1999 Research Report

SMBSC

1/1/1999
Southern Minnesota Beet Sugar Company
SMBSC

TABLE OF CONTENTS

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- Hilleshog Mono-Hy
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- Van der Have
- Seed Systems

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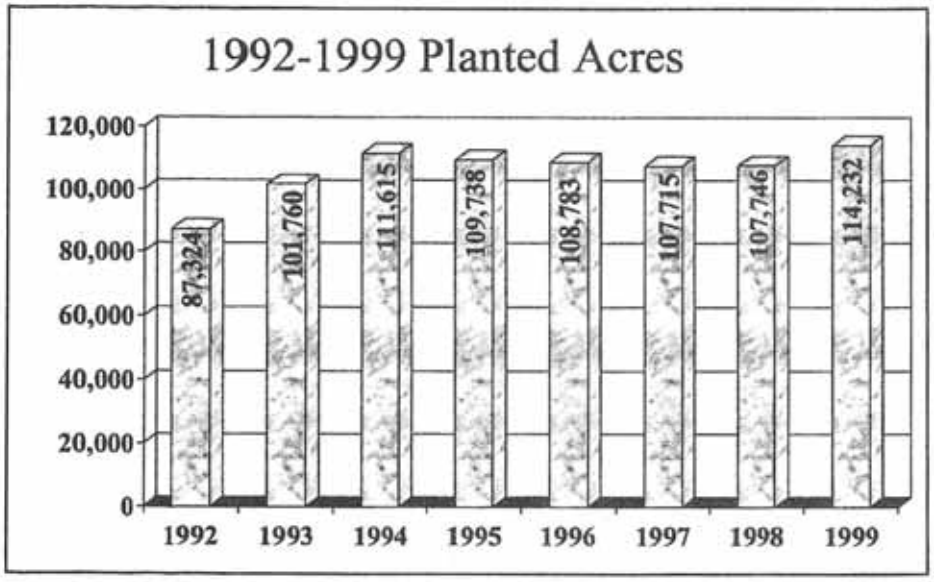
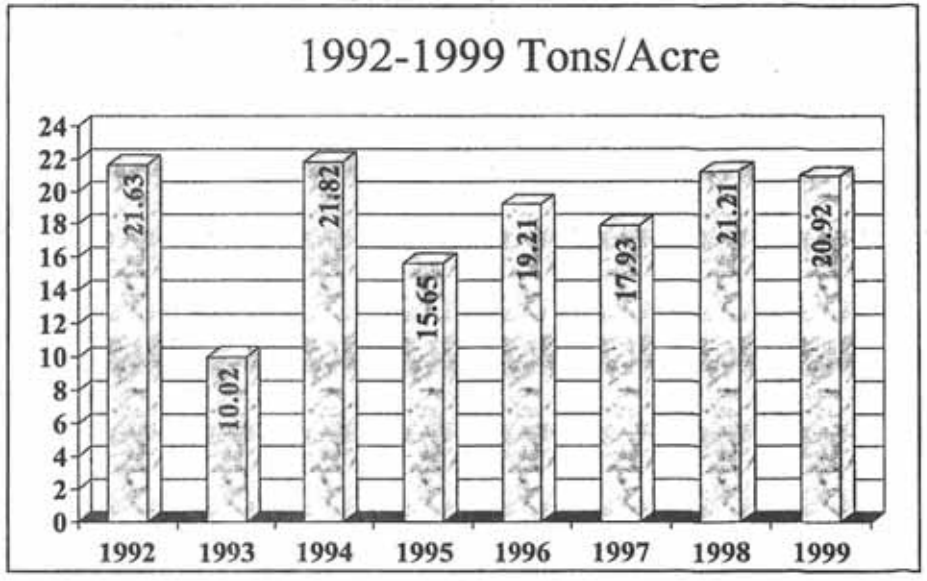
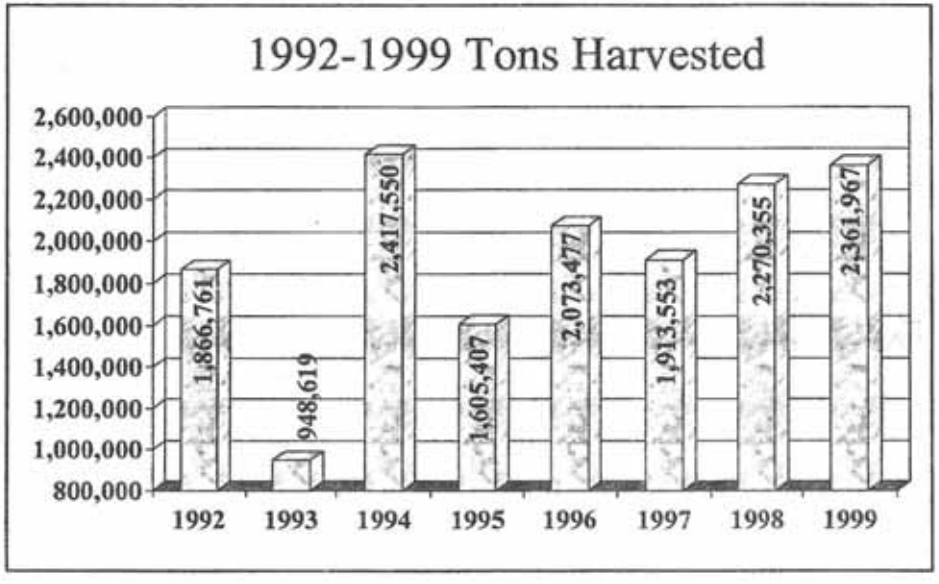
TABLE 1

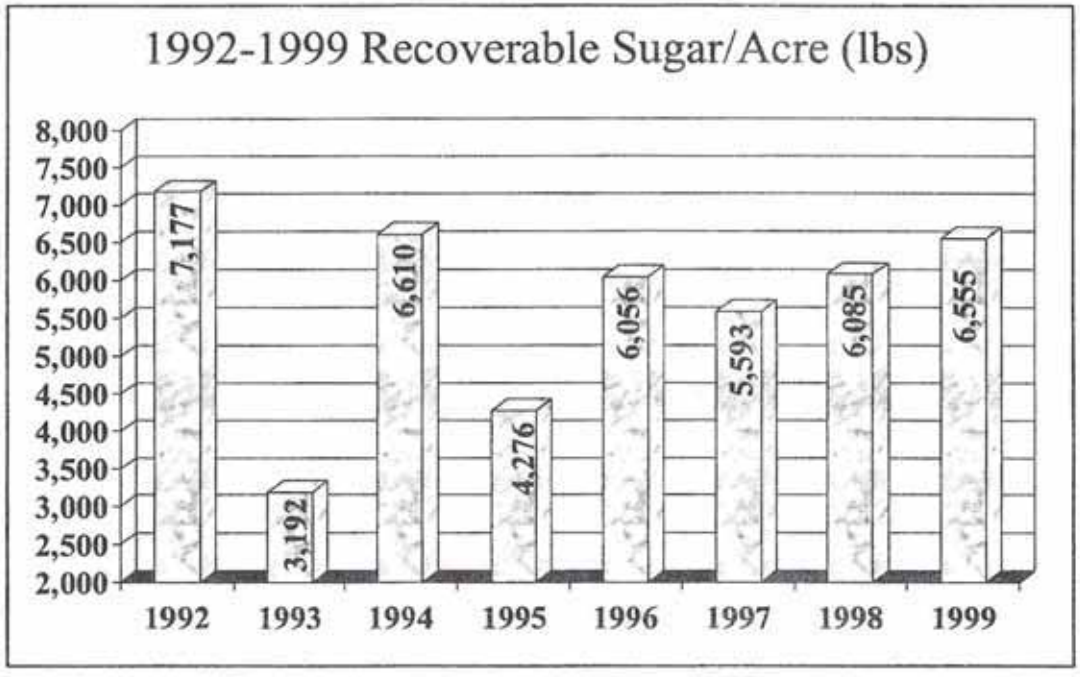
COMPARISON OF PLANTING DATES AND FINAL YIELDS
SMSC

YEAR	TOTAL ACRES	% REPLANTS	PERCENT PLANTED BY 04/25	05/02	05/09	05/16	05/23	TONS/AC	% SUGAR	COMMENTS
1984	57,240	11.4	15	23	25	63	94	17.54	15.49	VERY WET SEPT. - OCT.
1985	59,703	11.9	10	40	85	95	98	21.73	16.20	EXCELLENT START
1986	66,635	6.2	1	1	9	24	62	15.09	16.22	VERY WET SPRING; DELAYED PLANTING
1987	66,860	2.2	76	99	100	100	100	22.53	16.98	CROP PLANTED 3 WEEKS EARLIER THAN NORMAL
1988	70,646	59.5	97	100	70	85	100	17.69	17.15	60% REPLANT DUE TO HIGH WINDS
1989	74,943	14.7	19	45	78	98	100	20.36	15.91	19 DEGREES ON OCT. 1 STOPPED SUGAR ACCUM.
1990	80,783	50.1	85	90	75	90	99	17.91	15.60	50% REPLANTS DUE TO MAY 1 FROST; WIND
1991	82,284	9.2	25	58	61	96	99	16.36	15.42	150% OF NORMAL PPT
1992	87,324	1.1	17	65	99	100	100	21.60	17.59	CROP PLANTED 10 DAYS EARLIER THAN NORMAL
1993	101,780	8.7	4	31	47	85	99	10.00	17.00	200% OF NORMAL PPT PLANTING DELAYED 2-3 WEEKS
1994	111,615	7.2	17	17	35	85	100	21.82	16.36	PLANTING DELAYED 2 WEEKS - VERY FAVORABLE GROWING SEASON
1995	109,738	0.004	0	13	40	65	95	15.65	14.99	DELAYED PLANTING; WET SPRING; HIGH LEAF SPOT INFECTION
1996	108,783	1.6	1	17	20	43	80	19.21	16.91	DELAYED PLANTING - WET SPRING; RHIZOMANIA IDENTIFIED (SEPT.)
1997	107,715	1.1	10	50	80	95	100	17.93	16.61	COOL, DRY MAY; VERY WET JULY
1998	107,788	1.7	30	95	100	100	100	21.21	15.56	ABOVE NORMAL TEMPS., MAY THRU NOV. HIGH LEAF SPOT INFECTION.
1999	114,232	1.1	5.5	98	100	100	100	20.92	16.76	EARLY START; EXCELLENT LEAF SPOT CONTROL
MEAN	88004.31	11.73	25.78	52.63	64.00	82.75	95.38	18.60	16.30	


1992-1999 Planted Acres
120,000
100,000
80,000
60,000
40,000
20,000
0
87,324
101,760
111,615
109,738
108,783
107,715
107,746
114,232
1992
1993
1994
1995
1996
1997
1998
1999


1992-1999 Tons/Acre
24
22
20
18
16
14
12
10
8
6
4
2
0
21.63
10.02
21.82
15.65
19.21
17.93
21.21
20.92
1992
1993
1994
1995
1996
1997
1998
1999


1992-1999 Tons Harvested
2,600,000
2,400,000
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
1,866,761
948,619
2,417,550
1,605,407
2,073,477
1,913,553
2,270,355
2,361,967
1992
1993
1994
1995
1996
1997
1998
1999


1992-1999 Recoverable Sugar/Acre (lbs)
8,000
7,500
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
7,177
3,192
6,610
4,276
6,056
5,593
6,085
6,555
1992
1993
1994
1995
1996
1997
1998
1999

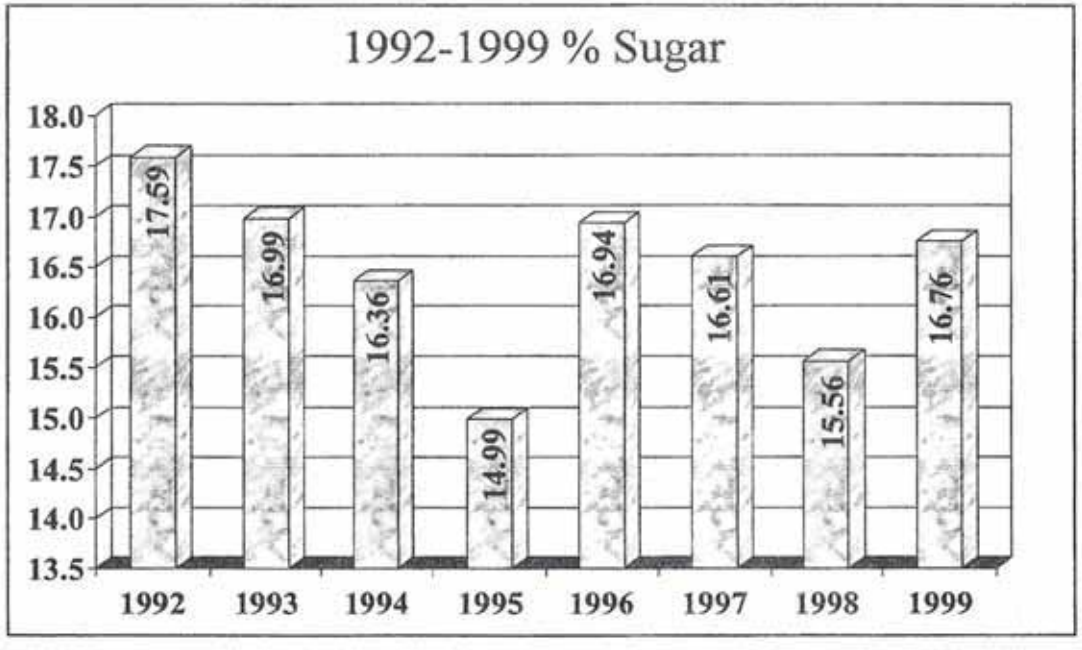

1992-1999 % Sugar
18.0
17.5
17.0
16.5
16.0
15.5
15.0
14.5
14.0
13.5
17.59
16.99
16.36
14.99
16.94
16.61
15.56
16.76
1992
1993
1994
1995
1996
1997
1998
1999

TABLE 2A PREVIOUS CROP, 1999 - 1992 (PLANTED ACRES)

