2000
INSECT AND DISEASE MANAGEMENT

RIDGETOWN COLLEGE

UNIVERSITY OF GUELPH
Ridgetown, Ontario
Dr. R.E. Pitblado

Trial Results may be seen on the Ridgetown College website:

www.ridgetownc.on.ca

December, 2000

To Those Interested in Insect and Plant Disease Controls in Sugarbeets:

We appreciate the cooperation and assistance provided by the chemical companies and their representatives, their ideas and the chemical samples they have provided for the research work carried out at Ridgetown College, University of Guelph.

We also appreciate the cooperation of our farmer cooperators who have provided land and assist in working the land, applying fertilizer, herbicides and planting the crop.

We are indebted to the Ontario Sugarbeet Growers' Association and to Michigan Sugar Company who feel this type of research program is desirable and are prepared to financially support this endeavour.

Technical assistance was expertly directed by Ms. Phyllis May of our college staff, and aided by Petra Biondi and Steven Moore. I wish to thank them.

We trust that the information provided by this research will further the science of insect and plant disease control, and to assist companies in furthering their registrations of agricultural chemicals that will prove beneficial to our Ontario farmers.

Yours truly,

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ABSTRACTS

TITLE: **CONTROL OF EARLY SEASON RHIZOCTONIA CROWN ROT IN SUGARBEETS - SEED MIXTURES**

CROP: Sugar beet (*Beta vulgaris L.*) cv. 1353 AND 319
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.
Rhizoctonia Crown Rot

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METHODS: Varying mixtures of two sugarbeet cultivars were planted on April 28, 2000 at Ridgetown. Plots were 4 rows, 7 m in length spaced 0.75 cm apart, replicated four times in a randomized complete block design. No fungicides were applied throughout the trial. Assessments were taken on May 15 for emergence and on June 2 and 13 for stand counts. Plots were rated for the incidence of Rhizoctonia crown rot throughout the season and for Cercospora leafspot on August 15 and 25 respectively. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The emergence and stand counts between either of the two sugarbeet cultivars 1353 and 319 were similar. There was not sufficient Rhizoctonia root rot present in the plot area to allow for a comparison between the cultivars alone or in the various seed mixtures. There was an apparent difference in the susceptibility to Cercospora Leafspot with 1353 being more tolerant to the foliar fungal disease. This also showed in the disease severity ratings with the amount of Cercospora less with increasing amounts of the more tolerant cultivar 1353.Alternatively the disease damage ratings increased with increasing concentrations of the more susceptible sugarbeet cultivar 319.

Table 1. Foliar disease control ratings.

Treatments	Emergence Cts/plot May 15	Stand Counts/plot June 2	Stand Counts/plot June 13	# Plants with Crown Rot Aug. 15	Foliar Damage Ratings (0-10)[1/] Aug. 25
100% 1353	30.0 b*	32.8 a	31.5 a	0.8 a	6.3 a
100% 319	31.3 ab	32.8 a	28.8 a	2.0 a	2.3 d
25% 1353 + 75% 319	30.5 ab	33.3 a	33.3 a	2.0 a	5.3 b
15% 1353 + 85% 319	40.0 a	36.3 a	30.8 a	1.8 a	3.3 c
ANOVA P#0.05	s	ns	ns	ns	s
Coefficient of Variation (%)	17.5				11.5

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **TRIAL A: CONTROL OF EARLY SEASON RHIZOCTONIA CROWN ROT IN SUGAR BEETS - SEED TREATMENT**
TRIAL B: CONTROL OF EARLY SEASON RHIZOCTONIA CROWN ROT IN SUGAR BEETS - EMERGENCE SPRAYS

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.
Rhizoctonia Crown Rot

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METHODS: Sugar beets were planted on April 28, 2000 at Ridgetown. Plots were 8 rows, 7 m in length spaced 0.75 cm apart, replicated four times in a randomized complete block design. Trial A included seeds that had been treated within 2 weeks of seeding using MAXIM 480FS at a rate of 5.2 ml/100kg of seed while in Trial B the foliar fungicides DITHANE DF 75% NT at 2.25 kg/ha and an experimental fungicide BAS 500 F 250EC at 0.64 L/ha (product) were applied directed to the seeded row on May 29 and June 19 using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Assessments were conducted by taking emergence ratings on June 2, stand counts on June 13 and Rhizoctonia crown rot ratings on August 15.

RESULTS: There were no significant differences in emergence and stand counts using either the seed treatments or the directed fungicide sprays. Also there were not sufficient infections caused by Rhizoctonia root rot to make comparisons amongst the various treatments.

TITLE: **CULTIVAR RESISTANCE AND ITS EFFECT ON A SPRAY PROGRAM FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGAR BEETS**

CROP: Sugar beet (*Beta vulgaris L.*) cv. 319 and E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE DF 75% NT (75% mancozeb), KOCIDE 101 (50% copper hydroxide), AGRAL 90 (surfactant).

METHODS: Sugar beets were planted on May 9, 2000, in the college research range J3 at Ridgetown. Plots were four rows, 7m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with two unsprayed row between plots. Spray applications were applied on July 4, 19, 28, Aug. 8 and 18. Foliar disease assessments were made on August 15 and 25. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The levels of genetic resistance between the susceptible sugar beet cultivar E17 towards Cercospora leafspot and the more tolerant sugar beet cultivar 319 was in evidence in this trial. The disease ratings were significantly different supporting earlier evidence of these differences. The use of a fungicide spray program was shown to be of benefit raising the susceptible sugar beet cultivar E17 foliage ratings equal to the resistance levels in the cultivar 319.

Table 1. Foliar disease control ratings.

Treatments	Rate product/ha	Foliar Damage Ratings (0-10)[1/] August 15	August 25
Resistant 319	no sprays	9.3 a*	8.0 a
Resistant 319 plus a spray program using:			
KOCIDE 101 +	2.25 kg	9.1 a	9.4 a
DITHANE DF 75% NT +	2.25 kg		
AGRAL 90	0.1% v/v		
Susceptible E17	no sprays	7.8 b	5.5 b
Susceptible E17 plus a spray program using:			
KOCIDE 101 +	2.25 kg	8.3 a	8.6 a
DITHANE DF 75% NT +	2.25 kg		
AGRAL 90	0.1% v/v		
ANOVA P#0.05	s	s	s
Coefficient of Variation (%)	17.5	16.8	11.0

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **REGISTERED FUNGICIDES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGAR BEETS - Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE M-45 (80% mancozeb), DITHANE DF 75% NT (75% mancozeb), MANZATE 200DF (80% mancozeb), PENNCOZEB 80WP (80% mancozeb), PENNCOZEB 75DF (75% mancozeb), KOCIDE 101 (50% copper hydroxide), SIL WETT (surfactant), SENATOR 70 WP (thiophanate-methyl).

METHODS: Sugar beets were planted commercially on May 10, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 6, 17, 27, Aug. 9 and 23. Foliar disease assessments were made on August 10, 24 September 2 and 27. Yields were taken on November 7 and analyzed in the Michigan Sugar Companies research laboratory. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: Sugarbeets were sprayed 5 times, 3 times in August and 2 times in September. SENATOR 70WP applied alone or tank mixed with DITHANE DG 75% NT for pesticide resistance management reasons provided the highest level of control throughout the entire season well into September, 4 weeks after the last spray application. These same two treatments showed either alone or in combination a significant increase when compared to an unsprayed control in RWSA, RWST and % sucrose with the combination treatment providing the highest numerical increase in sugarbeet yields. DITHANE DG 75% NT, KOCIDE 101 and PENNCOZEB 80WP gave excellent results early in the season until the last application on August 24 but control faded the rest of the season with only DITHANE DG 75% NT providing control into early September. DITHANE M-45, MANZATE 200 DF where not as effective as DITHANE DG 75% NT. It was interesting that the KOCIDE 101 alone was more efficacious than when mixed with the surfactant SIL WETT. In previous years, SIL WETT improved the level of control when combined with KOCIDE 101 even though the surfactant had caused a moderate amount of foliar damage. In this year's trial the 5 applications of SIL WETT caused considerably more phytotoxicity, resulting in tattered, shredded, torn leaves that would not be acceptable to commercial sugarbeet growers and apparently resulted in more Cercospora Leafspot disease with a lower foliar disease rating.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 10	Aug. 24	Sept.2	Sept. 27
1	DITHANE M-45	2.25 kg	7.9 a*	6.4 bc	7.4 b	4.9 d
2	DITHANE DG 75% NT	2.25 kg	8.3 a	7.4 abc	9.1 a	5.9 cd
3	MANZATE 200 DF	2.25 kg	7.8 a	6.1 c	7.1 b	5.8 cd
4	PENNCOZEB 80WP	2.25 kg	8.3 a	8.1 abc	7.4 b	6.8 bc
5	PENNCOZEB 75 DF	2.25 kg	8.5 a	6.3 c	7.0 b	5.6 cd
6	KOCIDE 101	2.25 kg	9.3 a	8.4 ab	7.8 b	7.4 b
7	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	6.3 b	6.8 bc	5.5 c	7.6 b
8	SENATOR 70 WP	0.5 kg	8.3 a	9.3 a	9.5 a	9.5 a
9	SENATOR 70 WP + DITHANE DG 75% NT	0.5 kg 2.25 kg	8.8 a	9.4 a	9.5 a	9.7 a
10	CONTROL		5.9 b	6.4 bc	4.0 d	2.5 e
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		12.1	17.0	10.8	11.3

