Sugarbeet (*Beta vulgaris* L.'Beta 5355')
Cercospora leaf spot*; Cercospora beticola*

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Timing of application of foliar fungicides for control of Cercospora leaf spot in sugar beet, 2007.

Sugar beet cv. E17 was PAT-treated and planted at the Michigan State University Bean and Beet Farm, Saginaw, MI on 25 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" 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 (Ontario Weather Network, Ridgetown, ON, Canada), starting on 25 Jul. Although four treatments were scheduled, disease pressure was low throughout the year and only three applications were made. 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 on 12 and 26 Sep. Beet roots were machine-harvested on 28 Sep and individual treatments were weighed. Sugar content was measured at the Michigan Sugar Company analytical service laboratory. Meteorological variables were measured with a Campbell weather station located at the farm, latitude 43.3787 and longitude -84.1128 deg. Maximum, minimum and average daily air temperature (^{o}F) from planting on 25 Apr were 74.9, 39.5 and 52.7 (Apr), 87.0, 28.5 and 59.1 (May), 92.8, 35.3 and 68.2 and 4-d with maximum temperature >90^{o}F (Jun), 96.9, 41.1 and 68.5 and 4-d with maximum temperature >90^{o}F (Jul), 95.1, 41.1 and 69.9 and 4-d with maximum temperature >90^{o}F (Aug) and 91.1, 33.0 and 63.7 and 2-d with maximum temperature >90^{o}F (to 29 Sep). Maximum, minimum and average daily soil temperature (^{o}F) over the same period were 71.1, 52.8 and 58.4 (Apr), 91.3, 47.9 and 61.6 (May), 83.0, 55.1 and 71.1 (Jun), 84.0, 61.2 and 71.9 (Jul), 84.7, 62.1 and 73.3 (Aug) and 80.0, 53.4 and 67.0 (Sep). Maximum, minimum and average daily relative humidity (%) over the same period were 98.1, 19.2 and 67.1 (Apr), 98.1, 14.8 and 61.9 (May), 97.3, 16.8 and 63.6 (Jun), 97.0, 28.5 and 66.2 (Jul), 97.4, 75.2 and 79.8 (Aug) and 97.2, 22.4 and 68.8 (Sep). Maximum, minimum and average daily soil moisture (% of field capacity at 6" depth) was 83.3, 75.2 and 79.8 (Apr); 89.6, 77.2 and 82.3 (May); 95.0, 71.3 and 82.2 (Jun); 99.8, 67.3 and 83.5 (Jul), 100.5, 86.4 and 91.8 (Aug) and 102.3, 86.1 and 90.8 (Sep). Precipitation was 0.61-in. (Apr), 2.2-in. (May), 1.1-in. (Jun), 2.6-in. (Jul), 4.8-in. (Aug) and 2.6-in. (Sep). There were 189 Beetcast DSV values accumulated in the Saginaw area from 1 Apr to 29 Sep.

Cercospora leaf spot developed slowly throughout the growing season and reached about 18.4% in the untreated control by 29 Sep. All treatments had significantly less Cercospora leaf spot than the untreated control at both evaluation dates. No treatment program or the untreated check exceeded the economic damage threshold (index = 6.0, about 50% foliar area affected spotted or necrotic). There were no significant differences among treatments in terms of sugar content of beets (13.8 to 16.0%); clear juice purity (87.4 to 93.6%); recoverable white sucrose per ton (RWST; 169.1 to 226.6 lb/t); recoverable white sucrose per acre of sugar beet (RWSA; 3604 to 5598 t/A); or yield/A [range 19.6 (20.1 = untreated) to 26.1 t/A].