CROP	1999		1998		1997		1996		1995		1994	
	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL
Alfalfa	12.0	0.01	301.0	0.28	0.0	0.00	10.0	0.01	37.0	0.03	349.0	0.31
Corn	81426.2	71.28	74989.5	69.60	71824.7	66.65	72789.9	66.91	81026.8	73.84	74832.5	67.04
Fallow	0.0	0.00	0.0	0.00	30.0	0.03	200.0	0.18	0.0	0.00	64.0	0.06
Mixed	6692.2	5.86	6755.9	6.27	7181.4	6.66	6631.6	6.10	7980.0	7.27	10636.0	9.53
Navy Beans	782.7	0.69	335.3	0.31	960.5	0.89	884.9	0.81	608.8	0.55	764.1	0.68
Oats	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	74.0	0.07
Peas	2091.8	1.83	2423.6	2.25	984.5	0.91	1757.5	1.62	953.8	0.87	1573.2	1.41
Set Aside	0.0	0.00	80.4	0.07	56.2	0.05	96.5	0.09	0.0	0.00	765.4	0.69
Small Grain	0.0	0.00	377.1	0.35	158.7	0.15	186.9	0.17	192.1	0.18	119.1	0.11
Soybeans	11022.4	9.65	13936.4	12.93	16779.2	15.57	17107.7	15.73	10317.5	9.40	13205.0	11.83
Sugarbeets	110.0	0.10	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	40.0	0.04
Sweet Corn	11345.2	9.93	7865.0	7.30	8661.3	8.04	8284.5	7.62	7042.4	6.42	5174.5	4.64
Wheat	749.4	0.66	682.0	0.63	1128.2	1.05	833.0	0.77	1580.1	1.44	4018.7	3.60
TOTAL	**114231.9**	**100.0**	**107746.2**	**100.0**	**107764.7**	**100.0**	**108782.5**	**100.0**	**109738.5**	**100.0**	**111615.5**	**100.0**

CROP	1993		1992	
	# ACRES	% OF TOTAL	# ACRES	% OF TOTAL
Alfalfa	0.0	0.00	87.0	0.10
Corn	74198.8	72.91	59209.0	67.90
Fallow	65.0	0.06	0.0	0.00
Mixed	9740.2	9.57	11162.0	12.80
Navy Beans	113.3	0.11	349.0	0.40
Oats	0.0	0.00	0.0	0.00
Peas	977.3	0.96	262.0	0.30
Set Aside	96.4	0.09	436.0	0.50
Small Grain	0.0	0.00	3837.0	4.40
Soybeans	10045.8	9.87	8110.0	9.30
Sugarbeets	0.0	0.00	0.0	0.00
Sweet Corn	4648.7	4.57	3750.0	4.30
Wheat	1875.4	1.84	0.0	0.00
TOTAL	**101760.9**	**100.0**	**87202.0**	**100.0**

Other crops on the graph to the right include: Alfalfa, fallow, navy beans, oats, set aside, small grain & sugarbeets

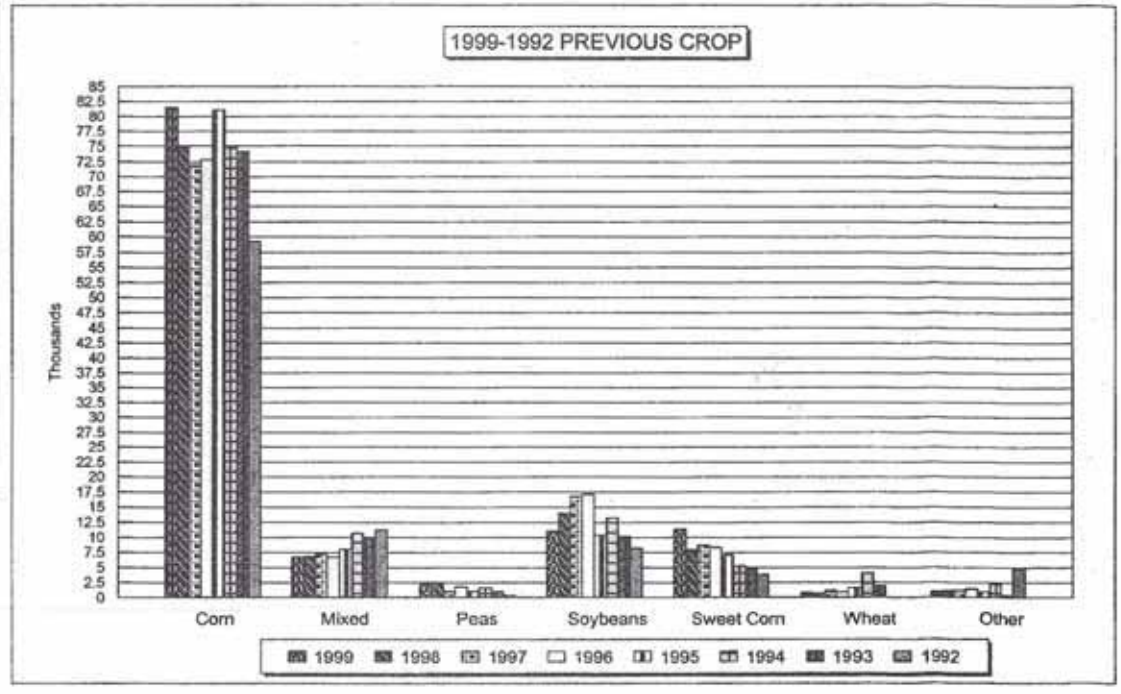


TABLE 2B PREVIOUS CROP, 1999 - 1994 (HARVESTED ACRES)

PREVIOUS CROP	1999 TOTAL ACRES	1999 TONS/ ACRE	1999 % SUGAR	1999 % LOSS MOL.	1998 TOTAL ACRES	1998 TONS/ ACRE	1998 % SUGAR	1998 % LOSS MOL.	1997 TOTAL ACRES	1997 TONS/ ACRE	1997 % SUGAR	1997 % LOSS MOL.
	WT. AVERAGE				*WT. AVERAGE*				*WT. AVERAGE*			
Alfalfa	12.0	18.84	14.0	1.32	300.5	24.03	15.6	1.32				
Corn	80594.7	20.88	16.7	1.09	74601.0	21.40	15.5	1.20	71222.6	17.38	16.1	0.97
Fallow									30.0	26.08	17.1	1.21
Mix (2 crops)	6661.7	20.87	17.0	1.07	6653.6	21.10	15.5	1.25	7072.1	16.48	15.7	0.99
Navy Beans	782.7	23.75	17.4	1.05	334.8	22.68	15.8	1.29	953.0	18.78	16.4	1.04
Oats												
Peas	1914.1	22.52	16.5	1.11	2391.4	20.95	15.1	1.24	983.2	18.60	15.6	1.05
Set Aside					80.4	17.33	15.1	1.27	56.2	17.45	14.9	1.12
Small Grain					377.1	20.68	15.6	1.14	158.7	13.21	15.8	1.16
Soybeans	10874.5	20.37	16.6	1.11	13789.6	20.80	15.6	1.24	16583.2	17.39	16.0	0.97
Sugarbeets	110.0	23.57	17.6	1.03								
Sweet Corn	11270.7	21.56	16.1	1.14	7832.3	20.43	14.7	1.31	8573.8	18.58	15.9	1.03
Wheat	748.4	19.43	17.0	1.07	670.7	20.80	15.5	1.27	1126.2	17.10	16.7	1.07
TOTAL	**112968.8**	**20.92**	**16.8**	**1.086**	**107031.4**	**21.21**	**15.6**	**1.22**	**106759.0**	**17.93**	**16.6**	**1.01**

PREVIOUS CROP	1996 TOTAL ACRES	1996 TONS/ ACRE	1996 % SUGAR	1996 % LOSS MOL.	1995 TOTAL ACRES	1995 TONS/ ACRE	1995 % SUGAR	1995 % LOSS MOL.	1994 TOTAL ACRES	1994 TONS/ ACRE	1994 % SUGAR	1994 % LOSS MOL.
	WT. AVERAGE				*WT. AVERAGE*				*WT. AVERAGE*			
Alfalfa	10.0	18.79	13.9	1.03	37.0	21.91	14.7	1.30	344.0	23.93	16.7	1.15
Corn	72173.4	19.23	16.9	1.12	74826.4	15.30	15.0	1.28	74265.8	21.87	16.3	1.17
Fallow	200.0	20.34	16.9	1.12					64.0	23.69	16.6	1.21
Mix (2 crops)	6619.0	19.36	17.0	1.15	7789.7	15.83	15.0	1.31	10547.9	21.61	16.4	1.18
Navy Beans	881.9	20.74	16.6	1.16	608.8	19.27	14.7	1.34	763.1	20.10	16.3	1.15
Oats									74.0	23.62	15.9	1.32
Peas	1752.8	19.47	17.1	1.19	952.8	17.32	14.7	1.40	1572.2	20.01	15.3	1.18
Set Aside	96.5	19.14	16.7	1.14					759.4	22.28	15.4	1.26
Small Grain	186.9	19.57	16.1	1.21	154.2	13.08	14.3	1.39	118.7	21.46	16.9	1.13
Soybeans	15877.9	17.87	16.8	1.12	9840.2	16.25	15.0	1.30	13133.6	22.42	16.4	1.19
Sugarbeets									40.0	13.74	17.2	1.25
Sweet Corn	8241.2	20.49	16.8	1.28	7016.0	17.74	14.5	1.38	5160.0	21.62	15.6	1.22
Wheat	832.5	17.68	17.3	1.14	1374.1	15.41	15.2	1.29	3972.8	20.33	16.6	1.14
TOTAL	**107872.1**	**19.20**	**16.9**	**1.15**	**102599.2**	**15.65**	**15.0**	**1.31**	**110815.5**	**21.82**	**16.4**	**1.18**

TABLE 3A ROTATIONAL PATTERN, 1999-1992 (PLANTED ACRES)

YEARS	1999		1998		1997	
	NO. ACRES	% OF TOTAL	NO. ACRES	% OF TOTAL	NO. ACRES	% OF TOTAL
New Ground	24,667.3	21.6	23,379.1	21.7	26,761.1	24.8
1	0.0	0.0	0.0	0.0	0	0.0
2	1,153.4	1.0	2,864.9	2.7	3,605.8	3.3
3	43,578.1	38.1	46,190.3	42.9	49,498.3	45.9
4	24,514.7	21.5	18,013.0	16.7	18,085.5	16.8
5+	20,318.4	17.8	17,298.9	16.1	9,814.0	9.1
TOTAL	**114,231.9**	**100.0**	**107,746.2**	**100.0**	**107,764.7**	**100.0**

YEARS	1996		1995		1994	
	NO. ACRES	% OF TOTAL	NO. ACRES	% OF TOTAL	NO. ACRES	% OF TOTAL
New Ground	29,270.2	26.9	30,940.7	28.2	32,505.9	29.1
1	248	0.2			108.0	0.1
2	8,093.2	7.4	7,957.5	7.3	7,820.2	7.0
3	48,386.1	44.5	49,183.0	44.8	49,959.9	44.8
4	12,815.9	11.8	11,495.0	10.5	11,951.0	10.7
5+	9,969.1	9.2	10,162.3	9.3	9,270.5	8.3
TOTAL	**108,782.5**	**100.0**	**109,738.5**	**100.0**	**111,615.5**	**100.0**

YEARS	1993		1992	
	NO. ACRES	% OF TOTAL	NO. ACRES	% OF TOTAL
New Ground	29804.9	29.3	23108	26.5
1		0.0		0.0
2	8937.5	8.8	9592	11.0
3	43916.9	43.2	39850	45.7
4	9852.4	9.7	10551	12.1
5+	9249.2	9.1	4098	4.7
TOTAL	**101760.9**	**100.0**	**87199**	**100.0**

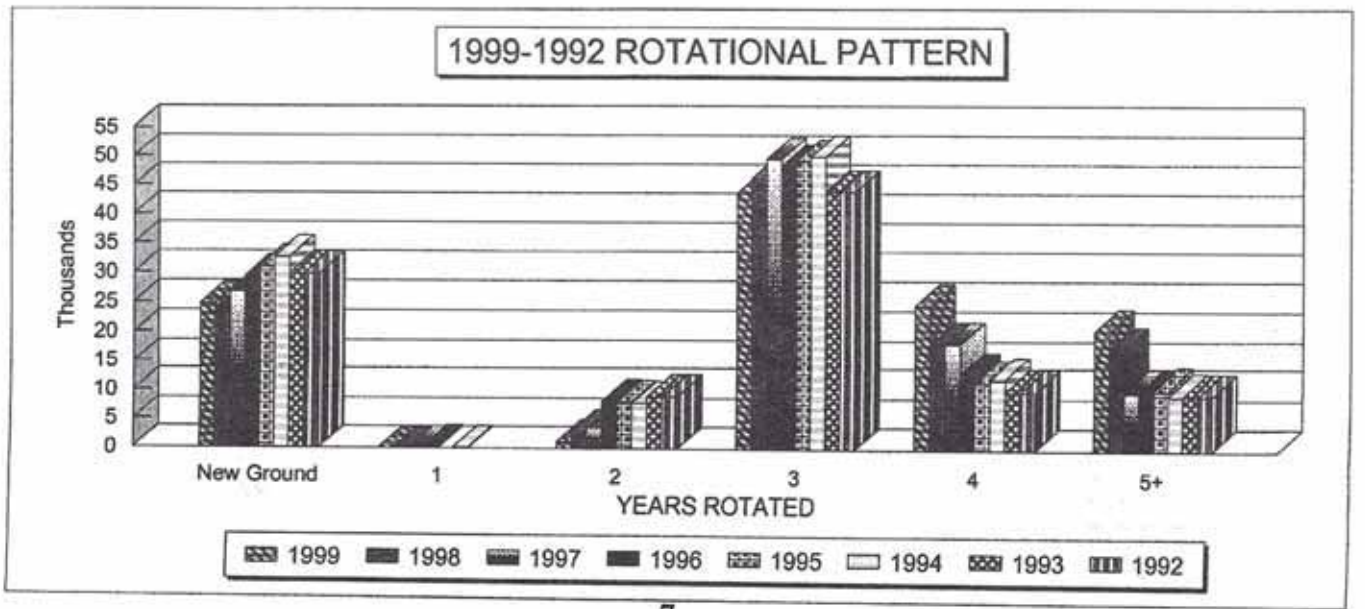


Table 3B ROTATIONAL PATTERN, 1999-1994 (HARVESTED ACRES)

