

**Evaluation of fungicide application programs for management of powdery mildew on muskmelon, 2009.**

Powdery mildew on melons, caused by the fungus *Podosphaera xanthii*, is an important disease on muskmelon, watermelon and other melon crops. Growers in Arizona have noticed that after a few years of widespread use, several of the primary fungicides used to manage powdery mildew have become less effective. Yearly fungicide field trials have documented these losses in efficacy as well. The objective of this field trial was to evaluate disease control efficiency of various fungicide treatment sequences, utilizing products with different modes of action that are registered for use on melon crops. This is a repeat of a similar trial conducted in 2008. The study was conducted at The University of Arizona, Yuma Agricultural Center in a silty clay loam soil (7-56-37 sand-silt-clay, pH 7.2, O.M. 0.7%). Muskmelon ‘Topmark’ was seeded 16 Mar on beds with 80 in. between bed centers, then sprinkler irrigated to germinate seed. Subsequent irrigations were made by furrow irrigation. Treatments were replicated five times in a randomized complete block design with each replicate plot consisting of 25 ft of row. Depending on treatment, foliar application of materials was made 18 May, 2 Jun, 9 Jun and 16 Jun with a tractor-mounted boom sprayer (hollow-cone nozzles spaced 12 in. apart) that delivered 50 gal/acre at 100 psi. Growth stage for each application date is as follows: 18 May, fruit up to 3.5 in. in diameter, plants covering bed; 2 Jun, fruit about 4.0 in. in diameter, plants covering bed and some of the furrow; 9 Jun, fruit 4.5 to 5.0 in. in diameter, netting on fruit more developed; 16 Jun, melons nearly mature. Maximum and minimum ranges (EF) of air temperature were as follows: 16 to 31 May, 71-91, 39-56; Apr, 73-102, 40-63; May, 84-109, 56-74; 1 to 25 Jun, 88-109, 62-72. Maximum and minimum ranges of relative humidity were as follows: 16 to 31 May, 39-81, 7-21; Apr, 57-90, 7-26; May, 43-85, 7-27; 1 to 25 Jun, 41-79, 5-19. No measurable rainfall occurred during the course of this trial. Disease severity was determined 24 and 25 Jun 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. Yield was determined by counting the number of muskmelons in each plot that were marketable.

The data in the following table illustrate the degree of control obtained by applications of the various materials tested in this trial. Powdery mildew was first detected in plots on 28 May, between the first and second application dates. A moderately-high level of disease developed on untreated muskmelon plants by the time they reached maturity and were rated for disease severity. Among treatments, the degree of powdery mildew control recorded from individual products applied to plots throughout the treatment period ranged from approximately 25 to 100%. Compared to untreated plants, reduction in disease severity on both the top and bottom of leaves by an average level of at least 80% was achieved by application of Microthiol Disperss, Procure, and Quintec. In comparison, powdery mildew was reduced from 25 to 75% by Cabrio, Flint, Kaligreen, Quadris, Topsin M, Serenade, and Sovran. On the other hand, all tested treatment sequences reduced the average severity of disease, considering upper and lower leaf surfaces, by 80 to 100% compared to untreated plants. Several of these alternation treatment programs contained fungicides that did not perform well when applied alone throughout the growing season, suggesting that these products when incorporated into a treatment program can provide different modes of action to combat the development of resistance management while not compromising the level of disease control. Due to the late onset of powdery mildew, there were no significant differences in the yield of marketable melons among treatments; therefore, yield data is not presented. No evidence of phytotoxicity was observed with any of the treatments.

Treatment and rate of product/A <sup>z</sup>	Disease rating <sup>y</sup>	
	upper leaf surface	lower leaf surface
Flint 50WG 0.125 lb (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Flint 50WG 0.125 lb (3), Quintec 250SC 6.0 fl oz (4) .....	0	0
Microthiol Disperss 80DF 10.0 lb (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Microthiol Disperss 80DF 10.0 lb (3), Quintec 250SC 6.0 fl oz (4) .....	0	0
Microthiol Disperss 80DF 10.0 lb (1,2,3,4) .....	0	0
Quintec 250SC 6.0 fl oz (1), Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (4) .....	0	0
Quintec 250SC 6.0 fl oz (1), Microthiol Disperss 80DF 10.0 lb (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Microthiol Disperss 80DF 10.0 lb (4) .....	0	0
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1,2,3,4) .....	0	0.1
Quintec 250SC 6.0 fl oz (1,2,3,4) .....	0	0.1
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (2), Quintec 250SC 6.0 fl oz (3), Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (4) .....	0	0.2

Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (3), Quintec 250SC 6.0 fl oz (4) .....	0	0.3
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Kaligreen 82WP 5.0 lb (2), Quintec 250SC 6.0 fl oz (3), Kaligreen 82WP 5.0 lb (4) .....	0	0.4
Quintec 250SC 6.0 fl oz (1), Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (4) .....	0	0.5
Quintec 250SC 6.0 fl oz (1), Kaligreen 82WP 5.0 lb (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Kaligreen 82WP 5.0 lb (4) .....	0	0.5
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Microthiol Disperss 80DF 10.0 lb (2), Quintec 250SC 6.0 fl oz (3), Microthiol Disperss 80DF 10.0 lb (4) .....	0.1	0
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Flint 50WG 0.125 lb (2), Quintec 250SC 6.0 fl oz (3), Flint 50WG 0.125 lb (4) .....	0.1	0.2
Quintec 250SC 6.0 fl oz (1), Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz .....	0.1	0.3
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (2), Quintec 250SC 6.0 fl oz (3), Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (4) .....	0.1	0.3
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Topsin M 4.5FL 10.0 fl oz (2), Quintec 250SC 6.0 fl oz (3), Topsin M 4.5FL 10.0 fl oz (4) .....	0.1	0.4
Quintec 250SC 6.0 fl oz (1), Flint 50WG 0.125 lb (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Flint 50WG 0.125 lb (4) .....	0.1	0.5
Topsin M 4.5FL 10.0 fl oz (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Topsin M 4.5FL 10.0 fl oz (3), Quintec 250SC 6.0 fl oz (4) .....	0.1	0.5
Quintec 250SC 6.0 fl oz (1), Serenade MAX 2.0 lb + Silwet 4.0 fl oz (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Serenade MAX 2.0 lb + Silwet 4.0 fl oz (4) .....	0.1	0.6
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (2), Quintec 250SC 6.0 fl oz (3), Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (4) .....	0.2	0
Quintec 250SC 6.0 fl oz (1), Topsin M 4.5FL 10.0 fl oz (2), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (3), Topsin M 4.5FL 10.0 fl oz .....	0.2	0.1
Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (1), Serenade MAX 2.0 lb + Silwet 4.0 fl oz (2), Quintec 250SC 6.0 fl oz (3), Serenade MAX 2.0 lb + Silwet 4.0 fl oz (4) .....	0.2	0.6
Serenade MAX 2.0 lb + Silwet 4.0 fl oz (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Serenade MAX 2.0 lb + Silwet 4.0 fl oz (3), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (4) .....	0.3	0.6
Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (3), Quintec 250SC 6.0 fl oz (4) .....	0.4	0.7
Kaligreen 82WP 5.0 lb (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Kaligreen 82WP 5.0 lb (3), Quintec 250SC 6.0 fl oz (4) .....	0.4	0.9
Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (1), Procure 480SC 8.0 fl oz + Silwet L-77 4.0 fl oz (2), Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (3), Quintec 250SC 6.0 fl oz (4) .....	0.5	0.8
Flint 50WG 0.125 lb (1,2,3,4) .....	0.6	1.1
Cabrio 20EG 1.0 lb + Kinetic 12.0 fl oz (1,2,3,4) .....	0.8	1.4
Quadris 25SC 15.0 fl oz + Kinetic 12.0 fl oz (1,2,3,4) .....	2.1	1.8
Topsin M 4.5FL 10.0 fl oz (1,2,3,4) .....	2.4	3.0
Kaligreen 82WP 5.0 lb (1,2,3,4) .....	2.7	3.1
Serenade MAX 2.0 lb + Silwet 4.0 fl oz (1,2,3,4) .....	2.9	3.4
Sovran 50WG 4.8 oz + Kinetic 12.0 fl oz (1,2,3,4) .....	3.0	3.0
Nontreated control .....	4.0	4.3
LSD ( $P = 0.05$ ) <sup>x</sup> .....	0.3	0.3

- z Application dates: (1) = 18 May; (2) = 2 Jun; (3) = 9 Jun; (4) = 16 Jun. Small powdery mildew colonies (0.1 inch in diameter) were first observed on some plants 28 May.
- y Disease rating was performed 24 and 25 Jun 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.
- x Least Significant Difference at  $P = 0.05$ . Values in each column differing by more than the least significant difference are significantly different from each other according to Fisher's Protected LSD test.