

# Management of Powdery Mildew on Cantaloupe in 2004

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## **Abstract**

*Powdery mildew occurs annually on melons in Arizona. *Podosphaera xanthii* (*Sphaerotheca fuliginea*) is the plant pathogenic fungus that causes powdery mildew on cucurbits, such as cantaloupe, honeydew, watermelon, cucumber and squash. Development of powdery mildew on melons is favored by moderate temperatures and relative humidity, succulent plant growth and reduced light intensity brought about by a dense plant canopy. Existing products as well as some materials under development were evaluated and compared for efficacy in management of powdery mildew on cantaloupe in a field trial conducted during the spring of 2004 at the Yuma Valley Agricultural Center. A high level of disease had developed by the time this trial was terminated (June 10). Among treatments, the degree of powdery mildew suppression ranged from modest to essentially complete control. All treatments significantly reduced the severity of powdery mildew compared to untreated plants. Relative performance of treatments on the top of leaves differed from that on the underside of leaves. The better treatments among all tested fungicides included Bravo Ultrex, Cabrio, Cabrio alternated with Procure, Flint alternated with Bravo, Microthiol Disperss, Procure, Procure alternated with Quinoxifen, Quinoxifen, Quinoxifen alternated with Topsin M, Rally, Topsin M+Microthiol Disperss, and Topsin M alternated with Cabrio. Among tested products, several are registered for use in Arizona for control of powdery mildew on melons. The use of a mixture or rotation among efficacious chemistries with different modes of action is important to minimize the development of insensitivity by the pathogen to one or more of these active ingredients.*

## **Introduction**

Powdery mildew is an annual concern to melon growers in Arizona. The disease on cantaloupes, caused by the fungus *Podosphaera xanthii* (formerly known as *Sphaerotheca fuliginea*), first appears as small, white, superficial spots on leaves and stems. These spots will enlarge, become powdery in appearance, increase in number and eventually cover stems and both surfaces of leaves. Young infected leaves may turn chlorotic and die. Severely infected leaves turn brown and desiccate. Cantaloupe fruit on severely infected plants may ripen prematurely, be of poor quality and become sunburned due to the reduced plant canopy. Development of powdery mildew is favored by moderate temperatures and relative humidity, dry soil conditions, reduced light intensity and succulent plant growth. These conditions often exist within the plant canopy of an actively growing cantaloupe planting. The same pathogen causes powdery mildew on watermelons, honeydews, squash and other cucurbits.

When available, effective control of powdery mildew can be achieved by planting cultivars that are resistant to the pathogen. If susceptible cultivars are grown, it is extremely important to have fungicidal protection in place when environmental conditions become favorable for disease development. The life cycle of the pathogen, going from spore germination on the plant to subsequent release of spores from this infection site, can be as short as 4 to 5 days. By the time initial colonies are visible on plant leaves, numerous additional infection sites are already developing but not yet visible.

Several compounds are available for management of powdery mildew on melons, such as azoxystrobin (Quadris), boscalid (Endura), chlorothalonil (Bravo), myclobutanil (Rally), neem oil (Trilogy), potassium bicarbonate (Armicarb, Kaligreen), pyraclostrobin (Cabrio), pyraclostrobin+boscalid (Pristine), sulfur, thiophanate-methyl (Topsin M), trifloxystrobin (Flint), and triflumizole (Procure). A fungicide trial was initiated in the spring of 2004 to compare the efficacy of available fungicides as well as new compounds under development for management of powdery mildew on cantaloupe.

## Materials and Methods

This study was conducted at the Yuma Agricultural Center in a silty clay loam soil (7-56-37 sand-silt-clay, pH 7.2, O.M. 0.7%). Cantaloupe “Topmark” was seeded, then watered March 9, 2004 on beds with 80 inches between bed centers. Treatments were replicated five times in a randomized complete block design with each replicate plot consisting of 25 ft. of row. Each of the five blocks of treatments was bordered by a single bed planted to “Golden Crenshaw.” Foliar applications of fungicides were made May 24 and June 3, 2004 with a tractor-mounted boom sprayer (nozzles spaced 12 in. apart) that delivered 50 gal/acre at 100 psi. Furrow irrigation was used for the duration of this trial after an initial sprinkler irrigation to germinate the seed. Maximum and minimum ranges (°F) of air temperature were as follows: March 9 to 31, 2004, 81-99, 51-70; April, 64-99, 46-67; May, 87-103, 55-72; June 1 to 10, 87-105, 60-66. Maximum and minimum ranges (%) of relative humidity were as follows: March 9 to 31, 2004, 53-98, 6-27; April, 54-99, 8-48; May, 31-83, 7-23; June 1 to 10, 44-83, 7-19. The only measurable rainfall during this time period occurred April 2 (0.69 inches). Disease severity was determined June 9 and 10 by collecting 10 leaves at random from each plot and rating the severity of powdery mildew on the upper and lower leaf surfaces using the following rating system: 0 = no powdery mildew present; 1 = 1 to 5 powdery mildew colonies on leaf surface; 2 = 6 to 10 powdery mildew colonies on leaf surface; 3 = more than 10 colonies to 25% of leaf surface covered with powdery mildew; 4 = 26 to 50% of leaf surface covered with powdery mildew; 5 = 51 to 100% of leaf surface covered with powdery mildew.

