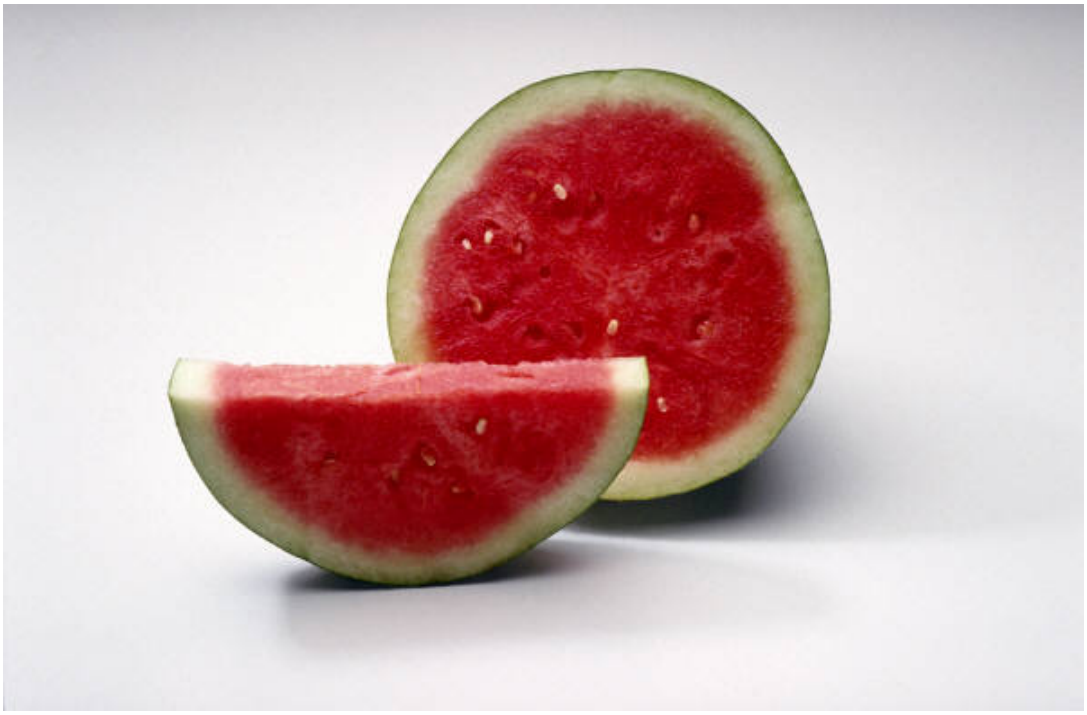
WATERMELON



2006
Powdery Mildew Control Trial in Stanislaus County

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ACKNOWLEDGEMENTS

Many thanks to Ratto Bros., Inc. and their staff for their excellent cooperation in this study. Special thanks to Ray Ratto for his continued support of UCCE vegetable crop pest management research. He generously provided the acreage needed to conduct this trial. He also supplied the mid-season field labor that trained the vines, making possible season-long fungicide applications by ground and field labor at harvest. The value of pest management efficacy trials depends largely on preventing the application of pesticides to the trial area when the larger field requires treatment for pests and diseases. Marco Turchetti was instrumental in ensuring this trial's integrity and for this I am greatly appreciative. Thanks also to Peter Reese for his assistance in coordinating the field crews that assisted in the vine-training, harvest, and crop destruct activities.

