QoI fungicides (protectants, M) when

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either disease is the priority of the spray program. *Never tank mix Qol's (Group 11) fungicides together and never apply any Group 11 fungicide in consecutive applications for Downy and/or Powdery mildew control.*

### When to begin spraying for Downy mildew on cucurbit crops?

The biggest question being asked thus far is when to start spraying for Downy mildew this coming year? Remember that Downy mildew is favored by prolonged wet/humid weather. Fortunately, we have few factors in our favor right now. First, Downy mildew has to work its way north from cucurbit crops grown in the south and second, there needs to be weather patterns which favor spreading the disease northward. Presently, Downy mildew should not be an immediate threat to our region. However, this will most likely change over the next month as hurricane season begins (forecasters are expecting a season similar to last year's) and more cucurbit acreage is planted in the south. Remember, Downy mildew was detected near Vineland, NJ during the last week of June last summer! However, that doesn't mean it will show up in our area at the same time this year. The best approach in determining when to spray for Downy mildew will be to be aware of the weather, especially weather systems coming out of the south. We've been in a rather dry spell this spring, not exactly Downy mildew weather, thus far, however, that could change anytime. As cucurbit crops begin to develop canopy make sure to scout on a regular basis, especially if wet weather has been around for a few days. Once Downy mildew has been forecasted or detected in our region, basic fungicide maintenance programs will need to be adjusted to include Downy mildew control. Strobilurin (Group 11) fungicides should not be applied when conditions for Downy mildew (or Powdery mildew) do not exist and/or are not an immediate threat. Thus, broad-spectrum protectant fungicides (Bravo, Maneb, copper, sulfur) should be applied until either disease is forecasted and/or detected in the Mid-Atlantic region (i.e. VA, DE, MD, NC - just to our south). *Once Downy mildew is present, weekly fungicide programs should shift to include a protectant fungicide plus a Downy mildew specific fungicide* such as Gavel (zoxamide + mancozeb, 22 + M3) at 1.5 to 2.0 lbs/A, *or* Previcur flex (propamocarb, 28) at 1.2 pt/A, *or* Curzate (cymoxanil, 27) at 3.2 oz/A alternated with Ridomil Gold Bravo (mefenoxam + chlorothalonil, 4 + M5) at 2 lb/A *and/or* alternated with a protectant fungicide plus Tanos (fomoxadone + cymoxanil, 11 + 27) at 8 oz/A, *or* Cabrio (pyraclostrobin, 11) at 8 to 12 oz/A, *or* Pristine (pyraclostrobin + boscalid, 11 + 7) at 12.5 to 18.5 oz/A. *Never apply fungicides in FRAC groups 3, 7, 11, or 27 in consecutive applications and always tank mix with a protectant fungicide (Group M).* The key to successfully controlling Downy mildew is to use different fungicide

## Vegetable Disease of the Week

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology



*Downy mildew sporulating on underside of a heavily-infected squash leaf.*

chemistries (i.e. FRAC groupings) against it to prevent resistance from building up against any one specific chemistry and to *keep up with an aggressive weekly spray schedule*. Just to keep in mind, reports from FL indicate that *an aggressive spray program incorporating the use of the newer, specific fungicide chemistries has been the only method for keeping up with Downy mildew in some areas! Thus, not keeping up with regular scouting and spraying and/or the overuse of a single fungicide chemistry may mean the difference in producing a successful crop and losing a crop to Downy mildew.*

Although Strobilurin-insensitivity in Powdery mildew has not been documented in New Jersey, a few fungicides in Group 11 that are listed for the control of Powdery mildew (Amistar, Flint, **Pristine**, **Cabrio**) are also recommended for Downy mildew (**Cabrio**, **Pristine**, Tanos). The overuse of any Group 11 fungicide specifically for Powdery mildew or Downy mildew control and/or both may help to exacerbate the potential for resistance to develop to all Group 11 fungicides for either disease. Therefore, the keys to controlling Powdery and Downy mildew will be to keep up with an aggressive spray program, tank mix any Group 11 fungicide with a protectant, and to incorporate different fungicide chemistries (FRAC groupings) into your fungicide program to help reduce the potential buildup of resistance.

To track the progress of Downy mildew in the eastern US and to keep up with reports of Downy mildew from other states please visit North Carolina State University's Cucurbit Downy Mildew Forecasting Center at <http://www.ces.ncsu.edu/depts/pp/cucurbit/>. □

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