

**Evaluation of control of powdery mildew on pumpkin with fungicides - Hancock, 2001**

Seeds of pumpkin cultivar Connecticut Field were direct seeded on June 7 in a field trial at the Hancock Agricultural Research Station, in central WI, to evaluate fungicide efficacy for powdery mildew control. Seeds were planted 4-5 per hill and then thinned to leave the one best plant per hill. Each treatment plot consisted of a single row containing five plants, spaced three feet apart in the row. Rows were planted 12 feet apart with alleys 10 feet wide between ends of adjacent plots. Where it was necessary for spray equipment to drive between rows to make fungicide applications, the rows were 18 feet apart. The trial was designed as a randomized complete block with four replications. Soil type was a Plainfield sand with pH 6.3. Fertilizer applications consisted of 5-10-30, 100 lb/A, placed in the furrow when rows were marked prior to planting and two additional sidedress applications of N during the growing season (34-0-0, 225 lb/A), July 9 and July 26. Agrimek (8 oz./A) was applied July 30 to control two-spotted spider mites. Fungicide treatments began at flowering and were applied with a plot sprayer with a tractor-mounted boom pressurized with an air compressor. Treatments were applied beginning July 24, according to treatment protocol, at a rate equivalent to 35 gal water/A at 40 psi, using Tee Jet D3-23 nozzles (15 nozzles at 8-inch spacing). Plots received natural inoculum only. Powdery mildew severity was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage and stems dead) and ratings were converted to %. On Aug 8, 22 and 31, and Sep 13, eight older leaves, eight middle-aged leaves and eight new leaves were rated in each plot. In addition, whole plot assessment (also using the Horsfall-Barratt scale) was done for five areas (approximately 3 by 3 feet) in each plot on Jul 31, Aug 8, 22 and 31, and Sep 10 and 13. All pumpkin fruit were harvested and weighed individually on Oct 2. Pumpkins were categorized as marketable (solid, predominantly orange), green (more than 50% green) or soft and rotting. Rainfall measured during the growing season (inches) was Jun (4.1); Jul (2.73); Aug (4.57) and Sep (4.59). An additional 8 inches of water was applied as overhead sprinkler irrigation in 16 applications (Jun 26 - Sep 5).

Disease pressure remained light through July and most of August, likely a result of the unseasonably hot and dry weather through this period. Powdery mildew colonies were first observed on pumpkin foliage on August 8 and by August 22, over 70% of the oldest leaves in the untreated check plots exhibited symptoms of powdery mildew. Younger leaves exhibited less infection than the older leaves on each of the ratings. On August 22, all fungicide programs except TD2435-01 provided acceptable control. In subsequent ratings, treatments with Flint/Folicur and Flint/Procure appeared to provide somewhat better control than Topsin M/Bravo and TD2435-01 with considerably lower total active ingredient applied. At harvest on October 2, there were numerical differences in yield between the untreated check plots and plots treated with fungicide where powdery mildew was controlled. However, these numerical differences in yield of marketable, green or decayed fruit were not significant between treatments. Given the late appearance of powdery mildew in these plots, differences in control were not reflected in increased yield.

**Table 1. Summary of treatments applied.**

No.	Treatment, Rate/Acre Formulated Product (and active ingredient in [ ]) and Application Dates	Total a.i./Trt (lb)
1	Unsprayed Control	0
2	Flint 50 WG, 0.13 lb [0.06 lb] Folicur 3.6 F, 0.38 pt [0.17 lb] + Silwet 0.25% v/v	Applied: 7/24, 8/21 Applied: 8/7, 9/4 0.46
3	Flint 50 WG, 0.94 lb [0.05 lb] Folicur 3.6 F, 0.25 pt [0.11 lb] + Silwet 0.25% v/v	Applied: 7/24, 8/21 Applied: 8/7, 9/4 0.32
4	Topsin M 70WP, 0.25 lb [0.18 lb] Bravo WS 6F, 2.0 pt [1.5 lb]	Applied: 7/24, 8/21 Applied: 8/7, 9/4 3.36
5	Topsin M 70WP, 0.50 lb [0.35 lb] Bravo WS 6F, 2.0 pt [1.5 lb]	Applied: 7/24, 8/21 Applied: 8/7, 9/4 3.7
6	TD 2435-01 90WG, 0.2 lb [0.18 lb]	Applied: 7/24, 8/7, 8/21, 9/4 0.72
7	TD 2435-01 90WG, 0.4 lb [0.36 lb]	Applied: 7/24, 8/7, 8/21, 9/4 1.44
8	Flint 50 WG, 1.5 oz [0.05 lb] Procure 50WS, 6 oz [0.19 lb]	Applied: 7/24, 8/21 Applied: 8/7, 9/4 0.48
9	Flint 50 WG, 1.5 oz [0.05 lb] Procure 50WS, 8 oz [0.25 lb]	Applied: 7/24, 8/21 Applied: 8/7, 9/4 0.60
10	Flint 50 WG, 1.5 oz [0.05 lb] Procure 50WS, 6 oz [0.19 lb] + Silwet 0.0625% v/v	Applied: 7/24, 8/21 Applied: 8/7, 9/4 0.48