Comparative Efficacy of Fungicides Against Watermelon Powdery Mildew

The experiment was conducted with Ratto Bros., Inc. in Modesto CA. The soil was a Dinuba sandy loam. On 26 May, K-pam HL was applied at 34 gal/A through drip tape installed 8-in. below the center of 80-in.-wide raised beds that were then shaped and covered with black polyethylene mulch. Three to four week-old seedlings of a seedless cultivar, 'Fandango' and a seeded cultivar, 'Fiesta', were transplanted 36-in. apart within rows on 20 Jun at a ratio of 2 'Fandango': 1 'Fiesta'. Water was supplied as needed through the subsurface drip tape. A randomized complete block design with 4 replications was used. A replicate was a single, 25-ft long bed. An 84-in. boom with 12-in. single-swivel drop tubes and five evenly spaced DG 8004 flat fan nozzles was calibrated to deliver treatments to plants in a 50 gallon per acre spray volume equivalent at 40 psi CO_2. The first application was made on 15 Jul. Mildew was not observed at this time and the vines had not yet entered the furrows. Follow-up treatments were made on 25 Jul and 4 and 15 Aug. Beet armyworm (*Spodoptera exigua*) was managed with an application of Success (8 fl oz/A) as a tank-mix with fungicide treatments on 22 Jul. An application of Agri-Mek 0.15EC (8 fl oz/A) and Acramite (1 lb/A) was made on 29 Jul and 15 Aug, respectively, to control spider mites (*Tetranychus urticae*). Mildew incidence and severity were evaluated from the upper and lower surfaces of 10 leaves collected from each plot on both 10 and 22 Aug. Disease incidence was recorded as the proportion of the sample with at least one powdery mildew lesion. Disease severity was measured on 10 Aug by counting the total number of lesions on the upper and lower leaf surfaces and rated on 22 Aug using the Horsfall-Barrett disease severity rating scale. Severity ratings were back-transformed to percentages using the midpoints of the class ranges and then averaged. Plots were hand-harvested on 28 Aug and 7 Sep. The number of fruit harvested and fruit weight were recorded for each harvest and then combined. A square root transformation was applied to the 10 Aug disease severity data, and proportion data were arcsine square root transformed prior to a one-way analysis of variance. Non-normal datasets were analyzed using the Kruskal-Wallis one-way analysis of ranks. Treatment means and medians were separated, in all cases, using Tukey's honestly significant difference test. Average high and low temperatures (°F) for Jul, Aug, and Sep were 93.4/58.3, 88/51.6, 84.5/48.3, respectively. Total rainfall for these months was 0.01, 0.00, and 0.01-in.

Treatment differences in mildew incidence on upper leaf surfaces were not observed at either evaluation period. Season-long reductions in mildew severity on upper leaf surfaces were obtained only with Topsin, Switch, and V-10118 rotations with Echo 720. These 3 fungicide treatments were also effective in reducing the incidence of mildew on the lower leaf surface at the first but not the final disease evaluation. As compared to the control, Switch alternated with Echo 720 was the only treatment that showed a significant reduction in mildew severity at the first evaluation. However, by Aug 22, mildew was no less severe in plots treated with Switch than in plots receiving any other treatment. Fruit yield and number of fruit harvested were not affected by treatment. For the first 5-6 weeks of field growth powdery mildew pressure was high and present in nearby fields at transplant. In July, the region was affected by extreme temperatures and we hypothesize that these temperatures were responsible for the below average yields in this trial and the vast amount of vegetative growth produced by the plants that prevented thorough fungicide coverage in August using a 50 gal/acre spray volume equivalent. Despite these conditions, no phytotoxicity was observed in this trial.

Table 1. Powdery mildew incidence and severity on upper and lower watermelon leaf surfaces.

