Cooperative Research Project, Doug Gubler, U.C. Davis Dept. of Plant Pathology

Trial name	Cucurbit Powdery Mildew Trial, 2004 Preliminary report: 19 November 2004
Location	Armstrong field area, U. C. Davis Plant Pathology Experimental Farm
Investigators	Doug Gubler, 530.752.0304; Ken Dell, 752.4982
Cooperators	Tom Komineck, U. C. Davis Plant Pathology
Crop.....	Cantalope 'Top Net Senior', Pumpkin 'Atlantic Giant'
Disease	Powdery mildew: *Sphaerotheca fuliginea*

Trial layout and method

Objective	Efficacy of fungicides for control of foliar powdery mildew		
Experimental design....	Treatments consist of 4 fungicide applications to single bed plots, in a randomized complete block design, with 6 replications.		
Application method.....	Backpack sprayer, dual nozzle wand (Echo SHR2100)		
plant spacing`	pump:18"; clope:12"	Bed spacing	pump: 10'; clope: 7'
Treatment unit	64" row length	Treatment unit area.....	53.3 (p) + 37.3 (c) = 90.6 ft^2
Area/Treatment, sq ft ..	544 ft^2	Area/Treatment, acre ...	0.01249
Vol. Water/acre, gal	180	Vol. water/trt, liter.....	8.5 (9.5L =10qt tank)
Apps. Start.....	Sept 22, 2004	Apps. End	Oct 30, 2004
Treatment interval	10-14 days as needed	Evaluation stage	7d + end of applications
Evaluation method	Leaf surface, upper and lower, rated for # colonies and/or surface covered with mildew.		

Treatments protocol

#	Col	Materials	Interval	FP/ac		FP/trt		FP/tank	Tol
1	W	UTC							Y
2	Y	Rally 40W	10-14	4.0	oz	1.42	g	1.51	Y
3	P	Procure 50WS	10-14	6.0	oz	2.13	g	2.38	Y
4	B	Procure 50WS	10-14	8.0	oz	2.84	g	3.18	Y
5	G	Procure 480SC	10-14	6.0	fl oz	2.22	ml	2.49	Y
6	K	Procure 480SC	10-14	8.0	fl oz	2.96	ml	3.31	Y
7	O	Rally 40W 1x fol/by Quintec 250SC	10-14	4 6	oz fl oz	1.42 2.22	g ml	1.51 2.49	N
8	Y-G	Rally 40W 1x fol/by Quintec 250SC	10-14	4 12	oz fl oz	1.42 4.44	g ml	1.51 4.97	N
9	P-G	V-10118 .41EC	10-14	3.12	floz	1.15	ml	1.29	N
10	B-G	V-10118 .41EC	10-14	6.24	floz	2.31	ml	2.59	N
11	K-G	Flutriafol	10-14	4	floz	1.48	ml	1.66	N
12	O-G	Flutriafol	10-14	8	floz	2.96	ml	3.31	N

Notes:

1. Tol indicates whether all products in the treatment have an EPA tolerance for cucurbits and if the crop can be harvested.
2. Plot evaluations include horticultural observations: plant vigor, leaf color, leaf phytotoxicity symptoms.

Materials list

Sponsor	Product	Active Ing.	Conc	Tol	Manufctr	Contact
Lab	Rally 40W	Myclobutanil	40%	Y	DowAgro	Jim Mueller
Uniroyal	Procure 50WS Procure 480SC	Triflumizole Triflumizole	50% 480 g/L	Y Y	Uniroyal Uniroyal	Curt Sandberg
Dow	Quintec 250SC Rally 40W	Quinoxyfen Myclobutanil	250g/L 40%	N Y	DowAgro	Jim Mueller
IR4	V-10118 .41EC	V-10118	.41 lb/gal	Y	Valent	Tom DeWitt
Cheminova	Flutriafol	Flutriafol	125 g/L	N	Cheminova	Richard Myers