NUMBER OF YEARS	1999				1998			
	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.
	WT. AVERAGE				*WT. AVERAGE*			
NEW GROUND	24162.7	22.93	17.09	1.070	23079.3	23.25	15.80	1.28
1 YEAR								
2 YEARS	1151.4	18.39	16.92	1.080	2841.9	19.18	15.25	1.17
3 YEARS	43172.6	20.42	16.56	1.100	46014.9	20.56	15.32	1.18
4 YEARS	24399.7	20.20	16.48	1.110	17966.3	20.71	15.41	1.23
5 YEARS	10500.4	20.04	16.44	1.120	9588.4	20.99	15.41	1.24
6 YEARS	4355	20.28	16.56	1.110	2828.8	20.81	15.39	1.24
7 YEARS	1282.6	21.22	16.65	1.100	1037.4	21.54	15.65	1.24
8 YEARS	954.6	19.17	16.43	1.120	460.4	20.98	15.97	1.28
9 YEARS	1195.6	21.61	17.35	1.055	1012.8	22.74	16.56	1.23
10 YEARS	587.5	20.52	16.76	1.090	1236.8	19.59	15.78	1.23
11 YEARS	540.9	22.48	16.97	1.080	232.6	22.79	15.79	1.21
12 YEARS	277.5	22.95	17.05	1.070				
13 YEARS	277	25.20	17.83	1.010	17.4	24.17	16.18	1.21
14 YEARS					55.4	22.25	16.06	1.29
15 YEARS	31.4	21.54	17.30	1.050	145.4	22.03	17.22	1.17
16 YEARS								
17 YEARS								
18 YEARS								
19 YEARS								
20 YEARS	38.2	17.90	12.48	1.380	336.6	24.21	16.17	1.57
21 YEARS								
22 YEARS								
23 YEARS								
24 YEARS								
25 YEARS								
28 YEARS								
30+YEARS	41.7	14.09	16.69	1.094	177	21.27	14.47	1.26
TOTAL	112968.8	20.92	16.76	1.086	107031.4	21.21	15.56	1.22

NUMBER OF YEARS	1997				1996			
	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.
	WT. AVERAGE				*WT. AVERAGE*			
NEW GROUND	26411.9	18.57	15.92	1.01	29010.7	20.70	16.98	1.19
1 YEAR					243	25.15	16.14	1.35
2 YEARS	3596.4	15.00	16.27	1.05	8074	17.05	16.78	1.08
3 YEARS	49199.4	17.33	16.18	0.96	48024.2	18.35	16.73	1.11
4 YEARS	17890.3	16.87	15.84	0.98	12652.8	19.01	16.89	1.15
5 YEARS	5235.3	16.18	16.15	0.97	5505.7	19.94	17.14	1.16
6 YEARS	1154.1	17.86	16.18	1.03	1703.2	18.27	16.82	1.16
7 YEARS	1119.7	15.64	15.35	0.91	364.7	19.90	17.23	1.13
8 YEARS	333.4	18.91	16.29	1.12	380.9	21.51	17.03	1.14
9 YEARS	1072.2	18.53	16.89	1.01	612.7	19.19	17.22	1.16
10 YEARS	283.9	15.79	15.41	0.99	847.2	21.57	17.03	1.24
11 YEARS					77	21.54	17.92	0.99
12 YEARS	97	12.87	15.75	1.05				
13 YEARS					70	19.83	16.88	1.24
14 YEARS								
15 YEARS	118	21.81	16.47	1.02				
16 YEARS								
17 YEARS								
18 YEARS	115	20.81	16.85	0.97				
19 YEARS								
20 YEARS	132.4	20.50	16.40	1.05				
21 YEARS								
22 YEARS								
23 YEARS								
24 YEARS								
25 YEARS					229	25.46	16.40	1.33
28 YEARS					77	21.64	16.99	1.20
30+YEARS								
TOTAL	106759	17.93	16.61	1.01	107872.1	19.20	16.90	1.15

Table 3B ROTATIONAL PATTERN, 1999-1994 (HARVESTED ACRES)
(continued)

NUMBER OF YEARS	1995				1994			
	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.	TOTAL ACRES	TONS/ ACRE	% SUGAR	% LOSS MOL.
	WT. AVERAGE				*WT. AVERAGE*			
NEW GROUND	29553.5	17.93	14.86	1.37	32334.4	23.22	16.30	1.20
1 YEAR					108	18.46	16.44	1.14
2 YEARS	6692.3	13.00	14.82	1.26	7623.8	20.02	16.55	1.13
3 YEARS	45959.1	14.69	14.96	1.25	49613.3	21.11	16.25	1.16
4 YEARS	10666.4	14.78	14.97	1.28	11908.7	21.66	16.16	1.18
5 YEARS	5933.7	15.51	14.88	1.30	4952.9	22.38	16.01	1.17
6 YEARS	1109.7	16.19	14.97	1.32	1609	24.26	16.02	1.28
7 YEARS	242	16.70	14.98	1.32	1244.7	22.60	16.16	1.19
8 YEARS	501.6	14.63	14.58	1.41	669.3	18.16	16.62	1.21
9 YEARS	927	18.87	15.08	1.35	117	22.41	15.95	1.20
10 YEARS	854.8	16.43	15.29	1.31	345.4	21.14	15.90	1.14
11 YEARS					85	22.94	15.74	1.40
12 YEARS					204	23.16	17.04	1.18
13 YEARS								
14 YEARS								
15 YEARS								
16 YEARS								
17 YEARS								
18 YEARS								
19 YEARS								
20 YEARS	10	2.19	16.48	1.17				
21 YEARS								
22 YEARS								
23 YEARS								
24 YEARS								
25 YEARS								
28 YEARS								
30+YEARS	149.1	17.49	15.47	1.29				
TOTAL	102599.2	15.65	15.00	1.31	110815.5	21.82	16.36	1.18

TABLE 4

COMPARISON OF YIELDS BY STATION
SMSC

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Simple Average	Olympic Average
Renville	22.1	15.8	22.7	18.0	20.1	18.3	16.2	21.3	10.1	22.8	15.1	19.3	18.8	21.7	20.8	18.87	19.25
Bird Island	20.4	15.8	25.0	19.3	21.9	16.2	15.6	22.5	9.6	22.9	17.2	19.8	17.7	20.6	20.8	19.02	19.28
Buffalo Lake												20.3	16.6	19.2	21.1	19.30	19.75
Clara City East	23.9	17.0	23.0	18.0	18.9	18.6	18.7	22.1	10.3	21.5	14.8	16.7	17.3	22.9	21.3	19.00	19.29
Clara City West	22.5	14.6	21.8	16.3	19.0	19.8	17.6	21.1	9.6	21.4	15.0	19.8	17.2	21.7	21.2	18.57	18.96
Hector	21.6	14.5	22.6	19.6	23.1	16.7	15.6	23.7	10.4	19.6	16.9	20.1	18.0	19.2	19.6	18.74	19.01
Maynard	22.8	13.0	22.7	16.1	19.1	18.2	16.4	20.2	7.6	20.4	13.6	15.8	16.3	21.4	19.9	17.57	17.93
Milan	19.9	13.3	17.4	12.8	18.1	18.1	14.8	19.3	12.3	18.5	12.1	14.7	14.4	19.4	17.6	16.18	16.21
Murdock	22.6	14.6	23.3	17.2	19.0	19.7	19.3	20.9	10.2	22.1	16.4	19.8	18.5	23.1	21.9	19.24	19.63
Redwood Falls	18.6	13.8	17.8	14.8	19.5	16.1	12.5	22.3	9.2	23.1	13.5	19.8	20.4	22.0	21.8	17.68	17.92
Benson															21.5	21.50	21.50
Raymond															23.1	23.10	23.10
Weighted Averages	21.7	15.1	22.5	17.7	20.4	17.9	16.3	21.6	10.0	21.8	15.7	19.2	17.9	21.2	20.9	18.66	19.03
% Sugar	16.2	16.2	17.0	17.2	15.9	15.6	15.4	17.6	17.0	16.3	15.0	16.9	16.6	15.6	16.8	16.35	16.36

Table 5. Historic Data for SMSC

Year	Planted Acres	Replant Acres	Harvest Acres	Net Tons	Ave. T/A	Ave. % Sugar	Ave. LTM	RS/A Lbs.	Days of Slice	Tons Sliced/Day
1975	49,273		48,536	766,743	15.79	14.41			145	3,196
1976	54,784		50,209	537,361	10.71	15.21			106	4,966
1977	51,614		49,345	986,056	19.98	14.11			193	4,810
1978	51,913		50,311	916,625	18.22	14.48			157	5,492
1979	52,061	948	48,425	727,124	15.02	15.88			134	5,162
1980	58,105	510	57,711	948,767	16.44	15.53			154	5,753
1981	59,051	5,456	57,484	848,808	14.77	13.04			157	5,088
1982	54,095	262	53,422	1,153,158	21.59	15.36			185	5,776
1983	57,308	1,100	56,084	1,083,689	19.32	14.61			150	6,697
1984	57,240	6,500	54,085	948,553	17.54	15.49			135	6,151
1985	59,703	7,082	58,897	1,279,935	21.73	16.21	1.204	6522	167	6,985
1986	66,635	4,150	65,412	986,846	15.09	16.22	1.201	4533	121	7,745
1987	66,860	1,450	66,488	1,498,024	22.53	16.98	1.301	7065	197	7,158
1988	70,646	42,000	69,500	1,229,526	17.69	17.15	1.468	5548	159	7,154
1989	74,943	11,000	74,040	1,507,224	20.36	15.91	1.484	5874	172	8,013
1990	80,783	40,350	78,781	1,411,200	17.91	15.63	1.348	5116	161	8,283
1991	82,285	7,600	79,672	1,303,837	16.37	15.42	1.221	4649	145	8,484
1992	87,324	1,019	86,292	1,866,761	21.63	17.59	0.986	7183	205	8,598
1993	101,760	8,814	94,679	948,619	10.02	16.99	1.064	3192	104	8,874
1994	111,615	5,000	110,815	2,417,550	21.82	16.36	1.182	6624	223	9,424
1995	109,738	423	102,599	1,605,407	15.65	14.99	1.311	4282	164	8,812
1996	108,783	1,697	107,939	2,073,477	19.21	16.94	1.146	6056	204	9,177
1997	107,715	1,143	106,709	1,913,553	17.93	16.61	1.013	5592	196	9,210
1998	107,746	1,894	107,033	2,270,355	21.21	15.56	1.221	6083	216	9,613
1999	114,232	1,247	112,969	2,361,967	20.92	16.76	1.086	6555	(214)	(10,050)
Mean	**75,848**	**7,126**	**73,897**	**1,343,647**	**17.98**	**15.74**	**1.216**	**5,658**	**167**	**7,227**

Percent Tare *

Year	1st Tare	2nd Tare	Total
1994	3.1	5.3	8.4
1995	3.5	5.0	8.5
1996	2.0	2.3	4.3
1997	2.1	3.4	5.5
1998	2.3	3.2	5.5
1999	2.4	2.1	4.5

* 1st tare - removed by piler
* 2nd tare - removed by washing in preparation for processing

TABLE 5B. GROSS SUGAR/ACRE 1975-1999

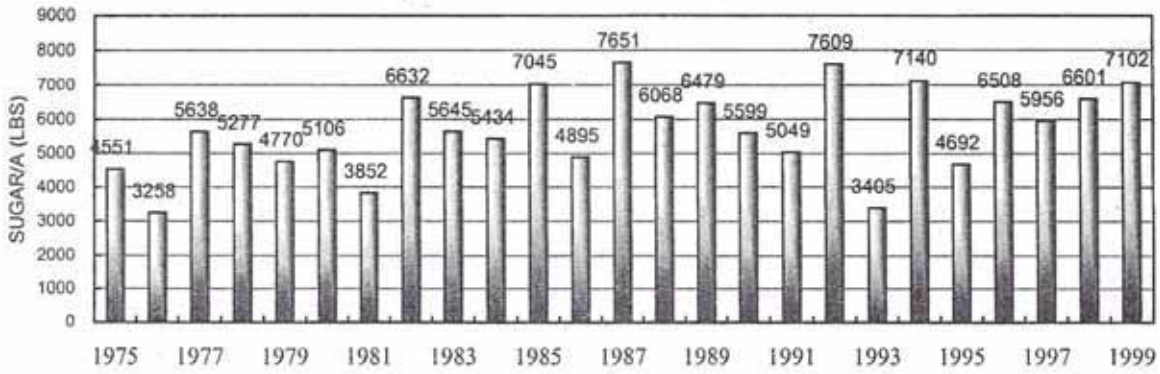


TABLE 5C. FIVE YEAR ROLLING AVERAGE OF GROSS SUGAR/ACRE 1975-1999

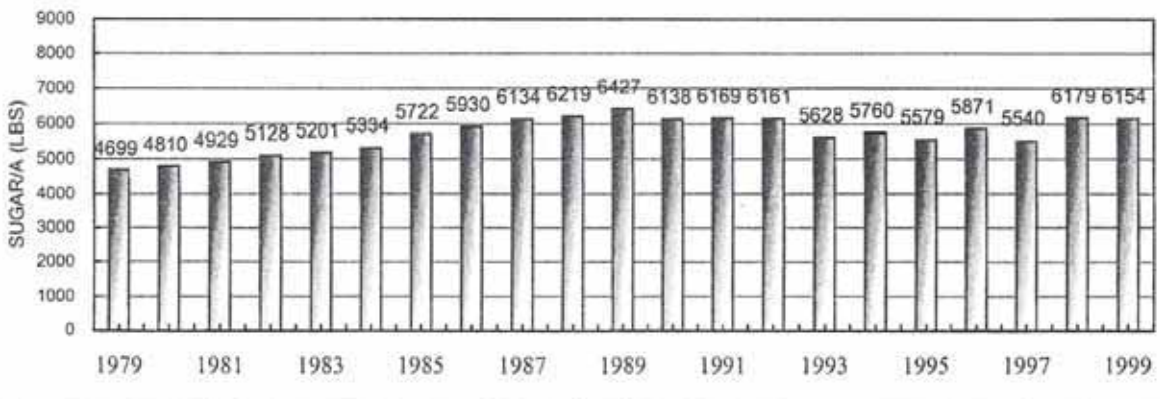


TABLE 5D

COMPARISON OF YIELD, SUGAR CONTENT AND LOSS TO MOLASSES BY RECEIVING STATION, 1985- 1999

	1985			1986			1987			1988			1989		
STATION	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM
RENV	22.1	16.14	1.205	15.8	16.25	1.189	22.7	16.77	1.389	18.0	17.08	1.439	20.1	15.89	1.465
BI, IS.	20.4	16.44	1.203	15.8	16.35	1.179	25.0	17.13	1.267	19.3	17.84	1.509	21.9	15.96	1.514
CC WEST	22.5	16.35	1.261	14.6	16.27	1.238	21.8	17.20	1.502	16.3	16.74	1.302	19.0	16.02	1.471
CC EAST	23.9	16.18	1.200	17.0	16.09	1.268	23.0	16.72	1.447	18.0	16.62	1.321	18.9	15.81	1.402
HECTOR	21.6	16.09	1.216	14.5	15.97	1.172	22.6	16.65	1.409	19.6	17.54	1.507	23.1	15.89	1.464
MAYN	22.8	16.27	1.224	13.0	15.95	1.245	22.7	17.15	1.472	16.1	16.78	1.292	19.1	15.91	1.418
MILAN	19.9	16.05	1.086	13.3	16.56	1.185	17.4	17.66	1.301	12.8	16.57	1.514	18.1	16.31	1.561
MURD	22.6	16.15	1.214	14.6	16.3	1.191	23.3	17.58	1.448	17.2	16.83	1.431	19.0	15.82	1.551
RWF	18.6	16.19	1.237	13.8	15.96	1.256	17.8	16.80	1.238	14.8	16.74	1.239	19.5	16.09	1.669
WT.AVE.	**21.7**	**16.20**	**1.204**	**15.1**	**16.21**	**1.213**	**22.5**	**16.98**	**1.376**	**17.7**	**17.15**	**1.434**	**20.4**	**15.91**	**1.483**

