Cabrio™: A New Broad Spectrum Fungicide

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Cabrio™ is a new broad spectrum fungicide that has just been labeled for many vegetables in the U.S. The active ingredient is pyraclostrobin, which is a strobilurin fungicide like Flint (trifloxystrobin), and Quadris (azoxystrobin). The new label includes uses on onions, carrots, turnips, radish, tomatoes, pepper (all), eggplant, and all cucurbit crops. A specimen label is attached in PDF format. Cabrio™ will have good activity on Alternaria, Anthracnose, and powdery mildew but has shown excellent control of Cercospora and downy mildew in university field trials. Since the mode of action is the same as other strobilurins, it should not be rotated with other strobilurin fungicides directly and the resistance in gummy stem blight is the same a Quadris (cross resistance).

Current Disease Woes

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This has been an awful fall for vegetable diseases. Tomato Yellow Leaf Curl virus (TYLCV) has been causing problems on tomatoes from Macon Co. to the Florida line. Cabbage Leaf Curl (CLCV) virus is plaguing collards and cabbage in Grady, Echols, Mitchell and Colquitt counties. This is primarily due to heavy whitefly pressure we are experiencing this fall. Unfortunately, whitefly-transmitted geminiviruses like TYLCV and CLCV are difficult to manage due to the constant influx of whiteflies. Using Admire insecticide at transplanting has shown some promise in tomato trials in Quincy, FL but many of our commercial fields in GA continue to have problems despite our best efforts. Hopefully the cooler weather we are currently experiencing will stop the bleeding of these whitefly-transmitted virus diseases.

As if we needed more virus problems, a new pepper virus was just identified this week on jalapeno pepper. This virus is called Pepper Mild Mottle Virus (PMMoV) and it belongs on the Tobamovirus group with Tobacco Mosaic virus (TMV). It can be seed transmitted but is spread easily through sap inoculation (i.e. mechanically) just like TMV. No foliar symptoms are evident, however, but the pepper fruit show round, sunken, discolored areas that have a diffuse margin. This disease can be confused with Tomato Spotted Wilt Virus (TSWV) but TSWV has sunken, circular lesions, often containing concentric rings. Mixed infections of PMMoV and TSWV have been found this year. Figure 1. is a picture with
PMMoV infected pepper on the left and a TSWV infected pepper on the right.

Figure 1. PMMoV (left), and TSWV (right).

PMMoV seems to be variety specific and we seem to be seeing more on an Agraset 4001 jalapeno variety in Grady Co. I am currently attempting to determine the source of the inoculum.

The onion growers are not without their share of problems. Recent rainy weather has caused severe outbreaks of bacterial diseases in onion seedbeds. At least two diseases have been identified. These are bacterial leaf blight (caused by a Xanthomonas sp.) and center rot (caused by Pantoea ananatis). These two diseases are favored by warm, wet conditions, hence the current cool spell may inhibit epidemic development somewhat. Only copper tank-mixed with mancozeb is currently recommended for suppressing these bacterial diseases. Xanthomonas generally causes a dark green, watersoaked tip dieback while Pantoea causes a tan or light green dieback (Figure 2).

Figure 2. Tip dieback typical of Xanthomonas (left) and Pantoea (right).

Diamondback Moth Larvae Resistant to SpinTor

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Diamondback moth (DBM) is a champion of insecticide resistance world-wide and has reared its ugly head in South Georgia once again. Last fall, DBM in an isolated area of southwest Georgia were found to be resistant to SpinTor, which has been on the market a very short time (relative to the normal life of an insecticide). This particular case of resistance resulted from singular reliance on SpinTor for caterpillar control on greens grown year round - a recipe for resistance development (and against all recommendations for resistance management and the SpinTor label). The good news was that populations in that growing area have reverted to susceptible after about 6 months of no SpinTor use.