Application schedule

Date..... App.#..... Crop..... Stage..... Vol/trt.....	22 Sept 1 cantaloupe, pumpkin prebloom-bloom 7.5 qts		5 Oct 2 cantaloupe, pumpkin bloom, fruit 9 qts		16 Oct 3 cantaloupe, pumpkin fruit 9 qts		25 Oct 4 cantaloupe, pumpkin fruit 9 qts	
Trt# 1	--		--		--		--	
2	Rally	1.4g	Rally	1.4g	Rally	1.4g	Rally	1.4g
3	Procure 50	2.1g	Procure 50	2.1g	Procure 50	2.1g	Procure 50	2.1g
4	Procure 50	2.8g	Procure 50	2.8g	Procure 50	2.8g	Procure 50	2.8g
5	Procure 480	2.2ml	Procure 480	2.2ml	Procure 480	2.2ml	Procure 480	2.2ml
6	Procure 480	3.0ml	Procure 480	3.0ml	Procure 480	3.0ml	Procure 480	3.0ml
7	Rally	1.4g	Quintec	2.2 ml	Quintec	2.2 ml	Quintec	2.2 ml
8	Rally	1.4g	Quintec	4.4 ml	Quintec	4.4 ml	Quintec	4.4 ml
9	V-10118	1.2ml	V-10118	1.2ml	V-10118	1.2ml	V-10118	1.2ml
10	V-10118	2.3ml	V-10118	2.3ml	V-10118	2.3ml	V-10118	2.3ml
11	Flutriafol	1.5ml	Flutriafol	1.5ml	Flutriafol	1.5ml	Flutriafol	1.5ml
12	Flutriafol	3.0ml	Flutriafol	3.0ml	Flutriafol	3.0ml	Flutriafol	3.0ml

Calendar of events

Date	Activity
11 Aug	seed planted, cantaloupe at 3"t interval, pumpkin at 3 ft interval.
13 Aug	Pumpkin interplanted at 1.5 ft interval.
23 Aug	1-2 leaf stage both crops. Stand good to fair. Plant spacing cantaloupe: 3 – 12"; pumpkin: 18"
7 Sept	No mildew observed; leafhopper and whitefly moderate population.
22 Sept	Flag plots to 64",6 reps. Treat all plants with 30 ml Knack in 30 qts (Echo). App. #1 3-5pm.
24 Sept	Disease progress monitor; 10+ leaves examined per UTC plot.
5 Oct	2nd application; KD; 12 – 2pm. Calm, warm, dry, clear. 10 qts tank/treatment; 11 sec cantaloupe, 22 seconds pumpkin each plot.
8 Oct	Rate UTC plots. 1 clopshoot /plot, with 14 -17 leaves; 5 pkin leaves at random. Older leaves likely to be infected both crops, (clop leaf position 14, 15). Knack application for control of whiteflies, 50ml in 30qt = 10 floz in 51 gal/A; Echo sprayer.
16 Oct	3rd application; KD; 12-3pm; few diabrotica, few whiteflies. Pumpkin leaves starting slight senesce.
25 Oct	4th application, KD; 12-3pm; 9 day interval due to impending rain, and cooler weather.
8 Nov	Sample all plots for rating; 10 leaves Pumpkin, 12 leaves cantaloupe, at random.

Plot map: treatment # / flag

Cantaloupe

Row 1	Row 2
1 Y	**2** W
K-G	Y
B	K
P	G
K	O-G
Y-G	Y-G
W	P
G	B-G
O-G	B
B-G	P-G
P-G	K-G
O	O
3 B	**4** Y
K-G	P
Y	B
O-G	G
B-G	K
P	O
Y-G	Y-G
K	P-G
O	B-G
W	K-G
P-G	O-G
G	W
5 O	**6** O-G
K	P
B-G	O
O-G	B-G
K-G	P-G
P	K-G
Y-G	Y-G
G	W
Y	K
B	Y
P-G	B
W	G

Pumpkin

Row 3	Row 4
1 P-G	
B-G	**2** K
W	B-G
Y	O
K-G	O-G
G	K-G
O-G	Y-G
B	P
O	Y
P	W
K	P-G
Y-G	B
3 K-G	G
G	**4** Y-G
Y-G	Y
O-G	P
W	O-G
P	K
K	P-G
O	G
Y	W
B-G	O
B	K-G
P-G	B
5 W	B-G
Y	**6** O-G
O-G	K
K	P
P-G	G
G	O
O	B
K-G	B-G
P	W
B-G	K-G
B	Y-G
Y-G	
P-G	
Y	

Results

Fungicides were applied 4 times at 9 to 12 day intervals, on 22 Sept, 5,16 and 25 Oct, for each treatment. Plots were sampled for rating on 8 Nov by selecting 10 leaves per plot at random; leaves were kept refrigerated until examination. Each leaf was rated on upper and lower leaf surfaces; data is given for upper, lower, and both leaf surfaces combined. Ratings consist of examination with a hand lens for powdery mildew, and count or estimation of the number of colonies and severity category for each leaf surface. Severity category is based on approximate leaf surface coverage by mildew where category 0.5= <1%, category 1= 1-4%, category 2= 5-9%, and category 3= 10+%. Values were analyzed by ANOVA and Fisher's LSD t test at P=0.05.