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugar beet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	YIELD RWSA	YIELD T/A	RWST	% Sucrose
1	DITHANE M-45	2.25 kg	8591 ab*	32.4 ab*	232 ab	17.8 abc
2	DITHANE DG 75% NT	2.25 kg	7936 b	29.8 b	224 ab	18.1 abc
3	MANZATE 200 DF	2.25 kg	7584 b	29.2 b	227 ab	17.5 bc
4	PENNCOZEB 80WP	2.25 kg	8600 ab	33.0 ab	228 ab	17.6 abc
5	PENNCOZEB 75 DF	2.25 kg	8352 b	31.7 ab	230 ab	17.8 abc
6	KOCIDE 101	2.25 kg	8394 b	32.5 ab	225 ab	17.8 abc
7	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	7986 b	29.5 b	238 ab	18.3 abc
8	SENATOR 70 WP	0.5 kg	9230 ab	33.3 ab	242 a	18.6 a
9	SENATOR 70 WP + DITHANE DG 75% NT	0.5 kg 2.25 kg	10154 a	37.4 a	238 ab	18.4 ab
10	CONTROL		8143 b	32.2 ab	221 b	17.3 c
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		12.7	12.5	4.8	3.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

TITLE: **USE OF SURFACTANTS TO IMPROVE THE EFFECTIVENESS OF COPPER FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: KOCIDE 101 (50% copper hydroxide), SIL WETT (surfactant), NU-FILM (surfactant), AGRAL 90 (surfactant), AG-BALANCE (surfactant), ASSIST (surfactant), DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on May 10, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 6, 17, 27, Aug. 9 and 23. Foliar disease assessments were made on August 10, 24 September 2 and 27. Yields were taken on November 7 and analyzed in the Michigan Sugar Companies research laboratory. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: KOCIDE 101 provided adequate Cercospora Leafspot control however disease control and yield were improved using specific surfactants. The most effective surfactant was ASSIST with significantly better RWSA than that of the unsprayed control. AGRAL 90 provided improved leafspot control early in the season but resulted in lower processing sugar qualities at harvest. The other surfactants including NU-FILM, AG-BALANCE and SIL WETT did not improve disease control when mixed with KOCIDE 101. The surfactant SIL WETT caused unacceptable injury to the sugarbeet foliar resulting in leaf shredding and a lower disease control rating. The addition of DITHANE DG 75% NT greatly improved the level of Cercospora leafspot control when mixed with KOCIDE 101than when KOCIDE 101 was used alone. Further additions of the surfactants SIL WETT and AGRAL 90 to DITHANE DG 75% NT did not improve the level of Cercospora control and may even have slightly reduced its effectiveness and sugarbeet quality.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 10	Aug. 24	Sept.2	Sept. 26
1	KOCIDE 101	2.25 kg	7.8 c*	7.4 ab	7.1 d	6.6 d
2	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	6.0 d	5.3 b	3.5 e	6.1 e
3	KOCIDE 101 + NU-FILM	2.25 kg 1.17 L	9.3 a	8.3 a	7.8 cd	6.5 de
4	KOCIDE 101 + AGRAL 90	2.25 kg 0.1% v/v	9.3 a	8.4 a	9.3 ab	7.3 c
5	KOCIDE 101 + AG-BALANCE	2.25 kg 10.0 L	8.4 b	7.0 ab	8.1 bcd	6.4 de
6	KOCIDE 101 + ASSIST	2.25 kg 1.0% v/v	9.3 a	9.3 a	9.5 a	8.5 ab
7	KOCIDE 101 + DITHANE DG 75% NT	2.25 kg 2.25 kg	9.8 a	9.1 a	8.8 abc	8.8 a
8	KOCIDE 101 + DITHANE DG 75% NT+ SIL WETT	0.5 kg 2.25 kg 0.1% v/v	9.3 a	8.0 a	8.4 abc	8.5 ab
9	KOCIDE 101 + DITHANE DG 75% NT+ AGRAL 90	2.25 kg 2.25 kg 0.1% v/v	9.4 a	8.8 a	7.9 cd	8.1 b
10	CONTROL		7.5 c	5.8 b	3.3 e	3.0 f
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		4.9	18.1	9.9	4.31

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugar beet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	YIELD RWSA	T/A	RWST	% Sucrose
1	KOCIDE 101	2.25 kg	7584 abc*	29.5 ab	225 ab	17.7 ab
2	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	6678 c	24.5 b	227 ab	17.7 ab
3	KOCIDE 101 + NU-FILM	2.25 kg 1.17 L	7921 abc	29.7 ab	233 ab	18.0 ab
4	KOCIDE 101 + AGRAL 90	2.25 kg 0.1% v/v	8396 abc	33.7 a	218 b	17.7 b
5	KOCIDE 101 + AG-BALANCE	2.25 kg 10.0 L	8626 ab	33.1 a	229 ab	18.0 ab
6	KOCIDE 101 + ASSIST	2.25 kg 1.0% v/v	9125 a	34.1 a	235 ab	18.5 ab
7	KOCIDE 101 + DITHANE DG 75% NT	2.25 kg 2.25 kg	8891 ab	31.7 a	246 a	18.9 a
8	KOCIDE 101 + DITHANE DG 75% NT+ SIL WETT	0.5 kg 2.25 kg 0.1% v/v	7948 abc	30.9 ab	225 ab	17.7 ab
9	KOCIDE 101 + DITHANE DG 75% NT+ AGRAL 90	2.25 kg 2.25 kg 0.1% v/v	8654 ab	33.6 a	226 ab	17.5 b
10	CONTROL		7038 bc	26.9 ab	232 ab	17.9 ab
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		14.4	14.1	5.5	3.9

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

TITLE: **EVALUATION OF CANDIDATE FUNGICIDES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: SENATOR 70 WP (thiophanate-methyl), DITHANE DF 75% NT (75% mancozeb), PENNCOZEB 75 DF (mancozeb), BAS 500 250 EC (experimental), ICIA5504 250 SC (azoxystrobin), BRAVO 500 (chlorothalonil), EMINENT 125 SL (tetraconazole), THIS COPPER (50% copper), THIS ZINC (zinc).

