

### Timing of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, 2006.

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-in. 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-in. 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. Meteorological variables were measured with a Campbell weather station located at the farm, latitude 43.3787 and longitude -84.1128 deg. Maximum and minimum air temperature ( $^{\circ}$ F) were 85.7 and 22.9 (Apr), 84.7 and 23.7 (May), 95.0 and 46.7 and 8-d with maximum temperature  $>90^{\circ}$ F (Jun), 91.6 and 48.5 and 6-d with maximum temperature  $>90^{\circ}$ F (Jul), 91.2 and 45.3 and 4-d with maximum temperature  $>90^{\circ}$ F (Aug) and 91.4 and 39.3 and 3-d with maximum temperature  $>90^{\circ}$ F (Sep). Maximum and minimum soil temperature ( $^{\circ}$ F) were 62.5 and 37.2 (Apr), 69.9 and 39.5 (May), 87.8 and 60.1 (Jun), 83.5 and 64.6 (Jul), 78.7 and 61.8 (Aug) and 73.1 and 54.2 (Sep). Maximum and minimum soil moisture (% of field capacity) was 42.6 and 33.0 (Apr); 46.2 and 37.1 (May); 67.2 and 41.8 (Jun); 48.6 and 32.8 (Jul), 42.0 and 31.4 (Aug) and 47.7 and 29.5 (Sep). Precipitation was 1.67-in. (Apr), 2.01-in. (May), 4.85-in. (Jun), 3.15-in. (Jul), 0.78-in. (Aug) and 2.44-in. (Sep).

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. 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 to 267.3 lb/t); recoverable white sucrose per acre of sugarbeets (RWSA; 2900 to 5033 lb/A). There were no significant differences among treatments in terms of yield/A [range 12.5 (untreated) to 19.7 (Topguard 14 oz (A,B,C) and Eminent 125SL 13 fl oz + Super Tin 80WP 5 oz (A); Headline 250SC 9 fl oz (B); Eminent 125SL 13 fl oz + Super Tin 80WP 5 oz) t/A].

Treatment and rate/acre	Cercospora leaf spot (Mean index category <sup>z</sup> )				% Sugar	CJP <sup>y</sup> (%)	RWST <sup>x</sup> (lb)	RWSA <sup>w</sup> (lb)	Yield (t/A)	
	24 Aug	11 Sep								
Eminent 125SL 13 fl oz (A <sup>v</sup> ); Super Tin 80WP 5 oz (B); Headline 250SC 9 fl oz (C).....	1.3	c <sup>u</sup>	2.0	ab	17.4	ab	93.8	249.5	4518	18.0
Eminent 125SL 13 fl oz (A); Headline 250SC 9 fl oz (B); Super Tin 80WP 5 oz (C).....	1.5	bc	2.0	ab	17.7	ab	95.1	261.3	4583	17.5
Eminent 125SL 13 fl oz + Super Tin 80WP 5 oz (A); Headline 250SC 9 fl oz (B); Eminent 125SL 13 fl oz + Super Tin 80WP 5 oz (C).....	1.3	c	1.5	b	17.5	ab	94.3	254.3	5033	19.7
Topguard 250SC 14 oz (A); Super Tin 80WP 3.75 oz (B); Headline 250SC 9 fl oz (C).....	2.0	abc	3.3	ab	18.2	a	94.6	267.3	4202	15.7
Topguard 250SC 14 oz (A,B,C).....	1.0	c	1.8	b	17.5	ab	94.6	256.5	5067	19.7
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	17.5	ab	94.7	255.8	4661	18.0
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	17.0	ab	93.6	243.0	4457	17.9
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	17.4	ab	93.8	249.5	4518	18.0
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	16.9	ab	93.8	242.8	4278	17.6
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	17.6	ab	94.8	258.5	4511	17.5
Eminent 125SL 13 fl oz (A).....	2.0	abc	2.8	ab	17.5	ab	94.7	256.0	4433	17.3
Proline 175SC 5 oz + COC 0.125 % v/v (A).....	2.5	abc	3.0	ab	17.8	ab	94.7	261.3	4595	17.5
Gem 500SC 3.5 oz (A).....	2.8	abc	3.5	ab	16.9	ab	94.5	246.3	3695	15.0
Headline 250SC 12 fl oz (A).....	2.0	abc	2.3	ab	16.8	ab	94.7	246.0	3940	16.0
Enable 2F 8 fl oz + COC 0.125 % v/v (A,B,C).....	2.3	abc	3.0	ab	17.6	ab	94.6	257.5	4492	17.4
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	16.7	ab	94.6	244.3	4011	16.1
Ballad QRD 288 AL 4 pt + Biotune QRD 602 AL 0.2 % v/v (A,B,C).....	3.5	ab	4.0	ab	16.4	ab	94.1	236.0	3450	14.6
Ballad QRD 288 AL 4 pt + Headline 250SC 4.5 fl oz + Biotune QRD 602 AL 0.2 % v/v (A,B,C).....	2.0	abc	3.0	ab	17.0	ab	94.3	246.8	4022	16.0
Headline 250SC 9 fl oz (A,B,C).....	2.0	abc	2.3	ab	17.5	ab	93.6	251.3	4594	18.2
Untreated Check.....	3.8	a	4.5	a	16.1	b	94.0	231.8	2900	12.5
Tukey HSD p = 0.05	2.01		2.70		1.85		NS	NS	NS	NS

<sup>z</sup> 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.

<sup>y</sup> Clear juice purity

<sup>x</sup> RWST = Recoverable White Sucrose per Ton of Sugarbeet

<sup>w</sup> RWSA = Recoverable White Sucrose per Acre (Ton/A \* RWST)

<sup>v</sup> Application dates: A= 10 Jul; B= 31 Jul; C= 21 Aug.

<sup>u</sup> Means followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).