	1990			1991			1992			1993			1994		
STATION	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM
RENV	18.29	15.54	1.348	16.21	15.43	1.195	21.29	17.59	0.972	10.1	16.9	1.065	22.8	16.49	1.189
BI. IS.	16.19	15.59	1.370	15.64	15.28	1.190	22.56	17.6	0.958	9.61	16.81	1.119	22.91	16.17	1.191
CC WEST	19.79	15.68	1.347	17.63	15.51	1.250	20.95	17.72	1.004	9.57	17.06	1.007	21.43	16.44	1.182
CC EAST	18.55	15.51	1.317	18.71	15.20	1.250	22.06	17.67	0.983	10.3	16.98	1.026	21.45	16.43	1.170
HECTOR	16.75	15.69	1.356	15.37	15.45	1.214	23.65	17.43	0.988	10.4	17.04	1.111	19.58	15.67	1.182
MAYN	18.18	15.57	1.324	16.36	15.46	1.196	20.21	17.69	0.996	7.55	17.04	1.004	20.35	16.70	1.112
MILAN	18.13	15.69	1.327	14.75	15.38	1.301	19.28	17.77	1.032	12.27	17.12	1.037	18.49	16.55	1.162
MURD	19.67	15.65	1.340	19.25	15.43	1.278	20.94	17.49	1.047	10.18	17.2	1.007	22.06	16.66	1.187
RWF	16.12	15.31	1.492	12.54	15.25	1.237	22.33	16.85	1.011	9.21	17.35	1.054	22.98	15.98	1.254
WT.AVE.	**17.91**	**15.60**	**1.348**	**16.37**	**15.40**	**1.220**	**21.64**	**17.57**	**0.986**	**10.0**	**17.0**	**1.064**	**21.82**	**16.33**	**1.184**

	1995			1996			1997			1998			1999			AVERAGE		
STATION	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM	T/A	% SUGAR	% LTM
RENV	15.1	14.9	1.323	19.3	16.8	1.123	18.8	16.6	1.020	21.7	15.7	1.221	20.8	16.7	1.094	**18.87**	**16.32**	**1.216**
BI. IS.	17.2	14.9	1.349	19.8	17.1	1.228	17.7	16.3	0.992	20.6	15.3	1.252	20.8	16.3	1.126	**19.03**	**16.34**	**1.230**
BUFF.L				20.3	17.1	1.249	16.6	16.1	0.990	19.2	14.9	1.326	21.1	16.7	1.094	**19.30**	**16.20**	**1.16**
CC WEST	15.0	15.1	1.256	19.8	16.7	1.079	17.2	17.0	1.016	21.7	15.7	1.182	21.2	16.9	1.078	**18.56**	**16.43**	**1.212**
CC EAST	14.8	14.8	1.259	16.7	16.7	1.085	17.3	16.7	0.987	22.9	15.8	1.170	21.3	16.9	1.078	**18.99**	**16.27**	**1.198**
HECTOR	16.9	14.9	1.334	20.1	17.1	1.204	18.0	16.1	1.010	19.2	14.9	1.271	19.6	16.0	1.150	**18.73**	**16.16**	**1.239**
MAYN	13.6	15.2	1.231	15.8	16.7	1.065	16.3	16.9	1.011	21.4	15.5	1.144	19.9	16.9	1.078	**17.56**	**16.38**	**1.187**
MILAN	12.1	15.4	1.205	14.7	16.6	1.098	14.4	16.7	1.072	19.4	15.9	1.164	17.6	17.4	1.042	**16.17**	**16.51**	**1.206**
MURD	16.4	15.3	1.252	19.8	17.0	1.084	18.5	17.3	1.015	23.1	15.9	1.154	21.9	17.1	1.063	**19.23**	**16.51**	**1.217**
RWF	13.5	14.5	1.406	19.8	16.7	1.140	20.4	17.1	1.047	22.0	16.4	1.321	21.8	17.5	1.035	**17.68**	**16.31**	**1.242**
BEN SO													21.5	17.5	1.035	**21.50**	**17.50**	**1.035**
RAYM.													23.1	17.3	1.049	**23.10**	**17.30**	**1.049**
WT. AVE	15.7	14.9	1.311	19.2	16.9	1.146	17.9	16.6	1.013	21.2	15.6	1.220	20.9	16.76	1.086	**19.06**	**15.25**	**1.092**

Table 6A

1999 MILEAGES BY WEIGH STATION

STATION	1- 5 MILES	6-10 MILES	11-15 MILES	16-20 MILES	21-25 MILES	26-30 MILES	31+ MILES	TOTAL AC.
Renville	9.4	19.2	29.9	21.0	10.5	5.7	4.3	35461.72
Bird Island	11.0	14.8	11.1	10.2	3.2	0.5	0.0	18008.5
Buffalo Lake	2.3	3.5	3.7	1.7	2.6	2.4	0.0	5764.89
C.C. West	4.3	11.2	9.5	2.7	0.8	0.5	0.0	10283.27
C.C. East	6.6	2.7	2.0	0.0	0.0	0.0	0.0	4016.27
Hector	9.2	10.4	6.4	3.3	1.1	0.5	0.6	11156.99
Maynard	5.0	3.8	2.4	0.1	0.0	0.0	0.0	4024.62
Milan	0.4	0.7	0.2	2.2	2.8	0.7	0.1	2479.97
Murdock	9.7	7.9	2.7	0.4	0.3	0.0	4.3	8961.7
Redwood Falls	4.1	2.5	3.0	1.2	0.6	0.0	0.4	4209.51
Benson	3.8	2.4	1.3	0.2	1.6	1.7	2.2	4684.04
Raymond	4.3	6.9	2.4	0.0	0.0	0.0	0.7	5074.8
Total Acres	24853.12	30503.48	26445.8	15316.36	8327.39	4229.47	4450.66	114126.28
% of Total	21.8	26.7	23.2	13.4	7.3	3.7	3.9	100.0

Table 6B. Net tons delivered by piler per station, 1999
A. Combination pilers

Station	piler	No. Loads	total	Piler Total	% End	% Side
Renville	end - 1	834	16,017		24.4	
	side - 1	2,016	49,711	65,727		75.6
	side - 2	3,381	84,027	84,027		100.0
	side - 3	3,377	82,618	82,618		100.0
	end - 4	4,243	80,900	80,900		100.0
	end - 5	2,773	53,530		36.0	
	side - 5	3,929	95,032	148,562		64.0
	end - 6	3,816	74,369		48.5	
	side - 6	3,245	79,111	153,481		51.5
	end - 7	2,478	48,727		42.8	
	side - 7	2,680	65,137	113,863		57.2
	total end	14,144	273,543		37.5	
	total side	18,628	455,637			62.5
	station tot	32,772	729,179	729,180		

Bird Is.	piler	No. loads	total	piler total	% end	% side
	end - 1	5,801	101,375	101,375	100.0	
	end - 2	886	15,704		13.7	
	side - 2	4,093	98,686	114,390		86.3
	end - 3	3,433	62,634		41.2	
	side - 3	3,692	89,298	151,932		58.8
	end total	10,120	179,713		48.9	
	side total	7,785	187,984	367,697		51.1
	station tot	17,905	367,697			

Station	piler	No. loads	total	piler total	% end	% side
Buff. Lk.	end - 1	2,203	42,946		35.1	
	side - 1	3,183	79,527	122,473		64.9
Benson	end - 1	2,061	40,857		41.5	
	side - 1	2,274	57,476	98,333		58.5
CC West	end - 1	2,087	37,929		35.1	
	side - 1	2,899	70,240	108,169		64.9
	end - 2	1,385	24,781		22.8	
	side - 2	3,466	83,972	108,753		77.2
	total end	3,472	62,710		28.9	
	total side	6,365	154,212	216,922		71.1
	station tot	9,837	216,922			
Hector	end - 1	2,515	44,716		42.4	
	side - 1	2,544	60,842	105,558		57.6
	end - 2	3,009	53,230		48.3	
	side - 2	2,405	56,888	110,118		51.7
	total end	5,524	97,946		45.4	
	total side	4,949	117,730	215,676		54.6
	station tot	10,473	215,676			

Murdock	piler	No. Loads	total	piler total	% end	% side
	end - 1	2,844	53,259		43.4	
	side - 1	2,907	69,513	122,772		56.6
	end - 2	4,518	73,554	73,554	100.0	
	total end	7,362	126,813		64.6	
	total side	2,907	69,513	196,326		35.4
	station tot	10,269	196,326			

Raymond	piler	No. loads	total	piler total	% end	% side

end - 1	2039	41,337		**35.4**	
side - 1	3132	75,298	116,635		**64.6**

Rwd. Fls.

end - 1	1645	28,957		**44.5**	
side - 1	1425	36,059	65,016		**55.5**
end -2	1432	24,778	24,778	**100.0**	
total end	3077	53,735		**59.8**	
total side	1425	36,059	89,794		**40.2**
station tot	4502	**89,794**			

stations with combination Pilers

total end	**50,002**	**919,600**		**42.7**	
total side	**50,648**	**1,233,436**			**57.3**
total	**100,650**	**2,153,036**			

B. End dump only

Station	piler	No. loads	total
CC East	end - 1	4,754	**85,595**
Mayn	end - 1	4,644	**80,220**
Milan	end - 1	2,247	**43,500**

total end	**11,645**	**209,315**
gr. Total	**112,295**	**2,362,351**

Table 6C. Harvest Summary by Station - 1999
adjusted for dirt

Station	Harvest Acres	Net Tons	T/Ac	% Sugar	% LTM	Recov. Sugar/t	Recov. Sugar/ac	1st tare	2nd Tare
Renville	35,098	728,762	20.76	16.70	1.094	312.1	6481	2.31	2.00
Bird Island	17,676	368,384	20.84	16.34	1.126	304.3	6341	2.81	2.40
Benson So.	4,570	98,342	21.52	17.48	1.035	328.9	7078	2.56	2.05
Buffalo Lake	5,805	122,481	21.10	16.69	1.094	311.9	6581	2.28	2.29
CC West	10,219	216,877	21.22	16.93	1.078	317.0	6729	2.20	1.92
CC East	4,015	85,632	21.33	16.92	1.078	316.8	6758	1.97	1.96
Hector	10,968	215,046	19.61	16.03	1.150	297.6	5835	3.11	2.26
Maynard	4,024	80,205	19.93	16.87	1.078	315.8	6295	1.74	1.80
Milan	2,472	43,469	17.58	17.38	1.042	326.8	5746	1.95	1.67
Murdock	8,951	196,314	21.93	17.14	1.063	321.5	7052	2.63	2.38
Raymond	5,062	116,705	23.06	17.32	1.049	325.4	7503	2.11	2.62
Redwood Falls	4,109	89,750	21.84	17.54	1.035	330.1	7210	2.03	1.80
Total	112,969	2,361,967	20.91	16.76	1.086	313.5	6554	2.43	2.12

harvest *acres* = as delivered not as contracted

Table 6D. Percentage of Net tons delivered per day at each station- 1999

Full Harvest tons only Before dirt adjustments

Date	Renv	Ben. So.	Bird Is.	Buff Lk.	CC West	CC East	Hector	Mayn	Milan	Murdock	Raymond	RWF	Coop
10/04	3.22	3.68	2.78	1.48	4.00	3.94	3.80	1.62	5.46	2.87	3.33	2.88	**3.18**
10/05	6.79	8.54	6.78	1.67	8.11	7.47	8.26	8.43	8.14	6.94	6.43	3.97	**6.84**
10/06	7.79	8.64	6.61	2.04	7.74	8.28	7.77	9.06	7.56	7.50	7.90	4.37	**7.25**
10/07	7.60	8.51	4.83	4.17	6.39	7.64	7.09	8.23	6.49	6.31	8.87	5.37	**6.74**
10/08	6.70	5.87	4.52	3.65	4.79	4.94	5.38	6.48	6.30	4.19	5.96	5.39	**5.50**
10/09	7.88	9.46	7.45	4.71	9.40	6.81	6.75	8.96	7.91	6.36	7.23	8.15	**7.60**
10/10	4.69	5.69	7.15	3.87	7.58	4.79	5.93	8.20	6.42	5.28	1.49	9.33	**5.67**
10/11	7.97	3.32	7.36	4.36	9.18	6.83	6.86	9.02	10.11	8.66	1.47	8.82	**7.31**
10/12	7.85	8.81	7.70	6.82	9.01	9.74	8.23	7.77	8.48	7.96	1.99	14.00	**7.99**
10/13	6.05	9.68	8.49	3.93	8.46	9.81	6.81	7.44	5.75	6.05	7.55	14.65	**7.34**
10/14	6.00	10.38	8.04	6.23	6.56	7.39	5.86	7.46	3.01	9.08	6.07	11.44	**7.06**
10/15	5.75	8.59	6.17	10.31	5.29	5.28	5.86	4.72	1.86	5.99	7.37	5.93	**6.12**
10/16	4.06	5.09	5.13	10.10	3.66	5.21	4.39	0.32	1.76	3.37	10.89	3.89	**4.72**
10/17	2.17	2.76	4.83	7.20	0.33		3.11		1.72	0.63	5.18		**2.47**
10/18	2.17	0.95	2.60	8.41	1.10		2.05			1.14	10.17		**2.44**
10/19	0.58		1.13	8.16			0.23			2.27	5.40		**1.25**
10/20	0.36			1.89						1.06	2.51		**0.21**
10/21	0.14			0.09									
10/22													
10/23													
10/24													
10/25													
Remainder													
Total %	**87.77**	**99.96**	**91.59**	**89.08**	**91.58**	**88.14**	**88.37**	**87.72**	**80.97**	**85.68**	**99.81**	**98.20**	**89.70**
Total tons	**730,756**	**98,640**	**369,321**	**122,763**	**217,210**	**85,782**	**216,792**	**80,315**	**43,558**	**196,978**	**117,160**	**90,016**	**2,369,248**