METHODS: Sugar beets were planted commercially on May 10, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 6, 17, 27, Aug. 9 and 23. Foliar disease assessments were made on August 10, 24 September 2 and 27. Yields were taken on November 7 and analyzed in the Michigan Sugar Companies research laboratory. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: A number of new candidate fungicides are showing great promise for the control of Cercospora Leafspot in sugarbeets. The most effective were EMINENT 125 SL and BAS 500 250EC providing equal control to the commercial standard SENATOR 70WP. EMINENT 125 SL showed significant improvements in sugarbeet quality in particular the RWSA and high ratings in the other quality parameters. BAS 500 250EC and SENATOR 70WP placed consistently high in beet quality as well. DITHANE DF 75% NT, BRAVO 500F, PENNCOZEB 75 DF and ICIA5504 250 SC gave good control during the period when repeat fungicide applications were made however control was less after the last application on August 23 with disease rated in September. The addition of THIS COPPER or THIS ZINC did not improved the level of Cercospora leafspot control when tankmixed with BRAVO 500 F.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 10	Aug. 24	Sept.2	Sept. 27
1	SENATOR 70WP	0.5 kg	8.0 a*	9.4 a	9.5 a	8.4 b
2	DITHANE DF 75% NT	2.25 kg	9.5 a	8.5 ab	7.4 b	6.6 e
3	PENNCOZEB 75 DF	2.25 kg	7.5 a	7.6 b	7.3 b	6.6 e
4	BAS 500 250 EC	0.44 L	9.0 a	9.5 a	9.9 a	9.5 a
5	ICIA5504 250 SC	0.3 L	9.0 a	7.1 b	7.4 b	7.1 de
6	BRAVO 500F	2.8 L	9.0 a	8.4 ab	7.6 b	7.9 bc
7	EMINENT 125 SL	1.0 L	8.5 a	9.4 a	9.8 a	9.7 a
8	THIS COPPER + BRAVO 500F	0.625 L 2.8 L	6.5 a	7.9 ab	7.3 b	7.5 cd
9	THIS ZINC + BRAVO 500F	0.42 L 2.8 L	8.0 a	7.3 b	6.8 b	7.4 cd
10	CONTROL		6.0 a	4.3 c	3.0 c	3.5 f
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		19.8	13.4	8.3	5.2

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugar beet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	YIELD RWSA	T/A	RWST	% Sucrose
1	SENATOR 70WP	0.5 kg	10333 bc*	34.1 ab	266 bc	18.4 abc
2	DITHANE DF 75% NT	2.25 kg	8987 c	33.5 b	239 c	17.8 bc
3	PENNCOZEB 75 DF	2.25 kg	9942 bc	32.8 b	264 bc	18.2 abc
4	BAS 500 250 EC	0.44 L	10380 bc	33.9 ab	269 bc	18.8 ab
5	ICIA5504 250 SC	0.3 L	10232 bc	33.1 b	271 bc	18.8 ab
6	BRAVO 500F	2.8 L	9938 bc	32.9 b	265 bc	18.3 abc
7	EMINENT 125 SL	1.0 L	13258 a	39.2 a	293 ab	18.9 a
8	THIS COPPER + BRAVO 500F	0.625 L 2.8 L	11465 ab	32.1 b	312 a	18.7 ab
9	THIS ZINC + BRAVO 500F	0.42 L 2.8 L	10130 bc	34.2 ab	260 bc	17.9 abc
10	CONTROL		8487 c	29.6 b	252 c	17.5 c
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		12.8	10.5	8.6	3.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

TITLE: **PROGRAM SPRAY SCHEDULES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: SENATOR 70 WP (thiophanate-methyl), KOCIDE 101 (50% copper hydroxide), DITHANE DF 75% NT (75% mancozeb), PENNCOZEB 75 DF (75% mancozeb), SIL WETT (surfactant), EMINENT 125 SL (tetraconazole), BRAVO 500F (chlorothalonil), BAS 500 250 EC (experimental)

METHODS: Sugar beets were planted commercially on May 10, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 6, 18, 27, Aug. 9 and 23. Foliar disease assessments were made on August 10, 24 September 2 and 27. Yields were taken on November 7 and analyzed in the Michigan Sugar Companies research laboratory. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: Season long control was observed with several different fungicide combinations. The addition of DITHANE DF 75% NT, PENNCOZEB 75 DF or 80 WP formulations with SENATOR 70 WP provided outstanding Cercospora Leafspot control in sugarbeets. Foliar control was less when KOCIDE 101 alone or with the surfactant SIL WETT was tank mixed with either SENATOR 70 WP or PENNCOZEB 75 DF. Outstanding control was achieved whenever EMINENT 125 SL or BAS 500 250EC was alternated with each other, BRAVO 500 or a combination of SENATOR 70 WP and DITHANE DG 75% NT. The highest sugarbeet quality assessment was observed when EMINENT 125 SL was alternated with a tank mixture of SENATOR 70 WP and DITHANE DG 75% NT.

Table 1. Foliar disease control ratings.

#	Treatments [/2]	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 10	Aug. 24	Sept.2	Sept. 27
1	SENATOR 70 WP + KOCIDE 101	0.42 kg 2.25 kg	9.5 a*	7.9 b	7.4 b	8.6 e
2	SENATOR 70 WP + DITHANE DF 75% NT	0.42 kg 2.25 kg	9.5 a	9.1 a	9.5 a	9.5 bc
3	SENATOR 70 WP + PENNCOZEB 75 DF	0.42 kg 2.25 kg	8.5 ab	9.4 a	9.5 a	9.5 bc
4	PENNCOZEB 75 DF; PENNCOZEB 75 DF + SENATOR 70 WP; PENNCOZEB 75 DF, 2 ap;	2.25 kg 2.25 kg 0.56 kg 2.25 kg	8.0 abc	9.1 a	9.5 a	9.7 ab
5	PENNCOZEB 80 WP; PENNCOZEB 80 WP + SENATOR 70 WP; PENNCOZEB 80WP, 2 ap;	2.25 kg 2.25 kg 0.56 kg 2.25 kg	8.5 ab	9.0 a	9.5 a	9.4 c
6	PENNCOZEB 75 DF + KOCIDE 101 + SIL WETT	2.25 kg 2.25 kg 0.1% v/v	7.5 bcd	8.8 ab	6.8 c	7.1 f
7	EMINENT 125 SL; BRAVO 500 F;	1.0 L 3.2 L	8.5 ab	8.6 ab	9.1 a	9.1 d
8	EMINENT 125 SL; SENATOR 70 WP + DITHANE DG 75% NT;	1.0 L 0.42 kg 2.25 kg	8.5 ab	9.3 a	8.9 a	9.5 bc
9	EMINENT 125 SL; BAS 500 250EC;	1.0 L 0.44 L	8.5 ab	9.0 a	9.5 a	9.8 a
10	CONTROL		6.5 cd	4.0 c	4.0 d	4.0 g
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		9.7	6.9	4.8	1.8

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2/] Treatments - products followed by a + sign indicate the two materials have been tank mixed and applied together. Products ending with a ; sign means the next spray application is followed using the next material listed. E.g. Treatment #1 SENATOR 70WP + KOCIDE 101 - both materials were tank mixed and applied all 5 spray applications. Treatment #7 EMINENT 125 SL; BRAVO 500F; - EMINENT 125 SL was applied on the first spray application date on July 6 followed by BRAVO 500F on July 17 then back to EMINENT 125 SL and so forth.

Table 2. Sugarbeet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	YIELD RWSA	T/A	RWST	% Sucrose
1	SENATOR 70 WP + KOCIDE 101	0.42 kg 2.25 kg	10451abc*	34.2 abc	268 a	18.6 a
2	SENATOR 70 WP + DITHANE DF 75% NT	0.42 kg 2.25 kg	11538 ab	37.2 ab	271 a	18.7 a
3	SENATOR 70 WP + PENNCOZEB 75 DF	0.42 kg 2.25 kg	10538 abc	34.7 abc	266 a	18.6 a
4	PENNCOZEB 75 DF; PENNCOZEB 75 DF + SENATOR 70 WP; PENNCOZEB 75 DF, 2 ap;	2.25 kg 2.25 kg 0.56 kg 2.25 kg	10843 abc	34.9 abc	271 a	18.9 a
5	PENNCOZEB 80 WP; PENNCOZEB 80 WP + SENATOR 70 WP; PENNCOZEB 80WP, 2 ap;	2.25 kg 2.25 kg 0.56 kg 2.25 kg	11312 abc	36.8 ab	269 a	18.7 a
6	PENNCOZEB 75 DF + KOCIDE 101 + SIL WETT	2.25 kg 2.25 kg 0.1% v/v	9543 cd	32.1 bc	261 a	17.8 bc
7	EMINENT 125 SL; BRAVO 500 F;	1.0 L 3.2 L	9751 bcd	31.0 c	277 a	18.8 a
8	EMINENT 125 SL; SENATOR 70 WP + DITHANE DG 75% NT;	1.0 L 0.42 kg 2.25 kg	12021 a	39.5 a	267 a	18.5 ab
9	EMINENT 125 SL; BAS 500 250EC;	1.0 L 0.44 L	10493 abc	35.2 abc	262 a	18.3 ab
10	CONTROL		8580 d	30.9 c	243 b	17.2 c
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		11.3	9.4	4.3	2.5

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

TITLE: **THE EVALUATION OF BAS 500 F 250EC FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: BAS 500 F 250 EC (experimental), ASSIST (surfactant), SENATOR 70 WP (thiophanate-methyl), DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on April 26, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 6, 18, 27, Aug. 9 and 23. Foliar disease assessments were made on August 24, September 2 and 27. Yields were taken on November 7 and analyzed in the Michigan Sugar Companies research laboratory. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: The fungicide BAS 500 250 EC with or without the surfactant ASSIST provided excellent Cercospora Leafspot control equal to the combination of SENATOR 70 WP tank mixed with DITHANE DG 75% NT. High levels of Cercospora Leafspot control could be attained using the lowest rate tested in this trial of BAS 500 F 250 EC at 0.22 L product/ha using a 5 spray application program. There was no visual signs of plant injury even with the highest BAS 500 F 250 EC treatment of 1.28 L product/ha with ASSIST. All of the treatments tested provided significantly higher sugarbeet yield and quality assessments than the non sprayed control.