	Disease Incidence (%)[z]				Disease Severity[y]			
	10 Aug		22 Aug		10 Aug		22 Aug	
Treatment, product/A[x]	Upper Leaf	Lower Leaf	Upper Leaf	Lower Leaf	Upper Leaf	Lower Leaf	Upper Leaf	Lower Leaf
Switch 62.5WG 0.75 lb (1,3)								
Echo 720 3 pt (2,4).....	20.0 a[w]	7.5 a	55.0 a	55.0 a	5.5 a	1.5 a	7.0 a	2.0 a
Echo 720 3 pt (1)								
Serenade MAX 1 lb (2,3,4)								
Flint 50WG 1.5 oz (2,3,4)								
Silwet 1.5 fl oz (2,3,4).....	42.5 a	27.5 ab	100.0 a	85.0 a	19.0 a	8.3 ab	33.5 ab	8.8 a
Topsin M 70WP 8 oz (1-4)								
Microthiol Disperss 5 lb (1-4)...	32.5 a	22.5 a	50.0 a	45.0 a	22.0 a	7.3 ab	4.1 a	7.4 a
Flint 50WG 2 oz (1,3)								
Echo 720 3 pt (2,4).....	37.5 a	27.5 ab	75.0 a	80.0 a	26.3 a	10.3 ab	16.4 ab	6.7 a
Quadris 2.08SC 12.5 fl oz (1,3)								
Echo 720 3 pt (2,4).....	40.0 a	37.5 ab	90.0 a	80.0 a	53.0 ab	47.8 ab	15.4 ab	8.9 a
V-10118 0.41EC 6.2 fl oz (1,3)								
Echo 720 3 pt (2,4).....	25.0 a	25.0 a	50.0 a	60.0 a	25.5 a	13.3 ab	7.9 a	3.5 a
V-10118 0.41EC 6.2 fl oz (1-4)								
Sonata ASO 6 pt (1-4).....	50.0 a	40.0 ab	95.0 a	65.0 a	50.5 ab	13.0 ab	16.2 ab	3.0 a
V-10118 0.41EC 3.1 fl oz (1,3)								
Sonata ASO 4 pt (2,4)……..	45.0 a	37.5 ab	80.0 a	80.0 a	19.5 a	10.3 ab	16.4 ab	5.8 a
Rally 40WSP 5 oz (1,3)								
Echo 720 3 pt (2,4) …….	50.0 a	42.5 ab	80.0 a	75.0 a	13.8 a	19.3 ab	11.5 ab	4.8 a
Pristine 38WDG 12.5 oz (1,3)								
Echo 720 3 pt (2,4)……..	51.4 a	28.3 ab	95.0 a	100.0 a	13.8 a	9.5 ab	20.4 ab	9.7 a
Procure 50WS 8 oz (1,3)								
Echo 720 3 pt (2,4) …….	47.5 a	40.0 ab	85.0 a	80.0 a	39.3 a	23.0 ab	14.3 ab	10.9 a
Procure 50WS 8 oz (1,3)								
Sonata ASO 6 pt (2,4)……..	42.5 a	27.5 ab	95.0 a	75.0 a	37.0 a	8.5 ab	26.3 ab	9.2 a
Procure 50WS 4 oz (1-4)								
Sonata ASO 4 pt (1-4)……..	60.0 a	40.0 ab	100.0 a	80.0 a	64.5 ab	21.5 ab	33.2 ab	8.0 a
Non-treated	80.0 a	75.0 b	100.0 a	95.0 a	215.3 b	111.8 b	47.5 b	17.1 a

Table 1.

[z] Disease incidence is the proportion of leaves with symptoms of powdery mildew on the upper or lower leaf surface. A one way analysis of variance was conducted on the 10 Aug lower leaf disease incidence data and a one-way Kruskal-Wallis analysis of variance on ranks was used on the remaining three disease incidence datasets. Tukey's test was used in all cases to separate the treatment means or medians.

[y] Disease severity was measured on 10 Aug by counting the total number of lesions on each leaf surface. On 22 Aug, the Horsfall-Barrett rating scale was used to estimate disease severity where 1=0%, 2=0-3%, 3=3-6%, 4=6-12%, 5=12-24%, 6=25-50%, 7=50-75%, 8=75-87%, 9=87-94%, 10=94-97%, and 11=97-100%. Upper leaf surface and lower leaf surface disease severity data collected on 10 and 22 Aug, respectively, were analyzed by analysis of variance as a one-way classification. The remaining disease severity datasets were non-normal and analyzed using the Kruskal-Wallis analysis of variance on ranks test

[x] Numbers in parentheses are treatment timing where 1=15 Jul, 2=25 Jul, 3=4 Aug, and 4=15 Aug.

[w] Data shown are the non-transformed treatment means. Treatment means and medians were separated using Tukey's honestly significant difference test at P=0.05. Means followed by the same letter are not statistically different.

Table 2. Fruit yield and number of fruit harvested from fungicide-treated and non-treated plots.