**Table 2. Effect of treatment on severity of powdery mildew.**

Treatment No.	Percent Foliage Infection (individual leaf rating) <sup>1</sup>												Disease Severity (whole plot rating, %) <sup>2</sup>					
	8/8			8/22			8/31			9/13			7/31	8/8	8/22	8/31	9/10	9/13
	Older	Middle	Young	Older	Middle	Young	Older	Middle	Young	Older	Middle	Young						
1	5.2	1.2	0.1	74.0	45.1	2.2	100.0	96.0	53.4	99.6	95.6	51.1	0.0	2.2	31.1	73.0	87.5	90.9
2	0.0	0.0	0.0	14.8	5.6	0.7	62.5	45.1	10.4	91.1	34.0	4.0	0.0	0.0	6.8	25.5	49.5	54.2
3	0.7	0.4	0.0	10.9	7.0	0.6	63.2	37.8	4.5	95.3	38.5	4.9	0.0	0.1	6.6	18.3	62.3	66.1
4	1.2	0.2	0.0	17.2	4.5	0.7	81.3	35.5	12.4	100.0	77.6	16.2	0.0	0.7	10.1	43.6	85.5	88.8
5	1.1	0.4	0.0	19.9	2.1	0.1	94.7	59.9	18.7	99.2	73.6	8.6	0.0	0.6	8.8	58.4	88.5	89.0
6	0.7	0.2	0.0	62.7	24.2	2.8	99.2	87.6	16.3	99.7	88.7	13.3	0.0	0.1	12.7	65.3	85.8	89.2
7	1.2	0.1	0.0	53.3	12.5	0.4	95.1	65.4	10.7	100.0	92.8	22.3	0.0	0.6	12.9	61.7	89.6	90.4
8	1.1	0.0	0.0	29.5	7.2	0.1	81.1	60.3	5.0	97.1	72.5	19.5	0.0	0.4	11.6	30.8	65.5	68.4
9	0.5	0.2	0.0	22.3	4.2	0.3	80.3	51.4	10.9	98.8	75.6	9.1	0.0	0.4	7.3	25.3	78.0	78.9
10	0.0	0.0	0.0	11.6	1.1	0.2	75.4	46.6	4.3	91.3	42.0	8.1	0.0	0.0	6.3	23.3	57.5	60.6
Pr > F <sup>3</sup>	0.01	0.06	0.46	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.37	< 0.01	< 0.01	---	0.01	< 0.01	< 0.01	< 0.01	< 0.01
LSD <sup>3</sup>	2.5	0.7*	NS	25.5	13.0	1.6	20.8	25.3	13.3	NS	24.0	21.3	---	1.1	7.2	16.8	18.2	17.0

1 Severity was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage and stems dead). Ratings were converted to percentages. On each rating date, eight older leaves, eight middle aged leaves and eight young leaves were rated in each plot.

2 On each rating date, five approximately 1 m<sup>2</sup> areas per plot were observed. Severity was rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage and stems dead). Ratings were converted to %.

3 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$ . \* indicates significant at  $P = 0.10$  but not at  $P = 0.05$ .

**Table 3. Effect of treatment on pumpkin yield.**

Treatment number	Total Yield			Avg. weight per pumpkin (lb)		Avg. no. of pumpkins per plot	Pumpkin quality at harvest					
	Weight (ton/A)		% Marketable (weight)	All harvested	Marketable <sup>1</sup>		Marketable		Green <sup>2</sup>		Soft, rotting	
	Total	Marketable <sup>1</sup>					Avg. no./ plot	%	Avg. no./ plot	%	Avg. no./ plot	%
1	9.7	8.6	92.8	16.2	15.8	6.3	5.8	94.4	0.0	0.0	0.5	5.6
2	15.6	14.6	93.8	16.7	18.7	9.8	8.3	83.5	0.5	5.9	1.0	10.6
3	14.8	13.6	90.9	15.7	17.4	9.8	8.3	83.0	0.8	9.0	0.8	8.0
4	11.0	10.5	91.8	17.0	17.9	6.8	6.0	87.5	0.3	4.2	0.5	8.3
5	11.9	10.9	92.1	17.5	18.4	7.3	6.3	87.5	0.5	6.9	0.5	5.6
6	11.1	9.6	86.2	17.0	19.1	7.0	5.3	75.6	0.5	9.8	1.3	14.6
7	11.1	10.4	91.8	16.0	17.6	7.3	6.0	84.7	0.8	9.4	0.5	5.9
8	13.4	12.7	94.6	19.1	21.0	7.3	6.3	86.0	0.0	0.0	1.0	14.0
9	13.3	12.3	91.7	17.1	17.5	8.5	7.5	89.4	1.0	10.6	0.0	0.0
10	13.1	11.8	90.4	18.2	18.9	7.5	6.5	87.2	0.8	9.7	0.3	3.1
Pr > F <sup>3</sup>	0.14	0.25	0.99	0.96	0.69	0.14	0.31	0.88	0.58	0.71	0.50	0.55
LSD <sup>3</sup>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

1 Marketable yield excludes green and soft-rotted pumpkins

2 More than 50% green at time of harvest

3 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated. NS = not significant at  $P = 0.10$ .