There appears a white flecking on the sugarbeet foliage where the Cercospora leafspot lesions had been suggesting a type of kickback activity using BAS 500 F 250 EC. This observation needs to be repeated to be understood and verified.

Table 1. Foliar disease control ratings.

#	Treatments [2]	Rate Product/ha	Foliar Damage Ratings (0-10)[1] Aug. 24	Sept.2	Sept. 27
1	BAS 500 F 250 EC	0.22 L	8.5 a*	8.4 b	9.3 b
2	BAS 500 F 250 EC + ASSIST	0.22 L 1.0% v/v	8.9 a	9.4 a	9.4 ab
3	BAS 500 F 250 EC + ASSIST	0.44 L 1.0% v/v	8.9 a	9.1 a	9.5 ab
4	BAS 500 F 250 EC + ASSIST	0.64 L 1.0% v/v	8.8 a	9.1 a	9.6 a
5	BAS 500 F 250 EC + ASSIST	1.28 L 1.0% v/v	7.8 a	9.3 a	9.7 a
6	SENATOR 70 WP + DITHANE DG 75% NT	0.42 kg 2.25 kg	8.8 a	9.4 a	9.6 a
7	CONTROL		4.3 b	4.0 c	3.8 c
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		10.4	5.3	2.5

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2] Treatments - products followed by a + sign indicate the two materials have been tank mixed and applied together.

Table 2. Sugar beet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	YIELD RWSA	YIELD T/A	RWST	% Sucrose
1	BAS 500 F 250 EC	0.22 L	10508 ab*	34.7 abc	266 a	18.7 a
2	BAS 500 F 250 EC + ASSIST	0.22 L 1.0% v/v	11881 a	37.2 a	280 a	18.8 a
3	BAS 500 F 250 EC + ASSIST	0.44 L 1.0% v/v	10129 b	32.1 bc	276 a	19.0 a
4	BAS 500 F 250 EC + ASSIST	0.64 L 1.0% v/v	11038 ab	35.8 ab	270 a	18.8 a
5	BAS 500 F 250 EC + ASSIST	1.28 L 1.0% v/v	10435 ab	34.0 abc	269 a	18.6 a
6	SENATOR 70 WP + DITHANE DG 75% NT	0.42 kg 2.25 kg	11903 a	38.4 a	272 a	18.9 a
7	CONTROL		8422 c	30.6 c	242 b	16.9 b
	ANOVA P#0.05		s	s	s	s
	Coefficient of Variation (%)		9.4	8.9	3.5	3.1

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

TITLE: **INITIAL SPRAY APPLICATION TIMING FOR CERCOSPORA LEAFSPOT CONTROL IN SUGARBEETS -Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS:, DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on April 26, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on the following days: Trt.#1- July 3, 15, 24, Aug. 4, 14, and 24; Trt.#2 - July 15, 24, Aug. 4, 14, and 24; Trt.#3 - Aug.1, 11, and 21; Trt.#4 - Aug 15, and 24; Trt.#5 - June 27 (55 DSV), July 7, 18, 28, Aug. 8, and 21; Trt.#6 - July 4 (70 DSV), 18, Aug. 1,11, and 21; Trt.#7 - July 18 (102 DSV), Aug. 1, 11, and 21; Trt.#8 - Aug. 1 (126 DSV), 11, and 21;Trt.#9 - July 4 - first symptoms (70 DSV), July 18, Aug. 1, 11 and 21. The Disease Severity Values were calculated using the TOMCAST disease forecasting model. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 26. Yields were taken on November 7 with sugar content determined from the samples sent to and analyzed by Michigan Sugar Co. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: The highest level of Cercospora leafspot control observed on the foliage was to initiate the fungicide spray program at first sight of disease or between July 1 and 15 or between 55-70 DSV calculated using the TOMCAST model. The most cost effective spray program having the highest level of Cercospora Leafspot control with the fewest number of fungicide sprays was the initiation of the program when the DSV were between 55 and 70. If the initial spray was delayed or fewer early sprays applied, late season control was significantly reduced. In this years trials delaying the initial spray application to July 18 (102 DSV) and beyond resulted in significantly more foliar damage due to Cercospora Leafspot. Using a product with higher levels of Cercospora Leafspot control may be necessary to show significant differences in yield and sugarbeet quality.

The first symptoms of Cercospora Leafspot were note on July 4 which corresponded to a cumulative disease severity value of 70 using the TOMCAST model.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Timing of Application[1/]		Foliar Damage Ratings (0-10)[2/]		
			Initial	Subsequent	Aug. 24	Sept.2	Sept. 26
1	DITHANE DF 75% NT	2.25 kg	July 1	5	8.0 a*	7.9 a	6.5 ab
2	DITHANE DF 75% NT	2.25 kg	July 15	4	6.8 a-d	7.6 ab	6.0 b
3	DITHANE DF 75% NT	2.25 kg	Aug. 1	2	5.3 cde	5.4 d	4.0 c
4	DITHANE DF 75% NT	2.25 kg	Aug. 15	1	4.8 de	4.3 e	4.0 c
5	DITHANE DF 75% NT	2.25 kg	55 DSV June 27	5	8.4 a	8.0 a	7.3 a
6	DITHANE DF 75% NT	2.25 kg	70 DSV July 4	4	7.6 ab	7.1 bc	6.6 ab
7	DITHANE DF 75% NT	2.25 kg	102 DSV July 18	3	7.0 abc	7.9 a	4.5 c
8	DITHANE DF 75% NT	2.25 kg	126 DSV Aug 1	2	5.6 b-e	6.8 c	4.0 c
9	DITHANE DF 75% NT	2.25 kg	first sign July 4	4	7.6 ab	7.1 bc	6.6 ab
10	CONTROL			0	4.0 e	2.0 f	3.8 c
	ANOVA P#0.05				s	s	s
	Coefficient of Variation (%)				21.4	6.6	14.3

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications; DSV calculated using TOMCAST model

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugar beet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	Timing of Application [1/]		YIELD			%
			Initial	Subsequent	RWSA	T/A	RWST	Sugar
1	DITHANE DF 75% NT	2.25 kg	July 1	5	9106	29.6	269	17.3ab
2	DITHANE DF 75% NT	2.25 kg	July 15	4	10059	32.9	268	17.3 ab
3	DITHANE DF 75% NT	2.25 kg	Aug. 1	2	9732	31.3	273	17.5 a
4	DITHANE DF 75% NT	2.25 kg	Aug. 15	1	8758	29.0	265	16.5 b
5	DITHANE DF 75% NT	2.25 kg	55 DSV June 27	5	10064	32.0	275	17.6 a
6	DITHANE DF 75% NT	2.25 kg	70 DSV July 4	4	10078	31.8	278	17.7 a
7	DITHANE DF 75% NT	2.25 kg	102 DSV July 18	3	8972	29.0	272	17.5 a
8	DITHANE DF 75% NT	2.25 kg	126 DSV Aug. 1	2	9510	30.5	273	17.5 a
9	DITHANE DF 75% NT	2.25 kg	first sign July 4	4	8748	28.3	271	17.4 ab
10	CONTROL			0	9250	30.5	265	16.9 ab
	ANOVA P#0.05				ns	ns	ns	s
	Coefficient of Variation (%)				5.9		3.9	3.2

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: DSV calculated using TOMCAST model.