TABLE 7

COMPARISON OF MID-AUGUST PRE-HARVEST SAMPLES (AUG. 20-25)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
NO. BEETS/10'	13.0	12.7	13.0	13.0	13.0	14.3	13.0	13.2	15.5	12.9	14.0	14.3	14.0	14.4	14.5
BEET WT./10' (LBS)	15.2	10.7	17.4	12.8	14.4	12.0	12.4	14.3	8.8	15.7	12.1	12.6	14.5	14.1	12.0
AVE. SUGAR %	12.83	12.13	14.44	15.01	14.31	11.35	12.90	13.50	11.55	13.88	12.30	13.00	13.50	13.38	13.10
PPM K		2629	2265	2523	2164	1962	1905	2209	2105	2461	2069	2460	2267	1987	1942
PPM NA		488	392	380	536	714	566	580	460	422	451	373	302	441	479
PPM AM. N		173	367	548	441	235	180	189	355	230	227	249	176	260	254
LTM %		1.351	1.434	1.751	1.561	1.311	1.153	1.274	1.397	1.338	1.2	1.339	1.145	1.221	1.086
FINAL T/A	21.7	15.1	22.5	17.7	20.2	17.9	16.4	21.6	10.0	21.8	15.7	19.21	17.93	21.21	20.92
FINAL SUGAR %	16.21	16.22	16.98	17.15	15.91	15.63	15.42	17.59	16.98	16.36	14.97	16.91	16.61	15.56	16.76
FINAL LTM %	1.204	1.213	1.376	1.434	1.484	1.347	1.211	0.986	1.064	1.181	1.311	1.146	1.013	1.221	1.086
NET TONS (M)	1.279	0.987	1.498	1.229	1.507	1.411	1.304	1.867	0.948	2.418	1.602	2.074	1.913	2.270	2.362
% SUGAR OPENING OF PREPILE	13.83	14.82	14.53	15.51	12.81	11.95	12.86	14.05	15.38	12.80	13.16	13.96	13.58	13.24	13.30
DATE OF PREPILE	09/14	09/27	09/01	10/03	09/06	09/10	09/19	09/08	09/27	08/30	9/14	9/09	09/02	08/26	09/09

Table 8A

SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE
COMPARISON OF MID-JULY SAMPLES

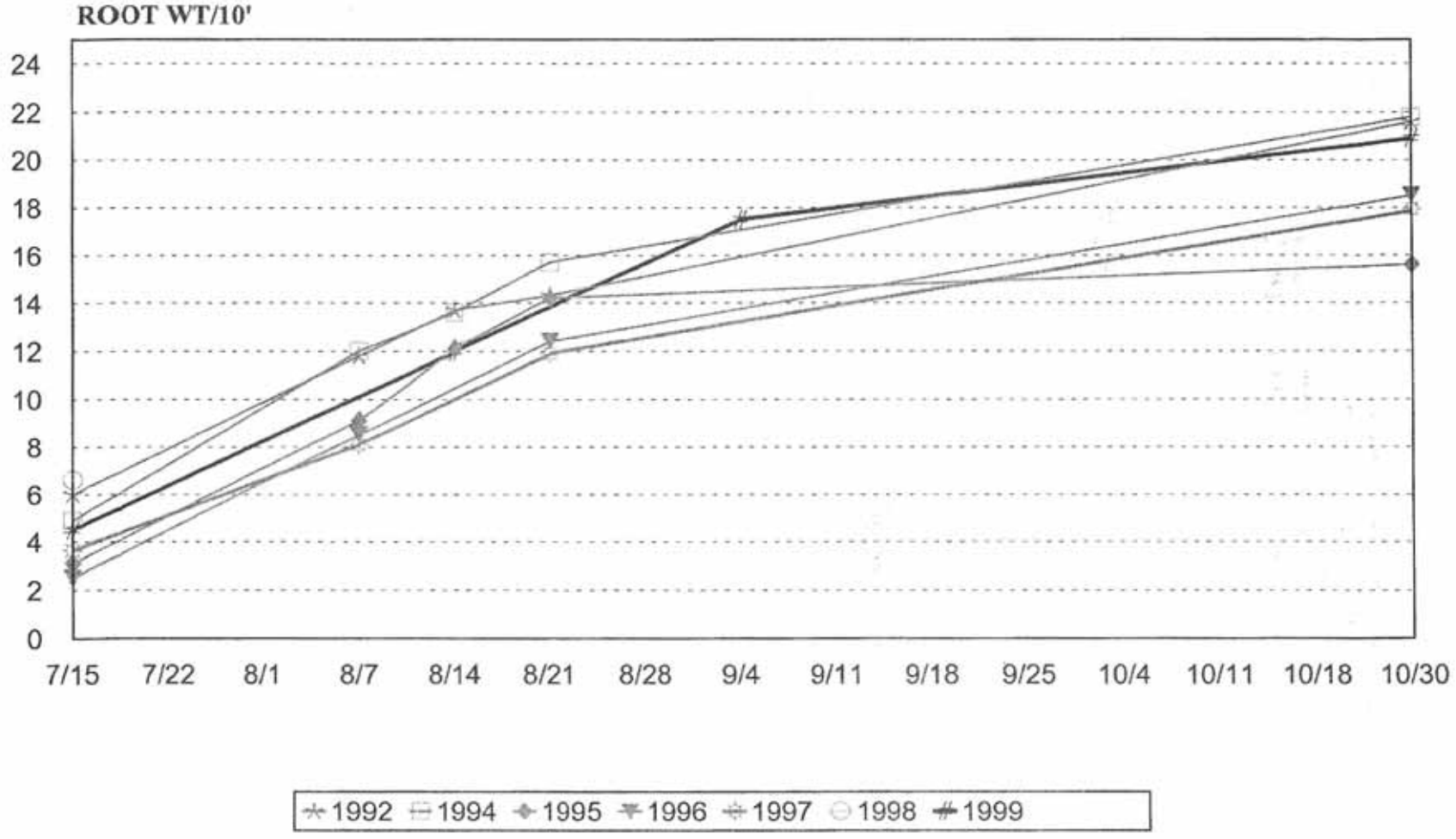
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1987 - 99 MEAN
No. Beets/10'	12.5	13.0	14.0	15.6	13.7	15.4	16.5	13.7	15.0	15.0	15.0	14.8	15.2	14.6
Top Wt./10' (lbs.)	19.8	8.3	8.6	9.4	9.2	14.2	4.3	13.1	9.3	8.0	10.6	14.8	12.6	10.9
Beet Wt./10' (lbs.)	11.4	6.9	4.1	3.1	3.9	6.0	1.5	4.9	3.1	2.5	3.6	6.6	4.5	4.8
Ave. Beet Wt. (oz.)	14.6	8.5	4.7	3.2	4.6	6.2	1.4	5.7	3.3	2.7	3.8	7.1	4.7	5.4
Top/Root Ratio	1.7	1.2	2.3	3.0	2.4	2.3	2.9	2.7	3.0	3.2	2.9	2.2	2.8	2.5
Final Yield (T/A)	22.5	17.7	20.4	17.9	16.4	21.6	10.0	21.8	15.6	19.6	17.9	21.2	20.9	18.7

Table 8B

JULY SAMPLES BY RECEIVING STATION - 1999

STATION	NO. BEETS/10'	TOP WT. LBS (10')	ROOT WT. LBS (10')
BENSON	15	13.37	5.25
BUFFALO LAKE	14	13.25	4.88
BIRD ISLAND	15	11.14	4.30
CLARA CITY E.	16	14.17	4.77
CLARA CITY W.	16	12.50	4.28
HECTOR	15	11.12	3.85
MAYNARD	17	14.90	4.35
MILAN	13	9.50	3.88
MURDOCK	16	13.54	5.44
RAYMOND	16	12.57	5.57
RENVILLE	15	13.02	4.51
REDWOOD FALLS	14	12.86	4.07
TOTAL	**Average 15.29**	**Average 12.63**	**Average 4.52**

COMPARISON OF PREHARVEST SAMPLES
ROOT WT/10'



SUCROSE CONTENT

PERCENT SUGAR

TABLE 10. HARVEST SUMMARY, 1985-1999

PRE-PILE HARVEST

VARIABLE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	1985 - 1998 AVERAGE
BEGINNING DATE	09/14	09/27	09/01	10/03	09/06	09/10	09/19	09/08	09/27	08/30	09/14	09/09	09/02	08/26	09/09	09/09
LENGTH (DAYS)	23	9	37	5	30	28	18	27	9	34	21	25	34	39	25	24
NET TONS (PREPILE) *	176,680	92,586	289,726	80,976	278,579	252,550	167,690	219,764	83,836	320,200	137,099	242,300	336,072	406,336	236,194	221373
% OF TOTAL TONS	13.80	9.40	19.30	6.60	18.50	17.90	12.90	11.70	8.00	13.20	8.50	11.70	17.60	17.90	10.00	13.13
% S IST DAY OF PREPILE	13.55	14.82	14.53	15.51	12.81	11.95	12.86	14.05	15.38	12.80	13.16	13.96	13.58	13.24	13.30	13.70
AVERAGE % SUGAR	14.55	15.10	15.89	16.28	14.21	13.79	13.66	15.36	15.87	14.03	14.00	15.33	14.88	14.48	14.90	14.82
% SUGAR ON FIRST DAY OF FULL HARVEST	16.07	15.80	17.46	16.71	16.30	15.95	15.30	17.83	16.88	16.05	14.41	16.90	17.02	15.52	16.56	16.32
% FINAL SUGAR	16.21	16.22	16.98	17.15	15.91	15.63	15.42	17.59	16.98	16.36	14.98	16.94	16.61	15.56	16.76	16.35

* BEFORE FINAL DIRT ADJUSTMENT

PREPILE PERIOD

AVE. CHANGE IN % SUGAR/DAY	0.11	0.11	0.08	0.24	0.12	0.14	0.14	0.14	0.17	0.10	0.06	0.118	0.101	0.060	0.130	0.120

TABLE 11. BEET QUALITY ANALYSIS, SMSC, 1985-1999

YEAR	AVERAGE % SUGAR	RS/T (LBS)	AVERAGE PPM POT.	AVERAGE PPM SODIUM	AVERAGE AM N	AVERAGE % LTM
1985	16.21	300.1	2,313	304	209	1.204
1986	16.22	300.4	2,363	324	185	1.201
1987	16.98	313.6	2,400	339	344	1.301
1988	17.15	313.6	2,433	268	394	1.468
1989	15.91	288.5	2,234	422	402	1.484
1990	15.61	285.2	2,052	557	296	1.348
1991	15.42	284.0	1,908	460	270	1.221
1992	17.59	332.1	1,883	221	184	0.986
1993	16.98	318.3	2,041	308	171	1.064
1994	16.36	303.5	2,120	277	254	1.184
1995	14.99	273.6	2,122	357	322	1.311
1996	16.94	315.9	2,187	238	222	1.146
1997	16.61	311.9	1,807	217	227	1.013
1998	15.56	286.8	1,815	328	344	1.221
1999	16.76					1.086
MEAN	**16.35**					**1.216**

1999 % LTM derived from regression table

TABLE 12. COMPARATIVE HARVEST SUMMARY, 1985-1999

TONS* HARVESTED BY WEEK

HARVEST	1985		1986		1987		1988		1989		1990	
PERIOD	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
START - 10/06	176,680	13.7	147,860	14.9	289,128	19.3	80,992	6.6	318,594	21.1	252,550	17.8
10/07 - 10/13	182,244	14.1	349,263	35.2	534,053	35.6	545,308	44.3	728,313	48.2	554,348	39.1
10/14 - 10/20	269,976	20.9	383,746	38.6	453,468	30.2	520,558	42.3	344,987	22.8	374,776	26.4
10/21 - 10/27	511,174	39.6	105,784	10.6	214,117	14.3	85,076	6.9	117,130	7.8	230,266	16.2
10/28 - END	152,254	11.8	6,887	0.7	11,195	0.7	0	0.0	1,890	0.1	5,758	0.4
TOTALS	1,292,328	100.0	993,540	100.0	1,501,961	100.0	1,231,934	100.0	1,510,914	100.0	1,417,698	100.0

HARVEST	1991		1992		1993		1994		1995		1996	
PERIOD	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
START - 10/06	167,690	12.8	418,797	22.4	148,301	15.6	334,746	13.8	157,716	9.8	640,610	30.82
10/07 - 10/13	632,102	48.4	336,582	18.0	414,837	43.5	687,307	28.3	232,229	14.4	1,035,179	49.8
10/14 - 10/20	365,074	27.9	236,436	12.7	242,202	25.4	319,878	13.2	835,892	51.9	376,174	18.1
10/21 - 10/27	142,193	10.9	737,027	39.5	147,921	15.5	560,065	23.0	252,959	15.7	26,620	1.281
10/28 - END	0	0.0	137,918	7.4	313	0.0	529,818	21.8	132,623	8.2	0	0
TOTALS	1,307,059	100.0	1,866,760	100.0	953,574	100.0	2,431,814	100.0	1,611,419	100.0	2,078,583	100.0

HARVEST	1997		1998		1999		AVERAGE	
PERIOD	TONS	%	TONS	%	TONS	%	TONS	%
START - 10/06	432,350	22.5	434,341	19.1	171,663	27.2	278,135	13.8
10/07 - 10/13	674,745	35.1	895,087	39.3	1,721,604	48.2	634,880	31.6
10/14 - 10/20	713,288	37.1	450,300	19.8	5,891,940	24.5	785,246	39.0
10/21 - 10/27	100,804	5.2	488,480	21.4	1,193	0.1	248,054	12.3
10/28 - END	0	0.0	10,411	0.5	0	0.0	65,938	3.3
TOTALS	1,921,187	100.0	2,278,619	100.0	2,369,267	100.0	2,012,253	100.0

