

Timing of application of foliar fungicides for control of *Cercospora* leaf spot in sugarbeet, 2006.

W. W. Kirk, R. L. Schafer and D. Berry, 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 24 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 10 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 24 Aug and 11 Sep. Beet roots were machine-harvested on 16 Oct and individual treatments were weighed. Sucrose content has still to be determined.

Cercospora leaf spot developed slowly throughout the growing season and reached a mean index of 4.5 in the untreated control by 25 Sep. By 24 Aug, the *Cercospora* leaf spot in the untreated control was 3.8. Treatments with indices less than 1.8 were significantly different from the untreated control. Treatments with indices from 1.0 to 2.8, 1.5 to 3.5 and 1.8 to 3.8 were not sufficiently different. By 11 Sep the *Cercospora* leaf spot increased in the untreated control from 3.8 to 4.5. Treatments with indices less than 2.0 were significantly different from the untreated control. There was no significant difference among treatments with indices between 1.5 to 4.0 and 2.0 to 4.5 (the untreated check). No fungicide treatment program exceeded the economic damage threshold (index = 6.0). Treatments with % sugar from 16.2 (the untreated check) to 17.8% and 16.4 to 18.2% were not significantly different (Table 2). There were no significant differences among treatments in terms of clear juice purity (93.6 to 95.1%), recoverable white sucrose per ton (RWST; 231.8 267.3 lb/t); recoverable white sucrose per acre of sugarbeets (RWSA; 2900 to 5595 t/A). There were no significant differences among treatments in terms of yield/A [range 12.5 (untreated) – 21.5 t/A].

Table 1. Trial A; Timing of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, 2006.

Treatment and rate/acre	Cercospora leaf spot (mean index category ^a)	
	24 Aug	11 Sep
1 Eminent 125SL 13 fl oz (A ^b); Supertin 80WP 5 oz (B); Headline 250SC 9 fl oz (C).....	1.3 c	2.0 ab
2 Eminent 125SL 13 fl oz (A); Headline 250SC 9 fl oz (B) Supertin 80WP 5 oz (C).....	1.5 bc	2.0 ab
3 Eminent 125SL 13 fl oz + Supertin 80WP 5 oz (A) Headline 250SC 9 fl oz (B) Eminent 125SL 13 fl oz + Supertin 80WP 5 oz (C).....	1.3 c	1.5 b
4 Topguard 250SC 14 oz (A); Supertin 80WP 3.75 oz (B) Headline 250SC 9 fl oz (C).....	2.0 abc	3.3 ab
5 Topguard 250SC 14 oz (A,B,C).....	1.0 c	1.8 b
6 Gem 500SC 3.5 oz (A); Eminent 125SL 13 fl oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	1.3 c	2.0 ab
7 Gem 500SC 3.5 oz (A); Proline 175SC 5 oz + Induce 480XL 0.125 % v/v (B); Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	1.5 bc	2.5 ab
8 Proline 175SC 5 oz + Induce 480XL 0.125 % v/v (A); Gem 500SC 3.5 oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	1.5 bc	2.5 ab
9 Headline 250SC 12 fl oz (A); Eminent 125SL 13 fl oz (B); Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	1.0 c	2.0 ab
10 Eminent 125SL 13 fl oz (A); Headline 250SC 3.5 fl oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	1.8 abc	2.8 ab
11 Eminent 125SL 13 fl oz (A).....	2.0 abc	2.8 ab
12 Proline 175SC 5 oz + COC 0.125 % v/v (A).....	2.5 abc	3.0 ab
13 Gem 500SC 3.5 oz (A).....	2.8 abc	3.5 ab
14 Headline 250SC 12 fl oz (A).....	2.0 abc	2.3 ab
15 Enable 2F 8 fl oz + COC 0.125 % v/v (A,B,C).....	2.3 abc	3.0 ab
16 Enable 2F 8 fl oz + COC 0.125 % v/v (A); Topsin-M 70WP 6.1 oz (B); Headline 250SC 3.5 fl oz (C).....	1.5 bc	2.0 ab
17 Ballad QRD 288 AL 4 pt + Biotune QRD 602 AL 0.2 % v/v (ABC) Ballad QRD 288 AL 4 pt + Headline 250SC 4.5 fl oz	3.5 ab	4.0 ab
18 Biotune QRD 602 AL 0.2 % v/v (A,B,C).....	2.0 abc	3.0 ab
19 Headline 250SC 9 fl oz (A,B,C).....	2.0 abc	2.3 ab
20 Untreated Check.....	3.8 a	4.5 a
Tukey HSD p = 0.05	2.01	2.70

^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= 10 Jul; B= 31 Jul; C= 21 Aug.