The bad news is that last week we put out a test on collards in Irwin County against heavy populations of DBM that came through a couple of SpinTor applications and could not kill them with SpinTor or any of the older chemistries (tested Fury, Lannate, Dibrom and Thiodan). The best control out of this group of insecticides was about 60 percent (for Lannate, Dibrom and Thiodan) and the worst was about 1 percent. One of the great concerns associated with this problem is that the insecticide use history in this case provides no direct clue as to why the resistance occurred. Prior use of SpinTor in the area was minimal. The levels of resistance detected to all of these products suggests that these insects have been regularly exposed to a variety of insecticides for some time.

Two newer products (Avaunt and Proclaim) still provided good control, but are not labeled for use on all of the crops which DBM will attack. These two products are labeled for cabbage and should be used with great care to prevent rapid development of resistance.

If SpinTor is working in your area, use it (and all other products) according to the label instructions, with close attention to the resistance management
recommendations. As previously stated, DBM is a world champion of insecticide resistance. Given strong selection pressure (repeated applications of a single insecticide), no insecticide remains effective against this pest for long. To reduce selection pressure, it is generally recommended that B.t. insecticides be used early in the production season when a little damage and slower kill can be tolerated. This reduces the selection for resistance to the synthetic insecticides and helps insure they will work if and when they are needed. When the synthetic insecticides are used, they should be rotated to reduce selection for resistance to each individual insecticide group.

A final side point to this discussion is year-round production of greens (or any other crop). In both cases where severe resistance has appeared, the growers were near the end of their first year of year-round production. While market forces may favor this approach, it provides unique challenges for pest management (particularly when done within a relatively small area). You may get away with it for a while, but if you play with fire, sooner or later your going to get burned. For DBM, a host free period of at least a month in mid-summer allows the populations to crash, which reduces the need for insecticidal control and selection pressure for insecticide resistance.

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**Diamondback Moth Larvae Resistant to SpinTor**

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I have received numerous calls the last few months concerning new insecticides for silverleaf whitefly (SLWF). The following is a list of the insecticides currently suggested for SLWF and my thoughts about the role of each.

Endosulfan (Thiodan, Phaser, Etc.) - Endosulfan provides good control of adults, but little or no mortality of nymphs. Early in the season it can be used to delay establishment of populations in the field. Once nymphs are well established a product that controls adults and immatures should be used, or endosulfan can be used in combination with an insect growth regulator (Knack, Courier) for immatures.

Knack - Knack is a growth regulator, with the primary impact on eggs (although it will control some larger nymphs). Knack moves through the leaf (thus coverage is not as big an issue) and prevents eggs from hatching. It has little or no impact on adults. Under light immigration (spring) it may be a stand alone product, but given the adult movement we have seen this fall, I would suspect a tank mix with something for the adults is justified. Although this product lasts about two weeks on the leaf, new growth is unprotected (and adults like the new growth).

Courier - Courier is an insect growth regulator. It causes problems in the molting process, thus, mortality occurs in the nymphs as they try to molt from one stage to the next. This product also lasts a long time on treated foliage (3+ weeks) and is reported to move to new growth through local vapor action. Personally, until we have more experience with this product I would keep an eye on the new growth. While Courier does cause some adult mortality and reduced egg hatch, given the adult pressure in the fall, foliar treatments for adults may be needed even if 100 percent control of nymphs is obtained.

Capture - Capture is a pyrethroid insecticide, but has a somewhat unique spectrum of pest activity among this group. It is the only pyrethroid that consistently provides good control of adult and immature SLWF as a stand-alone treatment. Occasionally, the efficacy of Capture can be improved with an organophosphate tank mix, but this is usually not needed.

Pyrethroids and organophosphates - With the exception of Capture, no single product in either of these groups provides much control of SLWF as a stand alone application. However, most tank mixes of any pyrethroid with any organophosphate will provide good control. Some minor differences occur with the specific combinations (Danitol plus Orthene is generally considered the standard), but for specific crops, any registered pyrethroid combined with any
registered organophosphate should provide good control.

