

DOWNY MILDEW IN CUCURBITS: OCCURRENCE OF QOI RESISTANCE IN THE USA AND IMPACT ON MANAGING DISEASE

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http://hortweb.cas.psu.edu/extension/veg crops/vegetable_gazette/2005/july2005.htm

Strains of the cucurbit downy mildew fungus resistant to QoI (also known as strobilurin) fungicides were detected in GA and NC in fall 2004 and in FL in spring 2005. The genetic mutation detected is the same as that in QoI-resistant cucurbit powdery mildew fungal strains. These strains exhibit qualitative resistance, thus resistant strains are highly insensitive to QoIs. It is not possible to re-gain control by increasing the application rate or shortening the interval with this type of resistance.

Development of resistance was not surprising. The cucurbit downy mildew pathogen has developed resistance to other fungicides. Other pathogens have developed resistance to QoIs thus demonstrating that this fungicide group is at high risk for resistance development. Conditions were very favorable for downy mildew in 2004.

Effect of QoI resistance on managing downy mildew in 2005 cannot be predicted. Only 4 samples have been examined, thus the frequency and distribution of resistant strains is not known. In fungicide efficacy experiments being conducted in GA and NC where 2 of the tested pathogen isolates were collected, QoI fungicides were not as effective as expected based on previous results. However, this could have been due to high disease pressure resulting from downy mildew starting to develop earlier than usual, and conditions being very favorable for disease development.

Fortunately, there are additional management practices for cucurbit downy mildew control. These include making adjustments to fungicide programs (Item 4 below), and attention to other control methods as follows:

1. Select cucumber and melons varieties with resistance to downy mildew when possible.
2. Minimize leaf wetness by selecting sites with good air movement and without shading.
3. Avoid overhead irrigation during early morning when leaves are wet from dew, and during late evening when leaves will not have an opportunity to dry before dew forms.
4. Non-QoI fungicides labeled for this disease must be combined and alternated with QoI fungicides (a) to reduce selection of resistant strains and (b) to protect against loss if resistance does occur and affect efficacy of the QoI fungicides.

It is critical to know what fungicides contain an active ingredient in the QoI fungicide group, which is Group 11 in the system being used by EPA and the Ag Chemical industry. Some of the products, plus their active ingredient(s) and Group number in parentheses that are registered for use on cucurbits include the following:

Amistar (azoxystrobin; Group 11),
Cabrio (pyraclostrobin; Group 11),
Flint (trifloxystrobin; Group 11),
Reason (fenamidone; Group 11),
Pristine (pyraclostrobin; Group 11 + boscalid; Group 7), and
Tanos (famoxadone; Group 11 + cymoxanil; Group 27).

Non-QoI fungicides that could be tank-mixed with QoI fungicides (Group 11) and applied in alternation with QoI fungicides are:

1. Translaminar fungicides with some ability to enter and/or move in leaves:
Curzate (cymoxanil; Group 27),
Acrobat (dimethomorph; Group 15),
Previcur Flex (propamocarb; Group 28),
Gavel (zoxamide; Group 22, and mancozeb; Group M2),
Phosphorus acid fungicides (Phostrol, ProPhyt, and Fosphite; Group 33),
Ridomil fungicides (mefenoxam; Group 4)
2. Protectant fungicides which do not enter leaves:
Bravo (chlorothalonil; Group M4),
Maneb (maneb; Group M2),
Dithane (mancozeb; Group M2), and
Copper fungicides (Group M1).

Curzate reportedly has good curative activity (about 3 day kickback), thus it is a good choice for the first application after downy mildew is detected. However, it has poor residual activity (only 1-2 days), thus it is critical to tank-mix it with a protectant fungicide and to follow-up with another systemic fungicide when disease pressure is high.

Furthermore, although downy mildew can be very destructive, luckily it occurs sporadically in the northeastern US, and usually does not affect yield because downy mildew develops so late in the season.

See the following web sites for more information on downy mildew and its management plus photographs of symptoms:

vegetablemdonline.ppath.cornell.edu/NewsArticles/Cuc_Downy.htm
vegdis.cas.psu.edu/VegDiseases/Identification_files/cucurbits.html
vegdis.cas.psu.edu/03Diseases/D400_Farm.html

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

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