TITLE: **TIMING OF SUBSEQUENT SPRAY APPLICATIONS FOR CERCOSPORA LEAFSPOT CONTROL IN SUGARBEETS - Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE DF 75% NT (75% mancozeb), SENATOR 70 WP (thiophanate-methyl), EMINENT 125 SL (tetraconazole), BAS 500 250 EC (experimental).

METHODS: Sugar beets were planted commercially on April 26, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75 m apart, replicated four times in a randomized complete block design. The initial spray application was applied on July 6 across all the treatments and subsequently sprayed on a cumulative Disease Severity Value of 30, 36,70 using the TOMCAST disease forecasting model and every 7 days respectively. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on the following days: Trt. #1 - July 6, 18, Aug. 1 and 16; Trts. #2,3,4 - July 6, 19 and Aug. 8; Trt. #5 - July 6 and Aug. 8; Trt. #6 - July 6, 19, 24, 29, Aug. 4 and 8. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 27. Yields were taken on November 7 with sugar content determined from the samples sent to and analyzed by Michigan Sugar Co. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: Since the last fungicide spray was applied early in August, August 8 for all but treatment #1 which was last sprayed on August 16, the disease assessments were reflective of the July and early August spray programs.

Excellent control of Cercospora leafspot resulting in high RWST and % sugar, was observed using the 3 spray regime of treatment 3. This treatment used the tank mix of EMINENT 125 SL and BAS 500, followed by DITHANE DF 75NT with the last of the three spray regime to include again the tank mixture of EMINENT 125 SL and BAS 500. The program was initiated on July 6 (71DSV) and was repeated every 36 DSV.

The next best spray program was treatment #2 with excellent control throughout the summer and into the fall but after the September 2 evaluation the treatment effect was lost and Cercospora Leafspot observations significantly increased resulting in less sugar content. This program was timed exactly the same as treatment #3. Although the fungicide SENATOR 70WP appeared to provide the necessary control as observed on both the August 24 and September rating days the number of times DITHANE DF 75%NT was used compared to treatment 3 resulted in a shorted control period.

When DITHANE DF 75%NT is used alone a shorter interval requiring more spray applications would be necessary to achieve the high level of control as when either SENATOR 70WP, EMINENT 125 SL and/or BAS 500 are used.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product /ha	Timing of Application [1/] Initial	Subsequent	Total # of Sprays	Foliar Damage Ratings (0-10)[2/] Aug. 24	Sept. 2	Sept. 27
1	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	30DSV	4	8.3 a*	6.5 c	5.1 b
2	SENATOR 70WP + DITHANE DF 75%NT; DITHANE DF 75%NT	0.42 kg 2.25 kg 2.25 kg	July 6 (71DSV)	36DSV	3	9.3 a	9.5 a	5.0 b
3	EMINENT 125 SL + BAS 500; DITHANE DF 75%NT	1.00 L 0.44 L 2.25 kg	July 6 (71DSV)	36DSV	3	9.3 a	9.5 a	8.6 a
4	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	36DSV	3	8.3 a	7.1 b	3.0 d
5	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	70DSV	2	6.0 b	4.0 d	4.0 c
6	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	7 day	6	8.1 a	7.1 b	3.0 d
7	Control				0	3.8 c	2.0 e	3.0 d
	ANOVA P#0.05					s	s	s
	Coefficient of Variation (%)					10.7	1.9	13.6

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: DSV calculated using TOMCAST model.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugarbeet yield and sugar quality measurements.

#	Treatments	Rate Product/ha	Timing of Application [1/] Initial	Timing of Application [1/] Subsequent	Total # of Sprays	Yield RWSA	Yield T/A	RWST	% Sugar
1	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	30DSV	4	8573	29.7	249abc*	16.9 c
2	SENATOR 70WP + DITHANE DF 75%NT; DITHANE DF 75%NT	0.42 kg 2.25 kg 2.25 kg	July 6 (71DSV)	36DSV	3	9860	33.0	262 a	17.7 ab
3	EMINENT 125 SL + BAS 500; DITHANE DF 75%NT	1.00 L 0.44 L 2.25 kg	July 6 (71DSV)	36DSV	3	9947	33.4	261 ab	18.2 a
4	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	36DSV	3	9394	33.0	250 abc	17.2 bc
5	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	70DSV	2	8506	30.5	245 c	16.9 c
6	DITHANE DF 75%NT	2.25 kg	July 6 (71DSV)	7 day	6	9559	32.7	256 abc	17.5 bc
7	Control				0	7947	28.2	246 bc	16.8 c
	ANOVA P#0.05					ns	ns	s	s
	Coefficient of Variation (%)							3.5	2.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: DSV calculated using TOMCAST model.

TITLE: **EFFECT OF EARLY, MID vs LATE SEASON SPRAY PROGRAMS FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS - Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: KOCIDE 101 (50% copper hydroxide), DITHANE DF 75% NT (75% mancozeb), AGRAL 90 (surfactant).

METHODS: Sugar beets were planted commercially on April 26, 2000, on the Fox Farm near Baldoon, Ontario. Three row plots were established, 8m in length with rows spaced 0.75 m apart, replicated four times in a randomized complete block design. Treatments were divided using the fungicide combination KOCIDE 101 + DITHANE DF 75%NT + AGRAL 90, sprayed early, mid-season and late-season. The early season applications were made on June 30, July 11 and 21, the mid-season fungicide treatments were made on Aug 1, 11 and 21 while the late season spray application was made on September 2. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 26. Yields were taken on November 7 with sugar content determined from the samples sent to and analyzed by Michigan Sugar Co. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Tables 1 & 2.

CONCLUSIONS: The early season fungicide spray applications were essential for the control of Cercospora Leafspot observations in late August. Ending the program early resulted in an increase in foliar diseases later in the season. Only one application was made in the Late Season Sprays treatments as by September the foliage was severely damaged and continued applications were deemed not worthwhile.

Control of Cercospora Leafspot could be controlled with multiple applications of fungicides.

Higher levels of control using other fungicides may have shown more significance in the sugarbeet quality assessments.

Table 1. Foliar disease control ratings.

#	Treatments[1/]	Total # of Sprays	Foliar Damage Ratings (0-10)[2/] Aug. 24	Sept. 2	Sept. 27
1	Early Season Sprays June 30, July 11, 21	3	8.0 a*	6.9 b	6.0 b
2	Mid-Season Sprays Aug. 1, 11, 21	3	7.0 bc	3.8 c	7.0 b
3	Late Season Sprays Sept. 2	1	5.0 d	2.0 d	3.0 c
4	Full Season Spray Program June 30, July 11, 21, Aug. 1, 11, 21, Sept. 2	7	9.1 a	9.4 a	9.4 a
5	Control	0	5.9 cd	2.3 d	2.7 c
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		13.9	17.1	15.4

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Fungicide rates, Product/ha, used were: KOCIDE 101, 2.25 kg; DITHANE DG 75% NT, 2.25 kg; AGRAL 90, 0.1% v/v.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

Table 2. Sugarbeet yield and sugar quality measurements.

#	Treatments[1/]	Total # of Sprays	Yield RWSA	Yield T/A	Yield RWST	% Sugar
1	Early Season Sprays June 30, July 11, 21	3	8106	28.8 a	247	17.3 ab
2	Mid-Season Sprays Aug. 1, 11, 21	3	8422	27.5 ab	248	17.1 ab
3	Late Season Sprays Sept. 2	1	5867	19.7 c	262	17.7 ab
4	Full Season Spray Program June 30, July 11, 21, Aug. 1, 11, 21, Sept. 2	7	7972	27.8 ab	261	18.2 a
5	Control	0	7344	18.9 c	243	16.8 b
	ANOVA P#0.05		ns	s	ns	s
	Coefficient of Variation (%)			19.4		4.7

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Fungicide rates, Product/ha, used were: KOCIDE 101, 2.25 kg; DITHANE DG 75% NT, 2.25 kg; AGRAL 90, 0.1% v/v.

TITLE: **COMMERCIAL EVALUATION OF A SPRAY PROGRAM FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGAR BEETS - Brian Fox - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE DF (80% mancozeb), SENATOR 70 WP (thiophanate-methyl).