## Results and Discussion

The data in the following table illustrate the degree of control obtained by applications of the various materials tested in this trial. Among treatments, the degree of powdery mildew control ranged from minimal to essentially complete. Powdery mildew was first detected in plots on May 21, three days before the first application of treatments. The “Golden Crenshaw” melon is very susceptible to powdery mildew and was planted to serve as a nursery for production of powdery mildew fungal spores once the plants became infected. A high level of disease developed on nontreated cantaloupe plants by the time plants were rated for disease severity. Powdery mildew in this trial was caused by *Podosphaera xanthii* (formerly known as *Sphaerotheca fuliginea*). Disease control observed on the upper leaf surface suggests that tested materials can significantly reduce powdery mildew compared to no treatment when the test compound is applied directly to the leaf surface with relatively good coverage. On the other hand, effective disease control on the underside of leaves, where coverage by the fungicide is not optimal, demonstrates the efficacy of chemistries that can move within the leaf. This trial had to be terminated before the melon plants reached maturity, due to increasing death of plants caused by charcoal rot.

**2004 Powdery Mildew of Cantaloupe Fungicide Trial**

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Treatment	Rate (a.i./A)	Application dates <sup>1</sup>	Disease rating <sup>2</sup>	
			Upper leaf surface	Lower leaf surface
<b>Nontreated control</b>	-----	-----	<b>3.1</b>	<b>4.1</b>
Procure50WS	0.25	1,2	0.1	1.9
Quinoxifen (250 g/l)	0.1	1		
alternated with Topsin M 70W	0.35	2	0.2	1.2
Flint 50WG	0.05	1		
alternated with Bravo Ultrex 82.5 WDG	1.48	2	0.4	2.2
Topsin M 70W + Microthiol Disperss 80DF	0.35 + 4.0	1,2	0.4	1.5
Cabrio 20WG	0.2	1		
alternated with Procure 50WS	0.25	2	0.4	1.1
Topsin M 70W	0.35	1		
alternated with Cabrio 20WG	0.2	2	0.5	2.5
Quinoxifen (250 g/l)	0.2	1,2	0.5	1.6
Procure 50WS	0.25	1		
alternated with Quinoxifen (250 g/l)	0.1	2	0.6	1.1
Bravo Ultrex 82.5 WDG	1.48	1,2	0.7	2.0
Flint 50WG	0.062	1		
alternated with Quinoxifen (250 g/l)	0.1	2	0.7	2.6
Microthiol Disperss 80DF	8.0	1,2	0.9	1.3
Rally 40W	0.1	1,2	0.9	1.5
Topsin M 70W	0.35	1,2	0.9	2.4
Flint 50WG	0.062	1,2	0.9	3.5
Pristine 38G + Kinetic	0.3 lb + 8.0 fl oz prod.	1,2	1.1	2.4
Quinoxifen (250 g/l)	0.1	1,2	1.2	2.3
PREV-AM	25.6 fl oz prod.	1,2	1.2	2.7
Quadris 25SC + Latron B-1956	0.25 lb + 0.24 pt prod.	1,2	1.3	3.1
Cabrio 20WG + Kinetic	0.2 lb + 8.0 fl oz prod.	1,2	1.3	1.9
Endura 70WG + Kinetic	0.28 lb + 8.0 fl oz prod.	1,2	1.4	2.7
<b>LSD (Least significant difference, P = 0.05)</b>			<b>0.2</b>	<b>0.3</b>
1	Treatment dates: 1 = May 24; 2 = June 3, 2004. Small powdery mildew colonies (2 to 3 mm in diameter) were first observed on some plants May 21.			
2	Disease ratings were performed on June 9 and 10 by collecting 10 leaves at random from each plot and rating the severity of powdery mildew on the upper and lower leaf surfaces using the following rating system: 0 = No powdery mildew colonies present on plant; 1 = 1 to 5 powdery mildew colonies on leaf surface; 2 = 6 to 10 powdery mildew colonies on leaf surface; 3 = More than 10 colonies up to 25% of leaf surface covered with powdery mildew; 4 = 26 to 50% of leaf surface covered with powdery mildew; 5 = 51 to 100% of leaf surface covered with powdery mildew.			