Admire/Provado - Admire was the first product registered that provided excellent control of whitefly. Admire placed in the soil (root zone) at planting should provide 4+ weeks of control. The rate effects the length of control, with higher rates providing longer residual activity. Provado (foliar application) is highly susceptible to breakdown in sunlight and generally does not last long enough in the field to provide good SLWF control. Where plant disorders (silverleaf in squash, irregular ripening in tomatoes) are involved and heavy adult migrations are occurring, a foliar application may be needed on top of Admire to prevent damage by adults (although the Admire kills the adults after feeding, they are replaced daily).

Platinum/Actara - The activity of Platinum is similar to Admire, with excellent control when placed in the root zone. The lower rates used with Platinum may reduce its longevity. Actara (foliar application) has provided very good control of adult and immature SLWF in tests. Actara apparently penetrates the leaf tissue more rapidly than Provado and thus lasts longer on the foliage. I anticipate Actara lasting 1 to 2 weeks.

Assail - Assail performs similarly to Actara. It is limited to foliar applications, but appears to last well on the leaf and controls adults and immatures. I anticipate 1 to 2 weeks control with Assail.

Tifton Plant Disease Clinic

Jason Brock
Plant Disease Diagnostician - UGA

During the last two years, October through December have been relatively slow compared to the summer and early fall. Virus diseases and soil-borne disease have been the predominant problems during this time frame. **Pythium**, **Phytophthora**, and **Rhizoctonia** have been recovered from samples each of the least two years. With the possibilities of more rains coming this year, these pathogens will likely continue to be a factor. When looking for a cause of plant decline, pay close attention to the roots and lower stem. Discolored roots and stem lesions are a strong indication of a soil-borne pathogen.

The following is a summary of the commercial vegetable samples diagnosed since the June newsletter.

Note: The number indicates the number of samples diagnosed.

**Bean:**
- Fusarium Root Rot (6)
- Southern Blight
- Tomato Spotted Wilt Virus
- Impatiens Necrotic Spot Virus
- Too Deteriorated To Diagnose (2)
- Negative for virus
- Unknown
- Insect injury

**Cabbage:**
- Downy Mildew
- Pythium crown rot
- Xanthomonas campestris (2)
- Cabbage Leaf Curl Virus
- Chemical injury

**Cantaloupe:**
- Alternaria leaf spot (2)
- Downy Mildew (3)
- Gummy stem blight
- Root-knot nematode
- Potyvirus
- Virus
- Crown Decline (2)
Cauliflower: Alternaria Leaf Spot
Collard: Alternaria leaf spot
No pathogen isolated
No disease (2)
Cucumber: Cucumber Mosaic Virus
Anthracnose
Unknown (2)
Eggplant: Phomopsis Blight
Kale: Pythium Root Rot
Mustard: Environmental
Okra: Fusarium wilt
Onion: Botrytis neck rot
Sour skin
Environmental
Mechanical damage
No disease
Too Deteriorated To Diagnose
Pepper: Anthracnose (2)
Phytophthora blight
Phytophthora crown and root rot
Pythium root and stem rot
Rhizoctonia solani
Bacterial Spot (5)
Tomato Spotted Wilt Virus (4)
Cucumber Mosaic Virus
Negative for TSWV
Plastic Burn
Chemical injury (2)
Broad mite (4)
Sun scald
Physical injury
Pumpkin: Watermelon Mosaic Virus - 2
Southern Pea: Cercospora leaf spot
Charcoal Root Rot
Powdery Mildew
Bacterial Blight
Squash: Pythium sp.
Root-knot nematode
Inadequate sample
Too much nitrogen
Unknown
No disease
Tomato: Alternaria Stem Canker (2)
Fusarium wilt
Bacterial Spot
Root-knot nematode
Tomato Spotted Wilt Virus
Negative for TSWV
Tomato Yellow Leaf Curl Virus (2)
Nutrient deficiency
Turnip: Cercospora leaf spot (2)
Pythium sp.
Oedema
Slime mold
Chemical burn
Virus symptoms
Unknown
Watermelon: Alternaria Leaf Blight
Downy Mildew
Potyvirus
Unknown
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