^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; 2006.

Treatment and rate/acre	% Sugar	CJP ^a (%)	RWST ^b (lb)	RWSA ^c (lb)	Yield (t/A)
1 Eminent 125SL 13 fl oz (A ^b); Supertin 80WP 5 oz (B); Headline 250SC 9 fl oz (C).....	17.7 ab	95.1 a	261.3 a	4583 a	17.5 a
2 Eminent 125SL 13 fl oz (A); Headline 250SC 9 fl oz (B) Supertin 80WP 5 oz (C).....	17.5 ab	94.3 a	254.3 a	5033 a	19.7 a
3 Eminent 125SL 13 fl oz + Supertin 80WP 5 oz (A) Headline 250SC 9 fl oz (B) Eminent 125SL 13 fl oz + Supertin 80WP 5 oz (C).....	17.8 ab	94.3 a	258.8 a	5595 a	21.5 a
4 Topguard 250SC 14 oz (A); Supertin 80WP 3.75 oz (B) Headline 250SC 9 fl oz (C).....	18.2 a	94.6 a	267.3 a	4202 a	15.7 a
5 Topguard 250SC 14 oz (A,B,C).....	17.5 ab	94.6 a	256.5 a	5067 a	19.7 a
6 Gem 500SC 3.5 oz (A); Eminent 125SL 13 fl oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	17.5 ab	94.7 a	255.8 a	4661 a	18.0 a
7 Gem 500SC 3.5 oz (A); Proline 175SC 5 oz + Induce 480XL 0.125 % v/v (B); Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	17.0 ab	93.6 a	243.0 a	4457 a	17.9 a
8 Proline 175SC 5 oz + Induce 480XL 0.125 % v/v (A); Gem 500SC 3.5 oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	17.4 ab	93.8 a	249.5 a	4518 a	18.0 a
9 Headline 250SC 12 fl oz (A); Eminent 125SL 13 fl oz (B); Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	16.9 ab	93.8 a	242.8 a	4278 a	17.6 a
10 Eminent 125SL 13 fl oz (A); Headline 250SC 3.5 fl oz (B) Topsin-M 70WP 6.1 oz + Supertin 80WP 3.75 oz (C).....	17.6 ab	94.8 a	258.5 a	4511 a	17.5 a
11 Eminent 125SL 13 fl oz (A).....	17.5 ab	94.7 a	256.0 a	4433 a	17.3 a
12 Proline 175SC 5 oz + COC 0.125 % v/v (A).....	17.8 ab	94.7 a	261.3 a	4595 a	17.5 a
13 Gem 500SC 3.5 oz (A).....	16.9 ab	94.5 a	246.3 a	3695 a	15.0 a
14 Headline 250SC 12 fl oz (A).....	16.8 ab	94.7 a	246.0 a	3940 a	16.0 a
15 Enable 2F 8 fl oz + COC 0.125 % v/v (A,B,C).....	17.6 ab	94.6 a	257.5 a	4492 a	17.4 a
16 Enable 2F 8 fl oz + COC 0.125 % v/v (A); Topsin-M 70WP 6.1 oz (B); Headline 250SC 3.5 fl oz (C).....	16.7 ab	94.6 a	244.3 a	4011 a	16.1 a
17 Ballad QRD 288 AL 4 pt + Biotune QRD 602 AL 0.2 % v/v (ABC).	16.4 ab	94.1 a	236.0 a	3450 a	14.6 a
18 Ballad QRD 288 AL 4 pt + Headline 250SC 4.5 fl oz Biotune QRD 602 AL 0.2 % v/v (A,B,C).....	17.0 ab	94.3 a	246.8 a	4022 a	16.0 a
19 Headline 250SC 9 fl oz (A,B,C).....	17.5 ab	93.6 a	251.3 a	4594 a	18.2 a
20 Untreated Check.....	16.1 b	94.0 a	231.8 a	2900 a	12.5 a
Tukey HSD p = 0.05	1.85	2.55	38.82	2831.8	10.43

^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= 10 Jul; B= 31 Jul; C= 21 Aug.

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