METHODS: A commercial field of sugarbeets were planted on May 10, 2000, on the Fox Farm near Baldoon, Ontario. The field was sprayed with fungicides on a timing that was deemed appropriate by the owners using their own fungicide field sprayer. Three plots were designed each 2 acres in size with a zero, one, or two spray application protocol. The foliar applications were made on July 12 and August 15. Assessments were taken on September 27 by rating the level of Cercospora leafspot on the foliage at 4 separate locations within the plot area. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Due to the cool temperatures in June and July there was very little Cercospora leaf spot noticed in sugarbeet fields until July 29, resulting in most growers delaying their first fungicide application. However by late August the disease had progressed sufficiently to cause significant foliage damage. In other trials at this location, yields were marginally reduced due to the incidence of this fungal disease however it is anticipated that sugar content will be affected due to this level of foliage damage. Sample results have not yet been received from the laboratory.

In this trial Cercospora leafspot was significantly reduced with either of the two fungicide application treatments. It would appear that the August spray timing was the more critical of the applications.

Table 1. Foliar disease control ratings.

Treatments	Rate Product/ha	Spray timing	# of spray applications	Foliar Damage Ratings (0-10)[1/] September 27
DITHANE DF + KOCIDE 101	2.25 kg 2.25 kg	1st spray + 2nd spray	2	6.5 a*
SENATOR 70 WP + DITHANE DF	0.5 kg 2.25 kg			
SENATOR 70 WP + DITHANE DF	0.5 kg 2.25 kg	2nd spray only	1	6.0 a
CONTROL			0	3.0 b
ANOVA P#0.05				s
Coefficient of Variation (%)				11.3

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).
[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **REGISTERED FUNGICIDES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGAR BEETS - Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE M-45 (80% mancozeb), DITHANE DF 75% NT (75% mancozeb), MANZATE 200DF (80% mancozeb), PENNCOZEB 80WP (80% mancozeb), PENNCOZEB 75DF (75% mancozeb), KOCIDE 101 (50% copper hydroxide), SIL WETT (surfactant), SENATOR 70 WP (thiophanate-methyl).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 10, 21, and Aug. 4. Foliar disease assessments were made on August 24, September 2, and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Three applications of fungicides were applied with the last on August 4. Assessments were taken at intervals after the last fungicide application. On August 24, 20 days after the last fungicide application the incidence of Cercospora Leaf Spot was significant however all but DITHANE M-45 proved effective. Assessments were made a week and 4 weeks later with no additional spray applications. Products which provided the greatest residual Cercospora Leafspot control were in order of effectiveness, SENATOR 70 WP + DITHANE DG 75% NT, SENATOR 70WP used alone and then DITHANE DG 75% NT when used alone. The next group showing degrees of effectiveness were KOCIDE 101 + SIL WETT and KOCIDE 101 when used alone. PENNCOZEB 75 DF and PENNCOZEB 80WP provided a high level of Cercospora Leafspot control early but without repeated applications, their effectiveness become significantly less later in the season. Similarly MANZATE 200DF and especially DITHANE M-45 were the least effective fungicides evaluated in this trial. The surfactant SIL WETT caused unacceptable leaf burn however it appeared to improve the effectiveness of KOCIDE 101. Possibly another less phytotoxic surfactant would prove beneficial.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 24	Sept.2	Sept. 27
1	DITHANE M-45	2.25 kg	6.7 b*	4.0 d	4.7 d
2	DITHANE DG 75% NT	2.25 kg	9.0 a	7.0 b	6.0 bc
3	MANZATE 200 DF	2.25 kg	7.7 ab	4.0 d	5.0 cd
4	PENNCOZEB 80WP	2.25 kg	8.3 a	4.0 d	5.3 bcd
5	PENNCOZEB 75 DF	2.25 kg	8.7 a	5.3 cd	4.5 d
6	KOCIDE 101	2.25 kg	7.3 ab	6.0 bc	4.8 cd
7	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	8.7 a	7.3 ab	5.3 bcd
8	SENATOR 70 WP	0.5 kg	8.7 a	8.5 a	6.3 ab
9	SENATOR 70 WP + DITHANE DG 75% NT	0.5 kg 2.25 kg	8.5 a	8.7 a	7.5 a
10	CONTROL		4.3 c	2.3 e	4.0 d
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		11.2	13.9	12.9

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **USE OF SURFACTANTS TO IMPROVE THE EFFECTIVENESS OF COPPER FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: KOCIDE 101 (50% copper hydroxide), SIL WETT (surfactant), NU-FILM (surfactant), AGRAL 90 (surfactant), AG-BALANCE (surfactant), ASSIST (surfactant), DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 10, 21, and Aug. 4. Foliar disease assessments were made on August 24, September 2 and 267. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Twenty days after the last of the 3 fungicide spray application program, the KOCIDE 101 fungicide provided excellent Cercospora Leafspot control with or without the addition of a surfactant. Disease progressed very rapidly after this date providing a clear differentiation between the surfactants. The most effective surfactant when added to KOCIDE was ASSIST providing equal disease control to that of the combinations of KOCIDE 101 plus DITHANE DG 75% NT with or without the SIL WETT and AGRAL 90 surfactants.

The fungicidal effect of KOCIDE 101 was improved with the use of the surfactant ASSIST.

AGRAL 90, AG-BALANCE and NU-FILM did not provide any additional benefits when tank mixed with KOCIDE 101. The addition of the surfactant SIL WETT caused minor damage to the sugarbeet foliage.

DITHANE DG 75% NT provided higher levels of Cercospora control than KOCIDE 10. Further additions of surfactants to DITHANE DG 75% NT did not improve the level of Cercospora control.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 24	Sept.2	Sept. 27
1	KOCIDE 101	2.25 kg	8.5 a*	6.5 cd	4.5 ab
2	KOCIDE 101 + SIL WETT	2.25 kg 0.1% v/v	8.3 a	6.5 cd	4.5 ab
3	KOCIDE 101 + NU-FILM	2.25 kg 1.17 L	7.6 a	6.0 d	4.0 bc
4	KOCIDE 101 + AGRAL 90	2.25 kg 0.1% v/v	8.5 a	6.5 cd	4.0 bc
5	KOCIDE 101 + AG-BALANCE	2.25 kg 10.0 L	5.6 b	4.0 e	3.8 bc
6	KOCIDE 101 + ASSIST	2.25 kg 1.0% v/v	9.0 a	8.8 a	4.3 abc
7	KOCIDE 101 + DITHANE DG 75% NT	2.25 kg 2.25 kg	8.5 a	7.9 ab	5.0 ab
8	KOCIDE 101 + DITHANE DG 75% NT+ SIL WETT	0.5 kg 2.25 kg 0.1% v/v	8.6 a	7.5 bc	5.5 a
9	KOCIDE 101 + DITHANE DG 75% NT+ AGRAL 90	2.25 kg 2.25 kg 0.1% v/v	8.5 a	8.9 a	4.8 ab
10	CONTROL		4.3 c	2.5 f	3.0 c
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		11.9	12.5	19.3

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **EVALUATION OF CANDIDATE FUNGICIDES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: SENATOR 70 WP (thiophanate-methyl), DITHANE DF 75% NT (75% mancozeb), PENNCOZEB 75 DF (mancozeb), BAS 500 250 EC (experimental), ICIA5504 250 SC (azoxystrobin), BRAVO 500 (chlorothalonil), EMINENT 125 SL (tetraconazole), THIS COPPER (50% copper), THIS ZINC (zinc).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 10, 21, and Aug. 4. Foliar disease assessments were made on August 24, September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Effective Cercospora Leafspot control was observed 4 weeks after the last of a three spray program using the following fungicides, BAS 500 250 EC, EMINENT 125 SL and SENATOR 70 WP. In addition, BAS 500 250 EC provided outstanding control even beyond that period providing acceptable control into late September, on September, 27 almost 7 weeks after the last application.

By August 24, 20 days after the last of three spray applications, DITHANE DF 75% NT, combinations of BRAVO 500F with THIS COPPER and THIS ZINC were still providing a level of control, statistically at least, equal to SENATOR 70WP, however the level of leafspot control became less by the September 2nd foliar disease ratings.