Treatment, product/A[z]	Number of fruit/A	Yield (t/A)
Switch 62.5WG 0.75 lb (1,3)		
Echo 720 3 pt (2,4)	3,920 a[y]	32.2 a
Echo 720 3 pt (1)		
Serenade MAX 1 lb + Flint 50WG 1.5 oz +		
Silwet 1.5 fl oz (2,3,4)	4,509 a	35.5 a
Topsin M 70WP 8 oz + Microthiol Disperss 5 lb (1-4)……	4,117 a	35.3 a
Flint 50WG 2 oz (1,3)		
Echo 720 3 pt (2,4)	4,574 a	36.7 a
Quadris 2.08SC 12.5 fl oz (1,3)		
Echo 720 3 pt (2,4)	4,901 a	38.8 a
V-10118 0.43EC 6.2 fl oz (1,3)		
Echo 720 3 pt (2,4)	4,182 a	30.5 a
V-10118 0.43EC 6.2 fl oz		
Sonata ASO 6 pt (1-4) ..... ……..	4,901 a	42.0 a
V-10118 0.43EC 3.1 fl oz (1,3) + Sonata ASO 4 pt (2,4)...	4,443 a	36.3 a
Rally 40WSP 5 oz (1,3)		
Echo 720 3 pt (2,4)	4,639 a	35.6 a
Pristine 38WDG 12.5 oz (1,3)		
Echo 720 3 pt (2,4)	4,639 a	37.2 a
Procure 50WS 8 oz (1,3)		
Echo 720 3 pt (2,4)	3,528 a	28.1 a
Procure 50WS 8 oz (1,3)		
Sonata ASO 6 pt (2,4)	4,901 a	38.1 a
Procure 50WS 4 oz + Sonata ASO 4 pt (1-4)	4,835 a	36.0 a
Non-treated	3,790 a	30.7 a

[z] Numbers in parentheses are treatment timing where 1=15 Jul, 2=25 Jul, 3=4 Aug, and 4=15 Aug.

[y] Means followed by the same letter are not significantly different according to Tukey's honestly significant difference test at P=0.05.

CAUTION

This publication is a research progress report that describes a watermelon pest management study conducted in Stanislaus County during 2006 with a local grower cooperator. It should not, in any way, be interpreted as a recommendation of the University of California. Trade names are used in this report instead of chemical names because the audience targeted is more familiar with the trade names of these products. No endorsement of products mentioned or criticism of similar products is intended. The rates of pesticides in this report are always expressed as formulated product/A (the amount of formulated product per treated acre) unless otherwise indicated. The Fungicide Resistance Action Committee (FRAC) and the Insecticide Resistance Action Committee (IRAC) have coded fungicides and insecticides, respectively, based on their mode of action. To avoid resistance developing in pathogen and pest populations' chemicals with the same code should not be tank-mixed or used in alternation.

Table 3. Fungicides used in this trial.

Trade Name	Common or Chemical Name	Manufacturer	FRAC Code	Reduced Risk
Echo 720	chlorothalonil	Sipcam Agro USA, Inc.	M5	No
Endura 70WP	boscalid	BASF	7	Yes
Flint 50WG	trifloxystrobin	Bayer CropScience	11	Yes
Microthiol Disperss	micronized sulfur	Cerexagri, Inc.	M2	No
Pristine 38WDG	pyraclostrobin + boscalid	BASF	11+7	No + Yes
Procure 50WS	triflumizole	Crompton Corp.	3	No
Quadris	azoxystrobin	Syngenta	11	Yes
Rally 40WP	myclobutanil	Dow AgroSciences, LLC	3	No
Serenade Max	*Bacillus subtilis*	AgraQuest, Inc.	biofungicide	Yes
Sonata ASO	*Bacillus pumulis*	AgraQuest, Inc.	biofungicide	Yes
Switch 62.5 WG	cyprodonil + fludioxanil	Syngenta	9+12	Yes + Yes
Topsin M 70WP	thiophanate-methyl	Cerexagri, Inc.	1	No
V-10118 0.41EC	not disclosed	Valent USA	ND*	ND*

*ND = not determined by EPA, yet.

Table 4. Insecticides used in this trial.

Trade Name	Common or Chemical Name	Manufacturer	IRAC Code	Reduced Risk	OP Alternative
Acramite 50WS	bifenazate	Cromptura	2D	Yes	No
Success	spinosad	Dow AgroSciences, LLC	5	Yes	Yes
Agri-Mek 0.15EC	abamectin	Syngenta	6	No	No

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