

Timing of application of foliar fungicides for control of Cercospora leaf spot and incidental control of Rhizoctonia crown and root rot in sugar beet, 2005.

W. W. Kirk, R. L. Schafer, D. Berry, P. Tumbalam, P. Wharton, 35 Plant Biology Building, Department of Plant Pathology, Michigan State University, East Lansing, MI 48824

Sugar beet cv. E17 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Saginaw, MI on 22 Apr. Seed was planted at 1" depth into four-row by 50-ft plots (ca. 4.375 in. between plants to give a target population of 275 plants/100ft. row) with 30" between rows replicated four times in a randomized complete block design. Fertilizer was drilled into plots immediately before planting, formulated according to results of soil tests (125 lb 46-0-0/A). No additional nitrogen was applied to the growing crop. Plots were inoculated by spreading sugarbeet foliar residue collected the previous season on 15 Jun across all plots. Fungicides were applied on a twenty-one-day interval (three applications), starting after the 55 Beetcast disease severity values were recorded in the area, starting on 16 Jul. Fungicides were applied with a hand-held R&D spray boom delivering 25 gal/A (80 p.s.i.) and using three XR11003VS nozzles per row. Weeds were controlled by cultivation and with a mixture of Pyramin DF at 5 lb/A plus Nortron at 4 pt/A applied at planting. Insects were controlled as necessary. Foliar leaf spot severity was measured using a 1 - 10 scale; 1 = 1 - 5, 0.1%; 2 = 6 - 12, 0.35%; 3 = 13 - 25, 0.75%; 4 = 26 - 50, 1.5%; 5 = 51 - 75, 2.5%; spots/leaf or severity; respectively; 6 = 3% (proven economic damage); 7 = 6%; 8 = 12%; 9 = 25%; and 10 \geq 50% severity. Evaluations were taken on 23 and 30 Aug and 25 Sep. Plants with signs and symptoms of Rhizoctonia crown and root rot were counted 126 days after planting (DAP; trial B) on 26 Aug. Beet roots were machine-harvested on 16 Oct and individual treatments were weighed. Sucrose content has still to be determined.

Trial A: Cercospora leaf spot developed slowly throughout the growing season and reached a mean index of 7.0 in the untreated control by 25 Sep. By 23 Aug there were no significant differences among treatments. By 30 Aug, the Cercospora leaf spot increased in the untreated control from 1.5 to 3.5. Treatments with indices less than 1.5 were significantly different from the untreated control. Treatments with indices from 0.34 to 2.5, 0.75 to 2.75 and 1.5 to 3.5 were not sufficiently different. By 25 Sep the Cercospora leaf spot increased in the untreated control from 3.5 to 7.0 (above the threshold of economic damage). All treatments were significantly different from the untreated control. There was no significant difference among treatments with indices between 0.75 to 2.63; 1.13 to 3.25; 1.5 to 3.5, 1.88 to 3.75, and 7.0 (the untreated check). No fungicide treatment program exceeded the economic damage threshold (index = 6.0).

There were no significant differences among treatments in terms of clear juice purity, recoverable white sucrose per acre of sugarbeets or yield/A. Treatments with recoverable white sucrose per ton (RWST) from 216 to 240 lb, 222 to 244 lb and from 224 to 248 lb were not significantly different and the non-treated control had 223 lb RWST. Treatments with % sugar from 15.1 to 16.3%, 15.3 to 16.3%, 15.5 to 16.6% and 15.6 (untreated control) to 16.8% were not significantly different (Table 2).

Trial B: Cercospora leaf spot developed slowly throughout the growing season and reached a mean index of 7.0 in the untreated control by 25 Sep. By 23 Aug there were no significant differences among treatments but the Headline-based treatment was not significantly different from the untreated control. By 30 Aug, the Cercospora leaf spot increased in the untreated control from 1.5 to 3.5. Treatments with indices less than 1.3 were significantly different from the untreated control and there were no significant differences among treatments. By 25 Sep the Cercospora leaf spot increased in the untreated control from 3.5 to 7.0 (above the threshold of economic damage). Treatments with indices less than 1.6 were significantly different from the untreated control and there were no significant differences among treatments. No fungicide treatment program exceeded the economic damage threshold (index = 6.0). No treatments had significantly less dead-beets than the untreated control but the Headline followed by (fb) Eminent program had significantly lower percentage of dead-beets (9.5%) than the Eminent fb USF 2004 program 24.3% (Table 3).

There were no significant differences among treatments in terms of % sugar, clear juice purity, and recoverable white sucrose per ton, recoverable white sucrose per acre or yield of sugarbeets. (Table 4).