* TONS HARVESTED ARE NOT ADJUSTED FOR FINAL DIRT PERCENTAGE

TABLE 13. COMPARATIVE HARVEST SUMMARY, 1985-1999

% SUGAR BY WEEK

HARVEST PERIOD	1985		1986		1987		1988		1989		1990		1991		1992	
	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU
START - 10/06	14.66	14.55	15.25	15.36	16.58	15.89	16.12	16.18	14.08	14.47	13.60	13.79	13.78	13.66	16.55	16.55
10/07 - 10/13	16.19	15.36	16.21	15.91	17.36	16.88	17.05	16.97	16.24	15.71	15.86	15.21	15.47	15.09	17.74	17.08
10/14 - 10/20	16.21	15.74	16.46	16.15	17.16	16.98	17.33	17.13	16.45	15.89	16.18	15.50	15.77	15.33	17.76	17.25
10/21 - 10/27	16.57	16.11	16.55	16.21	16.95	16.98	17.52	17.16	16.52	15.93	16.33	15.62	15.65	15.41	17.91	17.53
10/28 - END	16.72	16.20	16.79	16.21	16.85	16.98	17.52	17.16	16.45	15.93	16.14	15.63	15.83	15.42	18.36	17.59
TOTALS		16.20		16.21		16.98		17.16		15.93		15.63		15.42		17.59

HARVEST PERIOD	1993		1994		1995		1996		1997		1998		1999		AVERAGE	
	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU	% S WK	% S ACCU
START - 10/06	16.29	16.29	14.12	14.12	14.06	14.06	16.31	16.31	15.36	15.36	14.52	14.52	15.98	15.98	15.15	15.14
10/07 - 10/13	17.03	16.83	16.17	15.56	14.78	14.53	17.18	16.84	17.04	16.39	15.65	15.31	16.92	16.59	16.46	16.02
10/14 - 10/20	17.11	16.93	16.53	15.81	15.10	14.93	17.15	16.93	16.93	16.59	16.02	15.49	17.52	16.79	16.65	16.23
10/21 - 10/27	17.46	17.00	16.98	16.14	15.04	15.01	16.89	16.94	17.77	16.61	15.84	15.58	18.85	16.79	16.86	16.33
10/28 - END	17.70	17.00	17.08	16.36	14.58	14.98	--	--	--	--	15.93	15.59	--	--	16.66	16.25
TOTALS		16.98		16.36		14.98		16.94		16.61		15.59		16.79		16.36

% SUGAR ON:	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
FIRST DAY OF PREPILE	14.82	14.53	15.51	12.81	11.95	12.86	14.05	15.38	12.80	13.16	13.96	13.58	13.24	13.30
FIRST DAY OF FULL HARVEST	15.80	17.46	16.71	16.30	15.95	15.30	17.83	16.88	16.05	* 14.41	16.90	17.02	**15.52	16.56
DIFFERENCE	0.98	2.93	1.20	3.49	4.00	2.44	3.78	1.5	3.25	1.25	2.94	3.44	2.28	3.26

TABLE 14. SUMMARY OF DELIVERIES BY STATION, 1994 - 1999
(HIGHEST SINGLE DAY/STATION)

STATION	1994				1995				1996			
	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS
RENVILLE	2,635	59,285	56,032	21.26	2,341	50,870	47,673	21.73	2,683	61,219	58,815	22.81
BENSON												
BIRD ISLAND	1,708	32,285	29,226	17.11	1,489	28,205	26,474	18.94	1,564	31,679	30,550	20.25
BUFFALO LAKE									545	12,970	12,636	23.80
CLARA CITY W.	773	18,956	17,951	24.52	881	20,099	18,778	22.81	896	21,628	20,825	24.14
CLARA CITY E.	449	8,127	7,672	18.10	397	6,979	6,574	17.58	457	7,952	7,674	17.40
HECTOR	1,041	20,186	18,850	19.39	1,079	21,194	19,866	19.64	1,016	21,147	20,332	20.81
MAYNARD	443	7,579	7,155	17.11	360	5,904	5,540	16.40	459	7,700	7,335	16.77
MILAN	473	8,701	8,077	18.40	242	4,210	3,907	17.40	385	7,262	6,908	18.86
MURDOCK	881	15,165	14,388	17.21	798	13,263	12,319	16.62	937	16,230	15,581	17.32
RAYMOND												
REDWOOD F.	220	3,600	3,417	16.36	220	3,501	3,295	15.91	264	4,525	4,336	17.14
SINGLE DAY TOTAL	**8,623**	**173,884**	**162,768**	**20.16**	**7,807**	**154,225**	**144,426**	**19.76**	**9,206**	**192,312**	**184,992**	**20.89**
HIGHEST DAY (ACTUAL) COOP	**8,180**	**166,102**	**156,782**	**20.31**	**7,358**	**144,575**	**136,072**	**19.65**	**8,192**	**169,238**	**162,738**	**20.66**

STATION	1997				1998				1999				MEAN			
	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS	NO. LOADS	RAW TONS	NET TONS	AVE LOAD/ RAW TONS
RENVILLE	2,827	63,993	59,781	22.64	2,789	65,636	61,539	23.5	2,534	60,211	58,130	23.8	2,635	60,202	56,995	22.6
BENSON									452	10,650	10,211	23.6	452	10,650	10,211	23.6
BIRD ISLAND	1,447	30,245	28,542	20.90	1,645	35,720	33,808	21.7	1,501	32,833	31,206	21.9	1,559	31,828	29,968	20.1
BUFFALO LAKE	471	10,256	9,831	21.77	608	14,577	13,971	23.9	528	13,117	12,633	24.8	538	12,730	12,268	23.6
CLARA CITY W.	753	17,115	16,583	22.72	987	23,630	22,364	23.9	934	21,250	20,403	22.8	871	20,446	19,484	23.5
CLARA CITY E.	364	6,568	6,297	18.04	535	9,976	9,524	18.6	490	8,695	8,398	17.7	449	8,050	7,690	17.9
HECTOR	892	19,143	17,916	21.46	757	16,508	15,631	21.8	841	17,713	16,756	21.1	938	19,315	18,225	20.7
MAYNARD	461	8,165	7,968	18.12	482	8,704	8,300	18.1	423	7,501	7,265	17.7	438	7,592	7,261	17.4
MILAN	266	5,341	5,002	20.08	323	6,566	6,186	20.3	222	4,541	4,397	20.5	319	6,104	5,746	19.3
MURDOCK	869	14,795	14,042	17.03	819	14,945	14,141	18.2	869	18,729	17,841	21.6	862	15,521	14,719	18.0
RAYMOND									552	13,274	12,708	24.0	552	13,274	12,708	24.0
REDWOOD F.	215	3,660	3,540	17.02	310	5,491	5,293	17.7	615	13,721	13,160	22.3	307	5,750	5,507	17.7
SINGLE DAY TOTAL	**8,502**	**178,328**	**168,305**	**20.97**	**9,255**	**201,753**	**190,757**	**21.8**	**9,961**	**222,235**	**213,108**	**22.3**	**8,892**	**187,123**	**177,393**	**21.0**
HIGHEST DAY (ACTUAL) COOP	**8,052**	**165,706**	**161,167**	**20.99**	**8,330**	**179,816**	**170,369**	**21.6**	**8,806**	**195,869**	**188,724**	**22.2**	**8,153**	**170,218**	**162,642**	**20.9**

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties since 1980

1980	1981	1982	1983	1984
ACH 12	ACH 14	ACH 14	ACH 14	ACH 145
ACH 14	ACH 151	ACH 145	ACH 30	ACH 154
ACH 17	ACH 30	ACH 17	Beta 1230	ACH 30
ACH 30	Beta 1230	Beta 1230	Beta 1237	Beta 1230
Beta 1237	Beta 1237	Beta 1237	BJ Monofort	BJ Monofort
Beta 1345	Beta 1345	BJ Monofort	Maribo Ultramono	KW 3394
Beta 1443	Beta 1443	Holly HH33	Mono-Hy M7	Maribo Ultramono
BJ Monofort	BJ Monofort	Mono-Hy E4	Mono-Hy M8	Mono-Hy M7
Holly HH33	Maribo Ultramono	Mono-Hy M7	Mono-Hy R1	Mono-Hy R1
Mono-Hy E4	Maribo Unica	Mono-Hy M8		
Mono-Hy R1	Mono-Hy M7	Mono-Hy R1		
	Mono-Hy M8			
	Mono-Hy R1			
	Mono-Hy X73			

1985	1986	1987	1988	1988 (cont.)
ACH 145	ACH 146	ACH 164	ACH 164	KW 6264
ACH 154	ACH 164	Beta 1230	ACH 178	Maribo 403
ACH 30	ACH 30	Beta 5494	ACH 180	Maribo 411
Beta 1230	Beta 1230	Beta 6264	ACH 181	Maribo Ultramono
BJ Monofort	Beta 6264	BJ 1310	Beta 1230	Mitsui Monohikari
KW 1132	BJ 1310	BJ Monofort	Beta 3614	Mono-Hy R103
KW 3394	BJ Monofort	Hilleshog 4046	Beta 6625	
Maribo 401	KW 1132	Hilleshog 5090	BJ 1310	
Maribo Ultramono	KW 3265	Hilleshog 5135	BJ Monofort	
Mono-Hy M7	KW 3394	KW 1132	Hilleshog 4046	
Mono-Hy R1	Maribo 401	KW 3265	Hilleshog 5090	
	Maribo 403	KW 3394	Hilleshog 5135	
	Maribo Ultramono	Maribo 403	Hilleshog 8277	
	Mono-Hy M7	Maribo Ultramono	KW 1014	
		Mitsui Monohikari	KW 1132	
		Mono-Hy M7	KW 3145	
		Mono-Hy R103	KW 3265	
		Mono-Hy R117	KW 3394	

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties since 1980

1989	1990	1991	1992	1993
ACH 164	ACH 180	ACH 194	ACH 194	ACH 194
ACH 180	ACH 181	ACH 196	ACH 196	ACH 196
ACH 181	ACH 194	ACH 198	ACH 198	ACH 198
ACH 198	ACH 196	Beta 1238	Beta 1238	Beta 2010
Beta 3614	ACH 198	Beta 2988	Beta 2010	Beta 2988
Beta 6269	Beta 3614	Beta 5657	Beta 2988	Hilleshog 5090
Beta 6625	Beta 6269	Beta 6269	Beta 5657	Hilleshog 5133
Hilleshog 4046	Beta 6625	Beta 6625	Beta 6269	HM 2401
Hilleshog 5090	Hilleshog 4046	Hilleshog 2401	Beta 6625	KW 1119
Hilleshog 5135	Hilleshog 5090	Hilleshog 5090	BJ 1330	KW 1800
KW 1014	Hilleshog 5135	Hilleshog 5135	Hilleshog 5090	KW 2249
KW 3145	HM 2410	KW 2398	Hilleshog 5135	KW 2398
KW 3265	KW 1014	KW 3145	HM 2401	KW 3145
KW 3394	KW 3145	KW 3265	KW 1119	KW 3580
Maribo 403	KW 3265	Maribo 403	KW 2398	KW 6770
Maribo 411	KW 3394	Maribo 875	KW 3145	Maribo 875
Maribo Ultramono	Maribo 403	Maribo Ultramono	KW 3265	Seedex Monohikari
Mitsui Monohikari	Maribo 411	Mitsui Monohikari	Maribo 875	VDH 66140
	Maribo 875		Maribo Ultramono	
	Maribo Ultramono		Mitsui Monohikari	
	Mitsui Monohikari			

1994	1994 (cont.)	1995	1995 (cont.)
ACH 194	KW 3580	ACH 194	HM 2401
ACH 196	KW 6770	ACH 196	HM 7036 (Special)
ACH 198	Maribo 875	ACH 198	KW 1119
ACH 205 (Special)	Mitsui Monohikari	ACH 205 (Special)	KW 1800
ACH 302	Seedex SX1004	ACH 302	KW 2249
ACH 309	VDH H16640	ACH 309	KW 2398
ACH 311		ACH 311	KW 3291
Beta 2010		Beta 2010	KW 6770
Hilleshog 5135		Beta 1492	Maribo 875
Hill. 7505 (Niagara)		Beta 3712	Maribo 923
HM 2401		Hilleshog 5135	Mitsui Monohikari
KW 1119		Hilleshog 7034	Seedex Laser
KW 1800		Hilleshog 7514	VDH H66140
KW 2249 (Blend)		Hilleshog 2418	
KW 2398		Hilleshog Niagra	
KW 3291		Hilleshog Shasta	

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties since 1980

1996

ACH 194
ACH 196
ACH 302
ACH 309
Beta 1492
Beta 2010
Beta 3712
Beta 6863
HM 5135
HM Niagara (7505)
HM Shasta (2416)
HM Hector (2418)
KW 1800
KW 2398
KW 2249 (Blend)
KW 3291

1996 (cont.)

KW 6770
Maribo 875
Maribo 923
Mitsui Monohikari
Seedex Laser (100
VDH H66140

1997

ACH 196
ACH 302
ACH 309
Beta 1492
Beta 6963
Beta 1994
Beta 2010
Beta 2074
Beta 5014
Beta 6904
HM 5135
HM Hector
HM Niagara
HM Shasta
HM Viking
HM Resist

1997 (cont.)

KW 2398
KW 6770
Maribo 875
Maribo 923
Maribo 9363
SX Laser
VDH 66140

1998

ACH 302
ACH 309
Beta 2074
Beta 3945
Beta 5014
Beta 5296
Beta 6863
Beta 6904
HM 7057
HM Hector
HM Niagra
HM Resist
HM Tahoe
HM Viking
KW 6770
Maribo 9363
Seedex SX Laser

1999

ACH 302
ACH 309
Beta 3945
Beta 5014
Beta 5296
Beta 6863
Beta 6904
HM 7057
HM Hector
HM Resist
Seedex SX Laser
Van der Have H46109

Table 2. Comparison of Approved Varieties for Southern Minnesota over a twenty year period.