Table 1. Results of pumpkin leaf rating for both leaf surfaces.

Trt #	Materials	No. colonies/ leaf surface[1]	Severity category[2]	Incidence, %[3]
4	Procure 50WS, 8 oz	0.0 b[4]	0.0 c[4]	0.0 d[4]
6	Procure 480 SC, 8 fl oz	0.0 b	0.0 c	0.0 d
10	V-10118 .41EC, 6.24 floz	0.0 b	0.0 c	0.0 d
7	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 6 fl oz, 3x	0.0 b	0.0 c	0.8 d
8	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 12 fl oz, 3x	0.0 b	0.0 c	0.8 d
9	V-10118 .41EC, 3.12 floz	0.0 b	0.0 c	0.8 d
3	Procure 50WS, 6 oz	0.1 b	0.0 c	2.5 d
5	Procure 480 SC, 6 fl oz	0.0 b	0.0 c	2.5 d
2	Rally 40W, 4 oz	0.1 b	0.0 bc	6.7 cd
12	Flutriafol, 8 floz	0.3 b	0.1 bc	13.3 c
11	Flutriafol, 4 floz	1.9 b	0.2 b	39.2 b
1	Untreated control	42.5 a	2.4 a	96.7 a

Table 2. Results of pumpkin leaf rating for upper leaf surfaces.

Trt #	Materials	No. colonies/ leaf surface[1]	Severity category[2]	Incidence, %[3]
3	Procure 50WS, 6 oz	0.0 b[4]	0.0 b[4]	0.0 c[4]
4	Procure 50WS, 8 oz	0.0 b	0.0 b	0.0 c
6	Procure 480 SC, 8 fl oz	0.0 b	0.0 b	0.0 c
7	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 6 fl oz, 3x	0.0 b	0.0 b	0.0 c
8	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 12 fl oz, 3x	0.0 b	0.0 b	0.0 c
9	V-10118 .41EC, 3.12 floz	0.0 b	0.0 b	0.0 c
10	V-10118 .41EC, 6.24 floz	0.0 b	0.0 b	0.0 c
5	Procure 480 SC, 6 fl oz	0.0 b	0.0 b	1.7 c
12	Flutriafol, 8 floz	0.1 b	0.0 b	3.3 c
2	Rally 40W, 4 oz	0.1 b	0.0 b	5.0 c
11	Flutriafol, 4 floz	0.9 b	0.2 b	31.7 b
1	Untreated control	39.2 a	2.1 a	93.3 a

Table 3. Results of pumpkin leaf rating for lower leaf surfaces.

Trt #	Materials	No. colonies/ leaf surface[1]	Severity category[2]	Incidence, %[3]
4	Procure 50WS, 8 oz	0.0 c[4]	0.0 c[4]	0.0 d[4]
6	Procure 480 SC, 8 fl oz	0.0 c	0.0 c	0.0 d
10	V-10118 .41EC, 6.24 floz	0.0 c	0.0 c	0.0 d
7	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 6 fl oz, 3x	0.0 c	0.0 c	1.7 d
8	Rally 40W, 4 oz, 1x fol/by Quintec 250SC, 12 fl oz, 3x	0.0 c	0.0 c	1.7 d
9	V-10118 .41EC, 3.12 floz	0.0 c	0.0 c	1.7 d
5	Procure 480 SC, 6 fl oz	0.1 c	0.0 c	3.3 d
3	Procure 50WS, 6 oz	0.1 c	0.0 c	5.0 d
2	Rally 40W, 4 oz	0.2 c	0.0 c	8.3 d
12	Flutriafol, 8 floz	0.5 c	0.1 c	23.3 c
11	Flutriafol, 4 floz	3.0 b	0.3 b	46.7 b
1	Untreated control	45.8 a	2.7 a	100.0 a

[1]No. colonies/leaf surface was counted on upper and lower leaf surfaces

[2]Severity category is based on % leaf coverage with mildew where category 0.5=<1%, category 1=1-4%, category 2 = 5-9%, and category 3 = 10+%.

[3].Incidence is the % of leaves with any mildew.

[4]Values in a column followed by the same letter are not significantly different according to Fisher's LSD test at P=0.05.