Funding: Michigan Sugarbeet Company and Industry

Table 1. Trial A; Timing of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, 2005.

Treatment and rate/acre	Cercospora leaf spot (mean index category ^a)					
	23 Aug		30 Aug		25 Sep	
1 Flutriafol 250SC 0.625 pt (A,B,C ^b).....	0.25	a ^c	0.75	bc	1.25	de
2 Flutriafol 250SC 0.875 pt (A,B,C).....	0.50	a	1.25	bc	1.50	cde
3 Eminent 125SL 0.813 pt (A); Super Tin 80WP 0.31 lb (B); Headline 2.09SC 0.75 pt (C).....	0.25	a	0.38	c	0.75	e
4 Eminent 125SL 0.813 pt (A); Gem 25WP 0.44 lb (B); Super Tin 80WP 0.31 lb (C).....	0.25	a	1.00	bc	1.13	de
5 Eminent 125SL 0.813 pt (A); Headline 2.09SC 0.75 pt (B); Super Tin 80WP 0.31 lb (C).....	0.25	a	0.50	c	0.88	e
6 Summerdale A 0.6 pt (A,B,C).....	1.00	a	2.75	ab	3.50	bc
7 Summerdale A 1.8 pt (A,B,C).....	0.50	a	1.25	bc	2.25	bcde
8 Summerdale B 0.6 pt (A,B,C).....	1.25	a	2.75	ab	3.75	b
9 Summerdale B 1.8 pt (A,B,C).....	0.75	a	1.25	bc	2.25	bcde
10 Eminent 125SL 0.813 pt (A); Super Tin 80WP 0.31 lb (B,C).....	0.25	a	0.50	c	0.75	e
11 Headline 2.09SC 0.75 pt (A); Super Tin 80WP 0.31 lb (B,C).....	0.25	a	1.25	bc	1.25	de
12 Gem 25WP 0.44 lb (A); Super Tin 80WP 0.31 lb (B,C).....	0.25	a	0.50	c	0.75	e
13 Topsin 70WP 0.5 lb (A); Super Tin 80WP 0.31 lb (B,C).....	0.75	a	1.50	abc	2.63	bcde
14 Super Tin 80WP 0.31 lb (A,B,C).....	1.50	a	2.50	abc	3.25	bcd
15 Eminent 125SL 0.813 pt (C); Super Tin 80WP 0.31 lb (A,B).....	0.50	a	1.00	bc	1.88	bcde
16 Eminent 125SL 0.813 pt (D).....	1.50	a	2.50	abc	2.50	bcde
18 Untreated.....	1.50	a	3.50	a	7.00	a
HSD 0.05	1.59					

^a Cercospora leaf spot severity was measured using a 1 - 10 scale; 1 = 1 - 5, 0.1%; 2 = 6 - 12, 0.35%; 3 = 13 - 25, 0.75%; 4 = 26 - 50, 1.5%; 5 = 51 - 75, 2.5%; spots/leaf or severity; respectively; 6 = 3% (proven economic damage); 7 = 6%; 8 = 12%; 9 = 25%; and 10 ≥ 50% severity.

^b Application dates: A= 16 Jul; B= 5 Aug; C= 26 Aug, D= Minnesota beetcast threshold 22 Jul.

^c Means followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).

Table 2. Trial A; Timing of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, sugars and yield; 2005.