Year	No. of Approved	Recoverable Sugar/Acre Mean of Approved	Recoverable Sugar/Ton Mean of Approved	Tons/Acre Mean of Approved	% Sugar Mean of Approved	Leaf Spot Rating Mean of Approved	LTM Mean of Approved
1981 (78-79-80)	15	6,724	264.5	25.7	15.40	4.43	2.18
1982 (79-80-81)	12	6,282	262.6	23.9	15.50	4.31	2.17
1983 (80-81-82)	9	7,053	261.9	26.9	15.60	4.84	2.37
1984 (81-82-83)	9	6,823	253.1	26.9	15.30	4.80	2.50
1985 (82-83-84)	11	7,682	269.7	28.6	15.90	4.87	2.64
1986 (83-84-85)	14	7,837	280.9	27.9	16.10	4.80	2.41
1987 (84-85-86)	18	7,764	300.4	25.9	16.70	4.68	1.68
1988 (85-86-87)	24	8,884	308.7	28.7	16.95	4.93	1.51
1989 (86-87-88)	19	8,689	318.6	27.2	17.40	4.70	1.47
1990 (87-88-89)	21	9,078	307.8	29.4	17.10	4.87	1.71
1991 (88-89-90)	19	7,554	294.1	25.7	16.39	4.56	1.59
1992 (89-90-91)	21	6,831	276.6	24.8	15.50	4.60	1.60
1993 (90-91-92)	19	6,943	296.2	23.5	16.30	4.83	1.49
1994 (91-92-93)	21	5,961	308.8	19.6	16.90	4.80	1.40
1995 (92-93-94)	29	6,783	323.0	20.9	17.48	5.02	1.32
1996 (93-94-95)	22	6,259	306.6	20.8	16.79	4.81	1.47
1997 (94-95-96)	24	7,234	304.6	23.5	16.65	4.52	1.42
1998 (95-96-97)	19	5,794	291.9	19.75	15.83	4.38	1.24
1999 (96-97-98)	17	5,606	287.2	19.41	15.44	4.37	1.08
2000 (97-98-99)	12	5,555	281.0	19.70	15.14	4.19	1.08

Table 3. SEED USAGE PERCENTAGE
SMSC, 1991 - 1999

YEAR	SMALL	MEDIUM	LARGE	X-LARGE	MINI	REGULAR	JUMBO	TOTAL
1991	12.37	47.22	19.92	16.27	3.04	1.19	---	100.00
1992	17.27	31.79	26.15	15.04	8.75	1.00	---	100.00
1993	17.49	26.02	18.53	22.05	13.31	2.60	---	100.00
1994	14.90	20.96	12.06	22.97	24.50	3.43	---	100.00
1995	13.55	13.53	15.67	12.68	37.11	7.45	---	100.00
1996	3.67	6.79	9.44	4.05	37.80	38.25	---	100.00
1997	1.20	3.00	2.00	1.30	23.20	45.30	24.00	100.00
1998	1.60	1.60	1.60	1.60	17.50	50.60	30.00	100.00
1999	0.20	0.70	0.40	0.30	17.50	50.60	30.30	100.00
Average	**9.14**	**16.85**	**11.75**	**10.70**	**20.30**	**22.27**	**28.10**	**100.00**

* Mini and regular pellets were adjusted to bare seed equivalent basis.

Table 4. SEED USAGE
POUNDS PLANTED PER ACRE
SMSC, 1991 - 1999

YEAR	ACRES PLANTED	ACRES REPLANTED	TOTAL ACRES
1991	82,284	7,600	89,884
1992	87,324	1,000	88,324
1993	101,781	8,814	110,595
1994	111,547	5,048	116,595
1995	109,738	425	110,163
1996	108;783	1,697	110,480
1997	107,715	1,143	108,858
1998	107,746	1,894	109,640
1999	114,232	1,247	112,985
AVERAGE	**103,461**	**3,208**	**106,392**

Table 5. Mean of 3 Year Performance Summary of SMSC Approved and Specialty Varieties 3 year data, 1997-1999.

Entry	Source	Rec/T (lbs)		Rec/A (lbs)		Loss to Mol.		Yield (T/A)		Sugar %		C L S		Emergence (%)		Tare (%)	
		3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*	3 yr avg	*% of Mean*
2000 APPROVED VARIETIES																	
ACH 302	84	272.36	*96.81*	5412.82	*97.44*	1.15	*107.28*	19.87	*100.83*	14.77	*97.56*	4.28	*102.12*	63.84	*113.62*	3.02	*103.26*
ACH 309	116	273.81	*97.32*	5543.88	*99.79*	1.15	*106.66*	20.19	*102.47*	14.84	*97.98*	4.07	*97.03*	61.01	*108.57*	2.52	*86.07*
Beta 3945	95	296.09	*105.24*	5704.70	*102.69*	1.06	*98.29*	19.25	*97.70*	15.86	*104.74*	4.25	*101.25*	41.90	*74.56*	2.87	*98.02*
Beta 5014	112	284.10	*100.98*	5268.01	*94.83*	1.08	*100.15*	18.54	*94.08*	15.28	*100.91*	4.36	*103.87*	64.79	*115.30*	2.85	*97.45*
Beta 5296	117	284.66	*101.18*	5646.19	*101.64*	1.10	*102.32*	19.81	*100.56*	15.34	*101.28*	3.73	*88.93*	45.38	*80.75*	3.02	*103.03*
Beta 6863	104	289.94	*103.05*	5525.36	*99.46*	1.01	*93.64*	19.00	*96.42*	15.51	*102.40*	4.52	*107.68*	55.85	*99.39*	2.87	*97.91*
Beta 6904	85	287.45	*102.17*	5521.21	*99.39*	1.08	*100.77*	19.11	*96.99*	15.45	*102.05*	4.61	*109.99*	59.91	*106.61*	3.12	*106.67*
HM 7057	120	279.66	*99.40*	5474.82	*98.55*	1.02	*94.88*	19.53	*99.11*	15.00	*99.08*	3.99	*95.13*	49.33	*87.79*	3.16	*108.04*
HM Hector	103	276.90	*98.42*	5476.90	*98.59*	1.09	*101.39*	19.71	*100.04*	14.93	*98.62*	4.65	*110.78*	62.53	*111.29*	3.08	*105.08*
HM Resist	88	274.39	*97.52*	5495.02	*98.92*	1.06	*98.29*	19.92	*101.12*	14.77	*97.56*	4.16	*99.26*	63.08	*112.27*	3.14	*107.36*
Seedex SX Laser	119	272.91	*97.00*	5380.23	*96.85*	1.09	*101.70*	19.68	*99.87*	14.74	*97.32*	3.98	*94.97*	59.42	*105.75*	2.83	*96.54*
Van der Have H46109	94	283.95	*100.92*	6214.17	*111.86*	1.02	*94.63*	21.83	*110.80*	15.22	*100.50*	3.73	*89.01*	47.26	*84.11*	2.65	*90.57*
MEAN		281.35	*100.00*	5555.28	*100.00*	1.08	*100.00*	19.70	*100.00*	15.14	*100.00*	4.19	*100.00*	56.19	*100.00*	2.93	*100.00*
Specialty Varieties																	
ACH 205	101	265.10	*93.36*	5334.41	*85.84*	1.11	*108.78*	20.04	*91.80*	14.36	*94.36*	3.93	*105.27*	62.70	*132.68*	3.34	*125.95*
ACH 9744	93	273.16	*96.20*	5331.90	*85.80*	1.05	*103.54*	19.47	*89.18*	14.72	*96.71*	4.09	*109.55*	60.51	*128.04*	3.90	*147.06*
Beta 4705 (M705)	89	273.64	*96.37*	5511.67	*88.70*	1.12	*110.23*	20.10	*92.09*	14.81	*97.31*	4.99	*133.57*	40.36	*85.40*	2.54	*95.84*
Beta 4880 (M706)	106	274.77	*96.77*	5683.96	*91.47*	1.16	*114.22*	20.59	*94.34*	14.90	*97.89*	4.00	*107.05*	48.21	*102.01*	2.66	*100.36*
HM 7073	100	271.04	*95.45*	5427.81	*87.35*	1.14	*111.91*	20.00	*91.62*	14.69	*96.51*	4.60	*123.21*	52.99	*112.12*	2.82	*106.23*
Van der Have H68108	80	266.48	*93.85*	5952.71	*95.79*	1.19	*116.54*	22.32	*102.26*	14.51	*95.35*	3.70	*99.11*	51.26	*108.46*	2.74	*103.29*

Key:

ACH 205	Aphanomyces specialty
ACH 9744	Aphanomyces specialty
Beta 4705	Rhizomania specialty
Beta 4880	Rhizomania/Apanomyces specialty
HM 7073	Rhizomania specialty plus moderate aphanomyces tolerance
Holly Rival	Rhizomania specialty
VDH H68108	Aphanomyces specialty

Table 6. Mean of Two Year Performance Summary of 2000 SMSC Approved Varieties Varieties, 1998-1999.

Variety	Rec/T (lbs)		Rec/A (lbs)		Loss to Mol.		Yield (T/A)		Sugar %		C L S		Emergence (%)	
	2 yr avg	% of Mean	2 yr avg	% of Mean	2 yr avg	% of Mean	2 yr avg	% of Mean	2 yr avg	% of Mean	2 yr avg	% of Mean	2 yr avg	% of Mean
2000 APPROVED VARIETIES														
ACH 302	270.74	*95.88*	5903.13	*97.81*	1.26	*108.73*	21.74	*101.90*	14.80	*96.87*	4.27	*102.66*	70.99	*110.38*
ACH 309	276.71	*97.99*	6144.72	*101.81*	1.23	*106.14*	22.18	*103.96*	15.07	*98.61*	4.00	*96.28*	67.47	*104.91*
Beta 3945	297.12	*105.22*	6180.95	*102.41*	1.14	*97.94*	20.77	*97.35*	15.99	*104.66*	4.17	*100.25*	50.77	*78.94*
Beta 5014	285.05	*100.95*	5790.22	*95.94*	1.17	*100.53*	20.32	*95.24*	15.42	*100.90*	4.36	*104.94*	73.15	*113.74*
Beta 5296	286.56	*101.48*	6149.41	*101.89*	1.17	*100.96*	21.47	*100.64*	15.50	*101.46*	3.54	*85.21*	54.07	*84.07*
Beta 6863	292.31	*103.52*	5935.93	*98.35*	1.08	*92.77*	20.27	*95.01*	15.70	*102.73*	4.49	*108.07*	60.63	*94.28*
Beta 6904	289.40	*102.49*	5990.14	*99.25*	1.17	*100.53*	20.61	*96.63*	15.64	*102.34*	4.66	*112.17*	66.24	*103.00*
HM 7057	280.22	*99.24*	5833.58	*96.66*	1.09	*94.06*	20.76	*97.33*	15.11	*98.87*	3.89	*93.63*	57.74	*89.78*
HM Hector	277.39	*98.24*	5772.35	*95.64*	1.19	*102.26*	20.73	*97.19*	15.05	*98.51*	4.55	*109.52*	70.27	*109.26*
HM Resist	274.56	*97.23*	5959.46	*98.74*	1.15	*98.81*	21.57	*101.10*	14.87	*97.33*	4.21	*101.21*	70.97	*110.35*
Seedex SX Laser	272.66	*96.56*	5836.53	*96.71*	1.19	*102.26*	21.37	*100.17*	14.82	*96.97*	3.94	*94.71*	65.13	*101.27*
Van der Have H46109	285.73	*101.19*	6926.34	*114.77*	1.10	*95.01*	24.20	*113.48*	15.39	*100.75*	3.80	*91.34*		
MEAN	282.37	*100.00*	6035.23	*100.00*	1.16	*100.00*	21.33	*100.00*	15.28	*100.00*	4.15	*100.00*	64.31	*100.00*
2 YEAR TEST MARKET VARIETIES														
Beta 6850	298.83	*105.83*	6421.08	*106.39*	1.10	*95.11*	21.51	*100.86*	16.04	*105.00*	4.46	*107.35*		
Beta 5216	284.00	*100.58*	6108.66	*101.22*	1.17	*100.96*	21.55	*101.03*	15.38	*100.67*	3.73	*89.78*		
HM RH5	284.90	*100.90*	6065.08	*100.49*	1.06	*91.15*	21.34	*100.06*	15.31	*100.19*	3.73	*89.78*		
SPECIALTY														
ACH 205	256.49	*94.38*	5785.82	*95.87*	1.20	*103.12*	21.61	*101.32*	14.52	*95.04*	3.85	*92.67*	69.82	*108.56*
ACH 9744	272.05	*96.35*	5719.42	*94.77*	1.14	*98.37*	20.93	*98.10*	14.75	*96.51*	4.06	*97.60*	70.05	*108.92*
Beta 4705	275.03	*97.40*	5838.34	*96.74*	1.21	*104.17*	21.16	*99.22*	14.96	*97.93*	4.97	*119.63*		
Beta 4880	276.55	*97.94*	6174.98	*102.32*	1.26	*108.99*	22.20	*104.08*	15.08	*98.74*	4.08	*98.20*		
Beta 4811	280.05	*99.18*	6659.85	*110.35*	1.11	*95.68*	23.75	*111.34*	15.12	*98.98*	4.66	*112.17*		
HM 7073	270.99	*95.97*	5710.49	*94.62*	1.24	*107.24*	21.03	*98.58*	14.79	*96.78*	4.65	*111.92*		
HM 7083	266.75	*94.47*	5841.50	*96.79*	1.27	*109.59*	21.93	*102.82*	14.57	*95.37*	4.60	*110.72*		
Holly Rival	254.79	*90.23*	5491.74	*90.99*	1.35	*116.83*	21.43	*100.45*	14.09	*92.20*	4.13	*99.41*		
Van der Have H68108	266.67	*94.44*	6541.55	*108.39*	1.30	*112.48*	24.48	*114.76*	14.63	*95.77*	3.69	*88.70*		

Key:

ACH 205	Aphanomyces specialty
ACH 9744	Aphanomyces specialty
Beta 5216	Two year test market only
Beta 4705	Rhizomania specialty
Beta 4880	Rhizomania/Apanomyces specialty
Beta 4811	Rhizomania/Apanomyces specialty
Beta 6850	Moderate aphanomyces tolerance
HM RH5	Rhizoctonia specialty
HM 7073	Rhizomania specialty plus moderate aphanomyces tolerance
HM 7083	Rhizomania specialty
Holly Rival	Rhizomania specialty
VDH H68108	Aphanomyces specialty

Table 7. Mean of OneYear Performance Summary of 2000 SMSC Approved Varieties Varieties, 1999.