Significantly less leafspot control was achieved both in the August and September ratings with PENNCOZEB 75 DF, ICIA5504 250 SC and BRAVO 500F when used alone.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 24	Sept.2	Sept. 27
1	SENATOR 70WP	0.5 kg	8.6 a*	8.8 a	4.5 c
2	DITHANE DF 75% NT	2.25 kg	6.8 ab	4.6 c	3.0 de
3	PENNCOZEB 75 DF	2.25 kg	5.0 bc	5.0 c	4.3 c
4	BAS 500 250 EC	0.44 L	8.3 a	8.8 a	7.5 a
5	ICIA5504 250 SC	0.3 L	6.5 bc	6.5 b	4.0 cd
6	BRAVO 500F	2.8 L	6.0 bc	4.3 c	4.5 c
7	EMINENT 125 SL	1.0 L	8.6 a	8.5 a	5.8 b
8	THIS COPPER + BRAVO 500F	0.625 L 2.8 L	6.8 ab	6.9 b	4.5 c
9	THIS ZINC + BRAVO 500F	0.42 L 2.8 L	7.0 ab	7.5 b	4.0 cd
10	CONTROL		4.5 c	2.8 d	2.8 e
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		20.1	10.8	15.0

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **PROGRAM SPRAY SCHEDULES FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: SENATOR 70 WP (thiophanate-methyl), KOCIDE 101 (50% copper hydroxide), DITHANE DF 75% NT (75% mancozeb), PENNCOZEB 75 DF (75% mancozeb), SIL WETT (surfactant), EMINENT 125 SL (tetraconazole), BRAVO 500F (chlorothalonil), BAS 500 250 EC (experimental)

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 13, 21, Aug. 4. Treatment #5 was only sprayed twice on July 21 and Aug 4 while treatments 2 and 9 were sprayed only twice on July 13 and 21. Foliar disease assessments were made on August 24 September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The combination spray programs used in this trial provided outstanding Cercospora Leafspot control almost 4 weeks after the last of the three spray application program. Several combinations provided further control late in September. The most effective treatments were EMINENT 125 SL; SENATOR 70 WP +DITHANE DG 75% NT; // EMINENT 125 SL;BRAVO 500 F; then SENATOR 70 WP +PENNCOZEB 75 DF // PENNCOZEB 75 DF; PENNCOZEB 75 DF + SENATOR 70 WP; PENNCOZEB 75 DF. There appeared to be a significant difference between the PENNCOZEB formulations with the 75 DF providing longer lasting Cercospora Leafspot control than the 80 WP formulation.

The deletion of the third spray in treatments #9 and #2 may have resulted in less control noted by September 27.

Table 1. Foliar disease control ratings.

#	Treatments [/2]	Rate Product/ha	Foliar Damage Ratings (0-10)[1/] Aug. 24	Sept.2	Sept. 27
1	SENATOR 70 WP + KOCIDE 101	0.42 kg 2.25 kg	9.0 a*	8.1 ab	5.4 d
2	SENATOR 70 WP + DITHANE DF 75% NT	0.42 kg 2.25 kg	9.0 a	8.5 a	3.8 e
3	SENATOR 70 WP + PENNCOZEB 75 DF	0.42 kg 2.25 kg	8.9 a	9.4 a	7.8 bc
4	PENNCOZEB 75 DF; PENNCOZEB 75 DF + SENATOR 70 WP; PENNCOZEB 75 DF	2.25 kg 2.25 kg 0.56 kg 2.25 kg	9.0 a	9.4 a	7.5 c
5	PENNCOZEB 80 WP; PENNCOZEB 80 WP + SENATOR 70 WP; PENNCOZEB 80WP	2.25 kg 2.25 kg 0.56 kg 2.25 kg	8.9 a	8.5 a	6.1 d
6	PENNCOZEB 75 DF + KOCIDE 101 + SIL WETT	2.25 kg 2.25 kg 0.1% v/v	9.0 a	8.6 a	5.8 d
7	EMINENT 125 SL; BRAVO 500 F;	1.0 L 3.2 L	9.0 a	9.4 a	8.6 ab
8	EMINENT 125 SL; SENATOR 70 WP + DITHANE DG 75% NT;	1.0 L 0.42 kg 2.25 kg	9.0 a	8.8 a	9.1 a
9	EMINENT 125 SL; BAS 500 250EC;	1.0 L 0.44 L	8.5 a	7.1 b	3.1 ef
10	CONTROL		5.0 b	2.5 c	2.5 f
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		5.2	10.2	11.5

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2/] Treatments - products followed by a + sign indicate the two materials have been tank mixed and applied together. Products ending with a ; sign means the next spray application is followed using the next material listed. E.g. Treatment #1 SENATOR 70WP + KOCIDE 101 - both materials were tank mixed and applied all 3 spray applications. Treatment #7 EMINENT 125 SL; BRAVO 500F; - EMINENT 125 SL was applied on the first spray application date on July 13 followed by BRAVO 500F on July 21 then back to EMINENT 125 SL on Aug. 4.

TITLE: **THE EVALUATION OF BAS 500 F 250EC FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS -Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: BAS 500 F 250 EC (experimental), ASSIST (surfactant), SENATOR 70 WP (thiophanate-methyl), DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Spray applications were applied on July 13, 21, and Aug. 4. Treatments #2 and #3 were not sprayed on August 4. Foliar disease assessments were made on August 24, September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The most effective treatments under heavy Cercospora leafspot disease pressure were the three spray applications including BAS 500 F 250 EC and SENATOR 70 WP + DITHANE DG 75% NT. Even the lowest rate of BAS 500 F 250 EC without the surfactant ASSIST was effective when applied three times. Treatments #2 and # 3 had only two applications made on July 13 and 21 and although the foliar damage ratings were significantly lower irrespective of rate, it was amazing that even after 43 days since the last spray application and under the amount of disease pressure that was present, a measure of disease control remained in effect. The highest rate of BAS 500 F 250 EC + ASSIST provided a high level of control even late in September.

Table 1. Foliar disease control ratings.

#	Treatments [2]	Rate Product/ha	Foliar Damage Ratings (0-10)[1] Aug. 24	Sept.2	Sept. 27
1	BAS 500 F 250 EC	0.22 L	8.8 a*	8.3 bc	4.0 d
2	BAS 500 F 250 EC + ASSIST - only 2 applications	0.22 L 1.0% v/v	8.5 a	7.5 cd	4.0 d
3	BAS 500 F 250 EC + ASSIST - only 2 applications	0.44 L 1.0% v/v	8.3 a	6.8 d	5.0 c
4	BAS 500 F 250 EC + ASSIST	0.64 L 1.0% v/v	8.9 a	8.0 bc	6.5 b
5	BAS 500 F 250 EC + ASSIST	1.28 L 1.0% v/v	8.8 a	9.3 a	7.6 a
6	SENATOR 70 WP + DITHANE DG 75% NT	0.42 kg 2.25 kg	8.6 a	8.8 ab	6.0 b
7	CONTROL		4.0 b	3.0 e	3.8 d
	ANOVA P#0.05		s	s	s
	Coefficient of Variation (%)		8.6	7.4	10.7

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

[2] Treatments - products followed by a + sign indicate the two materials have been tank mixed and applied together.

TITLE: **INITIAL SPRAY APPLICATION TIMING FOR CERCOSPORA LEAFSPOT CONTROL IN SUGARBEETS -Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS:, DITHANE DF 75% NT (75% mancozeb).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75m apart, replicated four times in a randomized complete block design. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on the following days: Trt.#1- July 3, 15, 24; Trt.#2 - July 15 and; Trt.#3 - Aug.1 only; Trt.#4 - Aug 15 - not sprayed; Trt.#5 - June 27 (40 DSV), July 10, 19 and 28; Trt.#6 - July 4 (50 DSV), 18 and 24; Trt.#7 - July 15 (67 DSV) and Aug. 1; Trt.#8 - Aug. 1 (98 DSV) only; Trt.#9 - July 19 - first symptoms (74 DSV) and Aug. 1. The Disease Severity Values were calculated using the TOMCAST disease forecasting model. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: The excessive rainfall created conditions preventing further spray applications into August and September. Early in the season the weather conditions were unusually cool delaying the disease development of Cercospora leafspot . The first symptoms of Cercospora Leafspot were noted on July 19 with a cumulative disease severity value of 74 using the TOMCAST model. It is of interest that in another trial several miles west of this location the first disease symptoms were noted considerably earlier on July 4, however using the disease forecasting model TOMCAST the cumulative disease severity value was 70, very close to what was observed at this site.