Treatment and rate/acre	% Sugar		CJP ^a	RWST ^b (lb)		RWSA ^c	Yield
			(%)			(lb)	(t/A)
1 Flutriafol 250SC 0.625 pt (A,B,C ^d).....	16.0	abcd ^e	94.2	231.1	abc	3626	17.3
2 Flutriafol 250SC 0.875 pt (A,B,C).....	16.2	abcd	94.9	236.8	abc	3892	16.6
3 Eminent 125SL 0.813 pt (A); Super Tin 80WP 0.31 lb (B); Headline 2.09SC 0.75 pt (C).....	16.6	ab	93.6	235.9	abc	3719	16.6
4 Eminent 125SL 0.813 pt (A); Gem 25WP 0.44 lb (B); Super Tin 80WP 0.31 lb (C).....	16.3	abcd	95.1	239.6	abc	4391	17.6
5 Eminent 125SL 0.813 pt (A); Headline 2.09SC 0.75 pt (B); Super Tin 80WP 0.31 lb (C).....	16.2	abcd	94.7	237.0	abc	4472	17.6
6 Summerdale A 0.6 pt (A,B,C).....	15.3	cd	93.5	216.1	c	3685	15.5
7 Summerdale A 1.8 pt (A,B,C).....	15.8	abcd	94.5	228.4	abc	3641	14.7
8 Summerdale B 0.6 pt (A,B,C).....	15.7	abcd	93.9	224.6	abc	3496	17.2
9 Summerdale B 1.8 pt (A,B,C).....	15.9	abcd	93.9	227.3	abc	3525	17.1
10 Eminent 125SL 0.813 pt (A); Super Tin 80WP 0.31 lb (B,C).....	16.8	a	95.2	248.3	a	4169	16.9
11 Headline 2.09SC 0.75 pt (A); Super Tin 80WP 0.31 lb (B,C).....	16.8	a	94.6	244.3	ab	4446	18.5
12 Gem 25WP 0.44 lb (A); Super Tin 80WP 0.31 lb (B,C).....	16.0	abcd	94.4	231.3	abc	3917	18.5
13 Topsin 70WP 0.5 lb (A); Super Tin 80WP 0.31 lb (B,C).....	15.7	abcd	94.1	225.6	abc	3721	16.8
14 Super Tin 80WP 0.31 lb (A,B,C).....	15.5	bcd	93.9	221.8	bc	3203	13.3
15 Eminent 125SL 0.813 pt (C); Super Tin 80WP 0.31 lb (A,B).....	16.3	abc	94.6	238.2	abc	3860	17.4
16 Eminent 125SL 0.813 pt (D).....	15.1	d	94.2	217.3	c	3568	14.3
18 Untreated.....	15.6	abcd	94.0	223.5	abc	3780	15.1
HSD 0.05	1.19		2.43	25.21		1907.3	7.32

^a Clear juice purity.

^b RWST = Recoverable White Sucrose per Ton of Sugarbeets

^c RWSA = Recoverable White Sucrose per Acre (Ton/A*RWST)

^d Application dates: A= 16 Jul; B= 5 Aug; C= 26 Aug, D= Minnesota beetcast threshold 22 Jul.

^e Means followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).

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Table 3. Trial B; Timing of application of foliar fungicides for control of Cercospora leaf spot and Rhizoctonia crown and root rot in sugar beet; 2005.

Treatment rate/A	Cercospora leaf spot (mean index category ^a)						Dead- beets (%) ^b	
	23 Aug		30 Aug		25 Sep			
USF 2004 ^c 0.22 pt (A ^d)								
Eminent 125SL 0.813 pt (B).....	0.3	b ^e	0.3	b	0.8	b	16.0	ab
Eminent 125SL 0.813 pt (A)								
USF 2004 0.22 pt (B).....	0.3	b	1.3	b	1.6	b	24.3	a
Headline 2.08SC 0.56 pt (A)								
Eminent 125SL 0.813 pt (B).....	0.5	ab	0.8	b	1.0	b	9.5	b
Untreated.....	1.5	a	3.5	a	7.0	a	20.8	ab

^a Cercospora leaf spot severity was measured using a 1 - 10 scale; 1 = 1 - 5, 0.1%; 2 = 6 - 12, 0.35%; 3 = 13 - 25, 0.75%; 4 = 26 - 50, 1.5%; 5 = 51 - 75, 2.5%; spots/leaf or severity; respectively; 6 = 3% (proven economic damage); 7 = 6%; 8 = 12%; 9 = 25%; and 10 ≥ 50% severity.

^b Dead and dying sugarbeets (%) 126 DAP.

^c Liquid formulation of trifloxystrobin (Gem is the WDG formulation, Bayer).

^d Application dates: A= 16 Jul; B= 5 Aug.

^e Means followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).

Table 4. Trial B; Timing of application of foliar fungicides for control of Cercospora leaf spot and Rhizoctonia crown and root rot in sugar beet, sugars and yield; 2005.

Treatment rate/A	% Sugar	Clear Juice Purity		RWST ^a (lb)	RWSA ^b (lb)	Yield (t/A)
		(%)				
USF 2004 ^c 0.22 pt (A ^d)						
Eminent 125SL 0.813 pt (B).....	15.6	94.8		226.5	5280	23.2
Eminent 125SL 0.813 pt (A)						
USF 2004 0.22 pt (B).....	15.2	93.5		215.2	4131	19.0
Headline 2.08SC 0.56 pt (A)						
Eminent 125SL 0.813 pt (B).....	14.8	94.1		211.6	4417	20.8
Untreated.....	14.4	94.0		205.0	3474	17.0
HSD 0.05	1.63	2.06		28.10	1932.9	6.9

^a RWST = Recoverable White Sucrose per Ton of Sugarbeets

^b RWSA = Recoverable White Sucrose per Acre (Ton/A*RWST)

^c Liquid formulation of trifloxystrobin (Gem is the WDG formulation, Bayer).

^d Application dates: A= 16 Jul; B= 5 Aug.