Treatment and rate/acre	Cercospora leaf spot[z] (%) 12 Sep		29 Sep		Sugar %	CJP[y] (%)	RWST[x] (lb)	RWSA[w] (lb)	Yield (t/A)
Gem 500SC 3.5 fl oz (A); Eminent 125SL 13 fl oz (B); Super Tin 80WP 3.75 oz + Topsin-M 70WP 6.1 oz (C[v])…….	0.8	b[u]	2.0	b	15.0	91.2	201.0	4969	24.8
Eminent 125SL 13 fl oz (A); Gem 500SC 3.5 fl oz (B); Super Tin 80WP 3.75 oz + Topsin-M 70WP 6.1 oz (C)……..	0.5	b	1.8	b	15.4	93.3	216.8	5394	24.9
Gem 500SC 3.5 fl oz (A); Proline 175SC 5.5 fl oz + Induce 480XL 0.125 % v/v (B); Super Tin 80WP 3.75 oz + Topsin-M 70WP 6.1 oz (C)……	1.0	b	3.3	b	14.0	89.3	179.1	4135	22.8
Proline 175SC 5.5 fl oz + Induce 480XL 0.125 % v/v (A); Gem 500SC 3.5 fl oz (B); Super Tin 80WP 3.75 oz + Topsin-M 70WP 6.1 oz (C)……	1.1	b	1.8	b	15.1	92.9	211.2	4335	20.4
Proline 175SC 5.5 fl oz + Induce 480XL 0.125 % v/v (A,B,C).	0.6	b	1.5	b	15.3	92.5	210.8	4551	21.6
Eminent 125SL 13 fl oz (A,B,C)……	1.0	b	2.5	b	15.2	93.4	213.9	4276	20.0
Topguard 1.04SC 10 oz (A,B,C)……..……	0.6	b	2.8	b	15.4	93.0	215.2	4725	21.9
Topguard 1.04SC 14 oz (A,B,C)……..……	1.4	b	2.5	b	15.3	92.9	213.7	5040	23.7
Topguard 1.04SC 28 oz (A,B,C)……..……	0.6	b	1.5	b	15.5	92.7	215.3	5280	24.5
Topguard 1.04SC 14 oz (A); Super Tin 80WP 5 oz (B); Headline 2.08SC 9 fl oz + Super Tin 80WP 5 oz (C)…….	1.4	b	2.5	b	15.2	92.4	209.5	4110	19.6
Eminent 125SL 13 fl oz (A); Polyram 80DF 1.5 lb + Topsin-M 70WP 6.1 oz (B); Headline 2.08SC 9 fl oz (C)……..	0.9	b	3.5	b	15.4	91.3	207.1	4684	22.5
Eminent 125SL 13 fl oz (A); SA140307 125WDG 5 oz (B); Headline 2.08SC 9 fl oz (C)……	0.8	b	1.3	b	15.3	93.3	214.9	4335	20.2
Eminent 125SL 13 fl oz (A); SA140307 125WDG 4 oz (B); Headline 2.08SC 9 fl oz (C)……	0.8	b	1.5	b	14.9	92.5	205.0	4668	22.7
SA140201 125EC 12.8 fl oz (A,B); Headline 2.08SC 9 fl oz (C)……	0.6	b	3.3	b	15.4	93.4	217.2	4881	22.5
A7402 250EC 7 fl oz (A,C); Headline 2.08SC 9 fl oz (B)…….	0.9	b	1.0	b	14.3	88.1	178.1	4089	23.5
A8122 500EC 5 fl oz (A,B,C)……..……..	1.0	b	2.5	b	15.5	92.4	213.2	5029	23.5
A8122 500EC 7 fl oz (A,B,C)……	0.9	b	1.5	b	15.2	92.5	209.7	4613	22.0
A8122 500EC 5 fl oz (A,C); Headline 2.08SC 9 fl oz (B)…….	0.9	b	1.5	b	14.1	88.8	180.7	3994	21.9
A8122 500EC 5 fl oz (A,C); Quadris 2.09SC 11.5 fl oz (B)….	0.8	b	1.3	b	15.2	92.4	209.1	4449	21.3
A13703 325SC 8.5 fl oz (A,C); Super Tin 80WP 2.5 oz (B)….	1.1	b	1.5	b	15.1	93.0	211.8	4803	22.7
Eminent 125SL 13 fl oz (A,C); Headline 2.08SC 9 fl oz (B)….	0.9	b	3.0	b	13.8	87.4	169.1	3604	21.8
Serenade Max 1.34WP 1 lb + Headline 2.08SC 4.5 fl oz + Biotune 1EC 4.5 fl oz (A,B,C)……	1.1	b	1.5	b	15.1	92.0	206.3	4945	23.9
Eminent 125SL 13 fl oz (A); Serenade Max 1.34WP 1 lb + Biotune 1EC 4.5 fl oz (B,C)……..	1.8	b	5.5	b	14.9	92.3	204.3	4511	22.0
Headline 2.08SC 9 fl oz (A,C); Eminent 125SL 13 fl oz (B)….	1.2	b	2.9	b	15.2	92.4	208.8	4744	22.6
Eminent 125SL 13 fl oz (A); Headline 2.08SC 9 fl oz (B,C)….	1.3	b	4.3	b	15.5	93.6	220.2	5266	23.9
Headline 2.08SC 9 fl oz (A); Eminent 125SL 13 fl oz (B); Super Tin 80WP 5 oz (C)……..	2.5	b	5.0	b	15.3	92.9	214.0	5598	26.1
Eminent 125SL 13 fl oz (A); Super Tin 80WP 5 oz (B); Headline 2.08SC 9 fl oz (C)……	2.4	b	4.0	b	16	93.5	226.6	5538	24.5
Enable 2F 8 fl oz + COC 0.125 % v/v + Dithane 75DF 2 lb (A,B,C)…….	2.1	b	6.0	b	15.1	92.9	210.5	5085	24.2
Enable 2F 8 fl oz + COC 0.125 % v/v + Dithane 75DF 2 lb (A); Dithane 75DF 2 lb + Super Tin 80WP 8 oz (B); Dithane 75DF 2 lb + Headline 2.08SC 5 fl oz (C)…….	1.6	b	4.3	b	15.3	92.3	209.6	4498	21.5
Untreated Check…….	10.0	a	18.4	a	15.4	93.4	217.0	4360	20.1
Tukey HSD p = 0.05	2.84		5.50		NS	NS	NS	NS	NS

[z] Cercospora leaf spot severity was measured using as percent foliage affected by Cercospora leaf spot.
[y] Clear juice purity
[x] RWST = Recoverable White Sucrose per Ton of Sugarbeets
[w] RWSA = Recoverable White Sucrose per Acre (Ton/A*RWST)
[v] Application dates: A= 25 Jul; B= 15 Aug; C= 3 Sep.
[u] Means followed by same letter are not significantly different at P = 0.05 (Tukey multiple comparison method).