Control of leafspot was observed on August 24 from spray applications made during the early to mid July periods, treatments 1, 2, 5, and 6. Due to the cessation of spraying due to the moisture conditions in the field the September disease ratings indicated poor levels of control other than for treatment 5 where 3 + 1 = 4 applications were made interestingly all in July.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product/ha	Timing of Application[1/] Initial	Subsequent	Foliar Damage Ratings (0-10)[2/] Aug. 24	Sept.2	Sept. 26
1	DITHANE DF 75% NT	2.25 kg	July 3	2	8.4 ab*	5.8 c	3.0 a
2	DITHANE DF 75% NT	2.25 kg	July 15	1	8.5 ab	5.5 f	3.0 a
3	DITHANE DF 75% NT	2.25 kg	Aug. 1	0	5.5 d	4.0 g	2.5 ab
4	DITHANE DF 75% NT	2.25 kg	Aug. 15 NS	0	6.8 cd	4.1 g	2.5 ab
5	DITHANE DF 75% NT	2.25 kg	40 DSV June 27	3	8.9 a	9.0 a	3.3 a
6	DITHANE DF 75% NT	2.25 kg	50 DSV July 4	2	7.1 bc	5.8 ef	3.0 a
7	DITHANE DF 75% NT	2.25 kg	67 DSV July 15	1	6.9 cd	8.0 b	3.0 a
8	DITHANE DF 75% NT	2.25 kg	98 DSV Aug 1	0	6.3 cd	4.4 g	3.0 a
9	DITHANE DF 75% NT	2.25 kg	first sign July 19 74	1	6.8 cd	6.0 def	3.0 a
10	CONTROL			0	5.8 cd	4.3 g	2.0 b
	ANOVA P#0.05				s	s	s
	Coefficient of Variation (%)				12.6	7.6	9.8

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications; DSV calculated using TOMCAST model

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **TIMING OF SUBSEQUENT SPRAY APPLICATIONS FOR CERCOSPORA LEAFSPOT CONTROL IN SUGARBEETS - Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: DITHANE DF 75% NT (75% mancozeb), SENATOR 70 WP (thiophanate-methyl), EMINENT 125 SL (tetraconazole), BAS 500 250 EC (experimental).

METHODS: Sugarbeets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75 m apart, replicated four times in a randomized complete block design. The initial spray application was applied on July 13 (DSV=61) across all the treatments and subsequently sprayed on a cumulative Disease Severity Value of 20, and 35 using the TOMCAST disease forecasting model and every 10 days respectively. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture on the following days: Trt. #1 - July 13, 19 and Aug. 1; Trts. #2,3,4 - July 13 and Aug.1; Trt. #5 - July 13 only; Trt. #6 - July 13, 25 and Aug. 1. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Under conditions of severe Cercospora Leafspot disease pressure the most effective treatments where to apply subsequent sprays every 20 DSV if using DITHANE DF 75%NT. Equal or improved disease control can however be achieved with fewer spray applications if SENATOR 70WP, EMINENT 125 SL or BAS 500 fungicides were incorporated into the sequence of spraying. The intervals can be extended from 20 to 35 DSV with combinations of these new fungicide products.

It should be noted that disease symptoms did not appear until late July at this site. The TOMCAST disease forecasting model did not cumulate as high an index early in the season due to the unusually cool weather conditions which apparently are not conducive to encouraging the infection cycle of Cercospora. The cumulative disease severity value on July 13, the date of the first spray application was in contrast to a similar fungicide trial run several miles west of this site where much earlier on July 6 the cumulative DSV's had increased to 71. This demonstrates the site specific nature of this disease requiring a method such as a weather disease forecasting model such as TOMCAST to assist a grower in deciding when to initiate a fungicide spray program.

Table 1. Foliar disease control ratings.

#	Treatments	Rate Product /ha	Timing of Application [1/]		Total # of Sprays	Foliar Damage Ratings (0-10)[2/]		
			Initial	Subsequent		Aug. 24	Sept. 2	Sept. 27
1	DITHANE DF 75%NT	2.25 kg	July 13 (61DSV)	20DSV	3	8.3 a*	7.5 bc	2.0 a
2	SENATOR 70WP + DITHANE DF 75%NT; DITHANE DF 75%NT	0.42 kg 2.25 kg 2.25 kg	July 13 (61DSV)	35DSV	2	8.8 a	8.0 b	2.0 a
3	EMINENT 125 SL + BAS 500; DITHANE DF 75%NT	1.00 L 0.44 L 2.25 kg	July 13 (61DSV)	35DSV	2	9.0 a	9.0 a	2.0 a
4	DITHANE DF 75%NT	2.25 kg	July 13 (61DSV)	35DSV	2	8.5 a	6.9 c	2.0 a
5	DITHANE DF 75%NT	2.25 kg	July 13 (61DSV)	only	1	6.3 b	4.5 d	2.0 a
6	DITHANE DF 75%NT	2.25 kg	July 13 (61DSV)	10 day	3	8.6 a	6.8 c	2.0 a
7	Control				0	4.5 c	3.5 e	2.0 a
	ANOVA P#0.05					s	s	ns
	Coefficient of Variation (%)					10.0	8.4	

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Timing (#) of Applications: DSV calculated using TOMCAST model.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.

TITLE: **EFFECT OF EARLY, MID vs LATE SEASON SPRAY PROGRAMS FOR THE CONTROL OF CERCOSPORA LEAFSPOT IN SUGARBEETS - Bob Harvey - 2000**

CROP: Sugar beet (*Beta vulgaris L.*) cv. E17
PEST: Cercospora leafspot, *Cercospora beticola*, Sacc.

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MATERIALS: KOCIDE 101 (50% copper hydroxide), DITHANE DF 75% NT (75% mancozeb), AGRAL 90 (surfactant).

METHODS: Sugar beets were planted commercially on April 29, 2000, on the Harvey Farm near Dresden, Ontario. Three row plots were established, 8m in length with rows spaced 0.75 m apart, replicated four times in a randomized complete block design. Treatments were divided using the fungicide combination KOCIDE 101 + DITHANE DF 75%NT + AGRAL 90, sprayed early, mid-season and late-season. The early season applications were made on June 30, and July 11, the mid-season fungicide treatments were delayed due to the excessive wet conditions in the field as a result of record rainfalls while the late season spray applications were not applied as the foliage had by that time become severely damaged due to Cercospora Leafspot. The foliar applications were applied using a specialized small plot research CO_2 sprayer with a three nozzled hand-held boom applying 200L/ha of spray mixture. Two rows per treatment were sprayed with an unsprayed row between plots. Foliar disease assessments were made on August 24, September 2 and 27. Results were analysed using the Duncan's multiple range test (P# 0.05).

RESULTS: Data are presented in Table 1.

CONCLUSIONS: Due to the excessive rainfall the mid and late season fungicide sprays were not applied. The trial does demonstrate however the value in early season spray applications. Only two fungicide sprays of KOCIDE 101 + DITHANE DG 75%NT + AGRAL 90 were applied with the last on July 11, however its beneficial effect was noticed throughout the remaining days of July, the entire month of August and into early September.

Table 1. Foliar disease control ratings.

#	Treatments[1/]	Total # of Sprays	Foliar Damage Ratings (0-10)[2/] Aug. 24	Sept. 2	Sept. 27
1	Early Season Sprays June 30, July 11	2	8.8 a*	7.3 a	2.0 a
2	Mid-Season Sprays none	0	5.8 b	5.8 b	2.0 a
3	Late Season Sprays none	0	5.8 b	4.3 b	2.0 a
4	Full Season Spray Program June 30, July 11	2	9.5 a	7.6 a	2.0 a
5	Control	0	6.3 b	4.5 b	2.0 a
	ANOVA P#0.05		s	s	ns
	Coefficient of Variation (%)		15.9	10.9	

*These values are the means of four replications. Numbers within a column followed by the same small letter are not significantly different according to a Duncan's Multiple Range Test (P#0.05).

[1/] Fungicide rates, Product/ha, used were: KOCIDE 101, 2.25 kg; DITHANE DG 75% NT, 2.25 kg; AGRAL 90, 0.1% v/v.

[2/] Foliar Damage Ratings (0-10) - 0, no control, foliage severely damaged; 10, complete control.