Efficacy of Fungicides for Management of Powdery Mildew on Cantaloupe in 2005

Michael E. Matheron and Martin Porchas

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 2005 at the University of Arizona Yuma Valley Agricultural Center. A high level of disease had developed by the time disease severity data was recorded (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 upper leaf surface differed from that on the underside of leaves. The best treatments among all tested fungicides included Quintec, Pristine, BAS517, Procure and Topsin M + Microthiol Dispersss. Good levels of disease control were also achieved by Rubigan and Cabrio. The number of marketable cantaloupes was significantly higher in plots where powdery mildew was well controlled compared to untreated plots. Among tested products, several are registered for use in Arizona for control of powdery mildew on melons. Using a mixture of products or rotating among efficacious fungicides with different modes of action is important to minimize the development of insensitivity by the pathogen population 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.

This is a part of the University of Arizona College of Agriculture and Life Sciences 2005 Vegetable Report, index at http://cals.arizona.edu/pubs/crops/az1382/

When available, effective control of powdery mildew may 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 surface 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 2005 to compare the efficacy of some 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 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%). Cantaloupe "Topmark" was seeded, then watered March 15, 2005 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. The entire experimental planting of cantaloupes was bordered on the east and west side by a single bed planted to "Juane canary" melon. Depending upon treatment, foliar applications of fungicides were made May 12, May 19, May 26, June 1 and June 8, 2005 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 15 to 31, 2005, 68-80, 40-56; April, 72-92, 43-57; May, 77-108, 50-68; June 1to 10, 89-93, 56-67. Maximum and minimum ranges (%) of relative humidity were as follows: March 15 to 31, 2005, 53-86, 6-37; April, 51-91, 8-31; May, 52-87, 8-27; June 1to 10, 55-88, 8-22. The only measurable rainfall during this time period occurred April 23 (0.09 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. Yield was determined on June 23 by counting the number of cantaloupes in each plot that were marketable.

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 20, eight days after the first application of treatments on May 12. The "Juane canary" melon is very susceptible to powdery mildew and was planted to serve as a nursery for production of powdery mildew fungal spores once these plants became infected. A high level of disease developed on nontreated cantaloupe plants by the time they were rated for disease severity. Powdery mildew in this trial was caused by *Podosphaera xanthii* (formerly known as *Sphaerotheca fuliginea*). The degree of disease control observed on the upper leaf surface demonstrates the efficacy of each treatment under conditions of relatively good spray coverage, whereas disease control on the underside of leaves illustrates the efficacy of materials when spray coverage is less than optimal.

The number of marketable cantaloupes was significantly higher in plots where powdery mildew was well controlled compared to untreated plots.

2005 Powdery Mildew of Cantaloupe Fungicide Trial

Mike Matheron and Martin Porchas, The University of Arizona, Yuma Agricultural Center, Yuma, AZ

Treatment	Rate (lb active ingredient per acre, unless noted as amount of product)	Applic. dates [1]	Disease rating [2]		Marketable melons per plot [3]
			Upper leaf surface	Lower leaf surface	
Nontreated control	**---------**	**--------**	**4.4**	**5.0**	**30.2**
Quintec (250 g/l)	0.1	1,3,5	0	0.2	48.8
BAS 517 + Kinetic	0.37 + 16.0 fl oz prod	1,3,5	0.1	1.0	47.0
Procure 480SC	0.25	1,3,5	0.2	1.0	44.0
Procure 50WS	0.25	1,3,5	0.2	1.0	40.2
Pristine 38G + Kinetic	0.3 + 16.0 fl oz prod	1,3,5	0.3	0.9	48.4
Rubigan EC	10.0 fl oz prod	1,2,3,4,5	0.3	1.5	42.0
V-10118 EC	0.02	1,3,5	0.3	2.6	41.0
Flint 50WG alt with Bravo Ultrex 82.5 WDG	0.0625 1.5	1,5 3	0.3	3.5	42.4
Rubigan EC	8.0 fl oz	1,3,5	0.5	2.5	39.8
Rubigan EC	8.0 fl oz	1,2,3,4,5	0.5	1.8	40.2
Topsin M 70W + Microthiol Disperss 80DF	0.35 + 4.0	1,3,5	0.5	1.0	44.0
Cabrio 20WG + Kinetic	0.2 + 16.0 fl oz prod	1,3,5	0.7	1.7	43.6
Rubigan EC	6.0 fl oz	1,2,3,4,5	0.7	1.9	37.6
Rubigan EC	10.0 fl oz	1,3,5	0.7	1.8	40.4
V-10118 EC	0.03	1,3,5	0.8	2.2	40.0
Procure 50WS alt. with Serenade + Silwet L-77	0.25 8.0 qt + 2.0 fl oz prod	1,5 3	0.8	3.1	33.8
Quintec (250 g/l) alt. with Rally 40W	0.1 0.125	1,5 3	0.9	2.1	37.0
Kinetic	16.0 fl oz prod	1,3,5	1.1	3.4	34.4
Rubigan EC	6.0 fl oz prod	1,3,5	1.2	1.9	36.4
Procure 50WS alt. with Fosphite	0.25 3.0 qt prod	1,5 3	1.2	2.6	32.2
Ag Sil 25 + No Foam A alt with Rally 40W	1.5 qt + 4.0 fl oz prod 0.125	1,5 3	1.4	3.6	35.8
Procure 50WS alt with Sonata + Silwet L-77	0.25 8.0 qt + 2.0 fl oz prod	1,5 3	1.6	3.4	32.6
Rally 40W	0.125	1,3,5	2.2	2.4	39.2
Fosphite	3.0 qt prod	1,3,5	2.4	3.5	37.2
Silwet L-77	2.0 fl oz	1,3,5	2.4	3.9	35.0

Continued on next page

2005 Powdery Mildew of Cantaloupe Fungicide Trial

Michael Matheron and Martin Porchas, Yuma Agricultural Center, The University of Arizona, Yuma, AZ

Treatment	Rate (lb active ingredient per acre, unless noted as amount of product)	Applic. dates [1]	Disease rating [2]		Marketable melons per plot [3]
			Upper leaf surface	Lower leaf surface	
	Continued from preceding page				
Ag Sil 25 + No Foam A	1.5 qt + 4.0 fl oz prod	1,3,5	2.7	4.0	36.8
Topsin M 70W	0.35	1,3,5	2.8	3.0	44.6
Ag Sil 25 + No Foam A	2.0 qt + 4.0 fl oz prod	1,3,5	2.8	4.2	31.8
No Foam A	4.0 fl oz	1,3,5	3.6	4.4	38.6
Phostrol	5.0 pt	1,3,5	3.9	4.4	32.8
LSD (Least significant statistical difference, *P* = 0.05)			**0.2**	**0.2**	**5.3**

1 Treatment dates: 1 = May 12; 2 = May 19; 3 = May 26; 4 = June 1; 5 = June 8, 2005. Small powdery mildew colonies (2 to 3 mm in diameter) were first observed on some plants May 20.

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.

3 Yield of marketable melons was determined June 23, 2005.