Variety	Rec/T (lbs)		Rec/A (lbs)		Loss to Mol.		Yield (T/A)		Sugar %		C L S		Emergence (%)	
	1 yr avg	% of Mean	1 yr avg	% of Mean	1 yr avg	% of Mean	1 yr avg	% of Mean	1 yr avg	% of Mean	1 yr avg	% of Mean	1 yr avg	% of Mean
2000 APPROVED VARIETIES														
ACH 302	278.63	*96.01*	6465.22	*99.58*	1.28	*110.14*	23.18	*103.60*	15.22	*97.11*	4.42	*105.51*	76.24	*108.17*
ACH 309	281.20	*96.90*	6341.26	*97.67*	1.24	*106.70*	22.58	*100.92*	15.30	*97.62*	4.05	*96.66*	72.79	*103.28*
Beta 3945	308.08	*106.16*	6713.50	*103.40*	1.13	*97.23*	21.77	*97.30*	16.53	*105.47*	3.90	*93.09*	64.54	*91.57*
Beta 5014	292.86	*100.91*	6217.87	*95.77*	1.17	*100.68*	21.26	*95.02*	15.81	*100.88*	4.36	*104.08*	75.33	*106.88*
Beta 5296	292.48	*100.78*	6134.76	*94.49*	1.15	*98.96*	20.99	*93.81*	15.77	*100.62*	3.57	*85.22*	72.79	*103.28*
Beta 6863	302.31	*104.17*	6100.79	*93.97*	1.08	*92.93*	20.18	*90.19*	16.20	*103.36*	4.42	*105.51*	60.55	*85.91*
Beta 6904	299.39	*103.16*	6491.38	*99.98*	1.12	*96.37*	21.68	*96.89*	16.09	*102.66*	4.70	*112.19*	68.73	*97.51*
HM 7057	286.31	*98.66*	6159.76	*94.87*	1.12	*96.37*	21.49	*96.04*	15.44	*98.51*	3.86	*92.14*	66.61	*94.51*
HM Hector	287.73	*99.15*	6235.59	*96.04*	1.17	*100.68*	21.64	*96.72*	15.56	*99.28*	4.41	*105.27*	73.11	*103.73*
HM Resist	285.62	*98.42*	6748.85	*103.95*	1.15	*98.96*	23.63	*105.61*	15.43	*98.45*	4.01	*95.72*	77.13	*109.43*
Seedex SX Laser	270.82	*93.32*	5948.30	*91.62*	1.19	*102.40*	21.94	*98.06*	14.73	*93.98*	3.82	*91.18*	73.14	*103.77*
Van der Have H46109	290.00	*99.93*	7083.17	*109.10*	1.13	*97.23*	24.43	*109.18*	15.63	*99.73*	3.70	*88.32*	64.82	*91.97*
MEAN	290.21	*100.00*	6492.57	*100.00*	1.16	*100.00*	22.38	*100.00*	15.67	*100.00*	4.19	*100.00*	70.48	*100.00*
TEST MARKET VARIETIES														
HM 7089	292.22	*100.69*	7041.65	*108.46*	1.08	*93.06*	24.08	*107.62*	15.69	*100.11*	4.31	*102.88*		
Beta 6850	301.90	*104.03*	6939.37	*106.88*	1.10	*94.80*	23.11	*103.30*	16.20	*103.35*	3.08	*73.43*		
Beta M5216	282.81	*97.45*	5849.32	*90.09*	1.19	*102.62*	20.77	*92.81*	15.34	*97.88*	4.03	*96.28*		
HM RH5	287.65	*99.12*	6269.97	*96.57*	1.09	*93.93*	21.95	*98.12*	15.48	*98.77*	3.84	*91.62*		
Specialty varieties														
ACH 205	272.83	*94.01*	5999.96	*92.41*	1.19	*102.40*	21.92	*97.97*	14.83	*94.62*	3.80	*90.71*	52.68	*74.74*
ACH 9744	273.92	*94.39*	6094.96	*93.88*	1.16	*99.82*	22.16	*99.04*	14.86	*94.81*	3.99	*95.24*	63.23	*89.71*
Beta 4705	286.07	*98.57*	6362.98	*98.00*	1.23	*105.84*	22.25	*99.44*	15.54	*99.15*	4.83	*115.29*	40.36	*57.26*
Beta 4880	282.31	*97.28*	6492.55	*100.00*	1.26	*108.42*	22.92	*102.44*	15.37	*98.07*	4.17	*99.54*	48.21	*68.40*
Beta 4811	280.06	*96.50*	6363.70	*98.02*	1.15	*98.96*	22.73	*101.59*	15.16	*96.73*	4.73	*112.91*	57.01	*80.89*
HM 7073	276.31	*95.21*	5800.18	*89.34*	1.25	*107.56*	20.99	*93.81*	15.06	*96.09*	4.66	*111.24*	52.99	*75.18*
HM 7083	280.33	*96.60*	6297.89	*97.00*	1.20	*103.49*	22.64	*101.18*	15.22	*97.11*	3.59	*85.63*		*0.00*
Holly Rival	260.61	*89.80*	5586.07	*86.04*	1.36	*117.03*	21.40	*95.64*	14.39	*91.81*	4.10	*97.87*	48.01	*68.12*
Van der Have H68108	269.41	*92.83*	6622.19	*102.00*	1.30	*111.86*	24.54	*109.68*	14.77	*94.24*	3.74	*89.28*	51.26	*72.73*

Key:

ACH 205	Aphanomyces specialty
ACH 9744	Aphanomyces specialty
Beta 5216	Two year test market only
Beta 4705	Rhizomania specialty
Beta 4880	Rhizomania/Apanomyces specialty
Beta 4811	Rhizomania/Apanomyces specialty
Beta 6850	Moderate aphanomyces tolerance
Beta 7089	One year test market only
HM RH5	Rhizoctonia specialty
HM 7073	Rhizomania specialty plus moderate aphanomyces tolerance
HM 7083	Rhizomania specialty
Holly Rival	Rhizomania specialty
VDH H68108	Aphanomyces specialty

Table 8. SOUTHERN MINNESOTA COMMERICAL, SEMI COMMERCIAL & TRANSGENIC VARIETIES

1999 Aphanomyces Readings for Coded Test Entries

Code	Description	1999 Ratings R1* Rating	% Chk @	Root Index** Rating	% Chk @	2 Yr Mean R1*	Index**	1998 R1*	1998 Index**
577	Beta 2012LL(Aph)	1.75	62	7.08	94	2.4	6.0	3.0	4.9
529	Beta 3945(Aph)	2.42	86	7.25	96				
616	Beta 5014(Aph)	2.33	83	7.00	93				
517	Beta 5216(Aph)	2.08	74	7.17	95	2.9	6.5	3.7	5.8
555	Beta 5296(Aph)	2.17	77	7.33	97	3.2	6.1	4.2	4.9
543	Beta 6863(Aph)	2.67	95	7.33	97				
569	Beta 6904(Aph)	2.42	86	7.25	96	3.2	6.7	3.9	6.1
562	Beta M701(Aph Spec)	1.92	68	6.75	90	2.8	5.6	3.7	4.4
611	Beta M703(Blend)(Aph)	1.83	65	6.83	91	3.1	6.1	4.3	5.4
524	Beta M706(Rzm-Aph Spec)	1.92	68	6.83	91	3.4	6.5	4.9	6.2
622	Beta M811(Rzm-Aph Spec)	1.75	62	6.67	89	2.8	5.3	3.8	4.0
595	Beta M813(Rzm-Aph)	1.83	65	6.92	92	2.9	5.5	4.0	4.1
581	Beta M814(Aph)	2.42	86	7.25	96	3.0	6.1	3.6	5.0
549	Beta M815(Aph)	2.42	86	7.00	93	3.3	5.8	4.2	4.6
511	Beta M846(Rzm-Aph Spec)	2.92	104	7.67	102				
575	Beta M930(Rzm-Aph Spec)	2.17	77	6.75	90				
563	Beta M931(Aph)	2.17	77	6.75	90				
612	Beta M932(Aph)	1.92	68	6.67	89				
602	Crystal 205(Aph)	1.58	56	6.83	91	2.4	5.7	3.3	4.5
548	Crystal 302(Aph)	2.00	71	6.92	92	3.1	6.3	4.1	5.6
507	Crystal 309(Aph)	2.00	71	7.08	94	2.8	6.2	3.5	5.3
621	Crystal 555(Aph)	1.58	56	6.42	85	2.2	5.3	2.8	4.1
536	Crystal 921(Aph)	1.58	56	6.33	84				
503	Crystal 922(Rzm-Aph)	2.50	89	7.00	93				
576	Crystal 952(Aph)	1.83	65	6.50	86				
515	Crystal 953(Rzm-Aph)	1.75	62	6.83	91				
618	Crystal 9744(Aph)	1.50	53	6.50	86	2.4	5.2	3.3	3.8
598	Crystal 977LL(Aph)	1.92	68	7.25	96				
580	Crystal 979LL(Aph)	1.42	50	7.00	93				
556	Crystal 999(Aph)	2.25	80	7.25	96				
558	HM 107RR(Aph)	3.75	133	8.00	106				
540	HM 1642	3.17	113	7.75	103				
609	HM 7073(Aph-Rzm Spec)	2.83	101	7.50	100				
565	HM 7083(Rzm)	3.17	113	7.50	100				
522	HM 7089(Aph)	2.92	104	7.58	101				
533	HM 7521	3.33	119	7.83	104				
625	HM E26(Aph)	2.00	71	6.42	85				
600	HM E38(Aph)	2.17	77	7.08	94				
508	HM Hector	3.00	107	7.58	101				
570	HM Resist(Aph Spec)	1.67	59	7.17	95	2.8	6.3	4.0	5.5
521	HM RH5(Rhizoc Spec)	2.33	83	7.08	94				

Table 8cont.. SOUTHERN MINNESOTA COMMERICAL, SEMI COMMERCIAL & TRANSGENIC VARIETIES

1999 Aphanomyces Readings for Coded Test Entries

Code	Description	1999 Ratings R1* Rating	% Chk @	Root Index** Rating	% Chk @	2 Yr Mean R1*	2 Yr Mean Index**	1998 R1*	1998 Index**
623	HM Viking	2.17	77	7.17	95				
532	Holly HH98APH03(Aph)	1.58	56	6.58	87	2.0	4.8	2.5	3.0
552	Holly HH98HX806(Aph)	2.67	95	7.33	97				
579	Holly HH98HX829(Aph)	2.00	71	7.08	94				
604	Holly HH99HX941(Aph)	2.25	80	6.75	90				
597	Holly HH99HX942(Aph)	2.58	92	6.67	89				
620	Holly HH99HX957(Aph)	1.83	65	6.50	86				
539	Holly HH99HX958(Aph)	1.83	65	7.00	93				
574	Seedex SX1018(Aph)	1.67	59	6.67	89				
564	Van der Have H46109(Aph Spec)	2.00	71	6.83	91	2.8	5.8	3.6	4.7
545	Van der Have H46140(Aph Spec)	2.08	74	7.17	95				
599	Van der Have H46175(Aph-Rzm Spec)	2.58	92	6.67	89				
587	Van der Have H46177(46109RR)(Rzm-Aph Spec)	2.00	71	7.08	94				
530	Van der Have H68108(Aph Spec)	1.42	50	6.58	87	2.0	4.9	2.5	3.2
568	Van der Have H68151(Aph Spec)	2.33	83	6.92	92	3.2	5.9	4.0	4.8
528	Van der Have H68152(Rzm-Aph Spec)	2.17	77	6.58	87	2.5	4.9	2.9	3.3
571	Van der Have H68181(Aph Spec)	2.58	92	7.17	95				
	Check Varieties								
126	Aph. Res. Variety	1.25	44	6.67	89	2.7	5.6	4.2	4.6
130	Aph. Res. Variety	1.58	56	6.58	87				
127	RRV Mod. Susceptible Variety	3.58	127	8.17	108	4.7	7.7	5.8	7.2
131	RRV Mod. Susceptible Variety	3.67	130	8.17	108				
128	Very Susceptible Variety	4.58	163	8.50	113	5.2	8.0	5.8	7.5
132	Very Susceptible Variety	4.33	154	8.42	112				
129	USDA Resistant	1.83	65	6.75	90	2.4	5.4	3.0	4.1
134	USDA Resistant	1.67	59	7.00	93				
	Approval Limit for 2000 +	2.08				3.08		4.11	
	Trial Mean	2.51	89	7.27	97				
	CV	22.1%		6.3%					
	LSD .05	0.63	23	0.52	7				

* Lower numbers indicate better Aphanomyces resistance (1=Healthy, 9=Dead). Average of ratings from 7/30 and 9/15. Factors in plant stand and plant health.

** Lower number indicate better Aphanomyces resistance (1=High number of healthy plants, 9=Few survivors and severe damage). Ratings taken 10/15. Factors include number and condition of survivors.

@ % Check is the mean of the two resistant and two susceptible check varieties.

+ Approval Limit effective in 2000 (110% of mean of Beta 6904, Crystal 205 and HM Resist).

Table 9

1999 Cercospora Readings for Coded Test Entries
Betaseed Nursery - Shakopee, MN

Code	Description	Average Rating at Each Date * 7/28**	8/6	8/10	8/13	8/17***	8/24	All Data Adjusted to 5.5 Equivalent 1999 Mean	2 Yr Mean	3 Yr Mean	1998 Mean	1997 Mean
833	Beta 2012 LL(Aph)	2.28	3.92	5.07	6.45	6.70	7.19	5.27	5.08	4.91	4.89	4.58
903	Beta 2084	2.21	3.75	5.07	6.05	6.54	6.86	5.08	4.97	4.96	4.87	4.94
853	Beta 2086	2.21	3.92	5.22	6.21	6.54	6.86	5.16	5.02	5.02	4.88	5.02
810	Beta 2276(Blend)	2.04	3.26	4.24	5.39	5.56	6.37	4.48	4.58	4.79	4.69	5.20
785	Beta 2286(Blend)	2.21	3.75	4.58	5.72	6.05	6.37	4.78	4.61	4.80	4.44	5.19
754	Beta 3555(Blend)	2.37	3.75	4.90	6.05	6.05	6.37	4.91	4.94	5.00	4.97	5.11
729	Beta 3636	2.40	3.66	4.81	5.77	6.19	6.61	4.90	4.75	4.77	4.59	4.82
888	Beta 3712	2.28	3.75	5.07	6.29	6.70	6.86	5.16	5.05	5.16	4.95	5.37
825	Beta 3777(X751)(Aph)	2.13	3.26	4.41	5.56	6.05	6.54	4.66	4.49	4.57	4.32	4.72
703	Beta 3843	2.45	3.92	4.90	5.72	5.72	6.21	4.82	4.83	4.89	4.83	5.03
737	Beta 3857(X857)(Aph Spec)	2.21	3.43	4.41	5.56	5.72	5.88	4.53	4.64		4.76	
780	Beta 3945(Aph)	1.64	2.62	3.43	4.82	5.39	5.56	3.90	4.17	4.25	4.43	4.41
872	Beta 4689(Rhizoc)(NC)	2.04	3.26	4.41	5.39	6.05	6.37	4.59				
905	Beta 4705(M705)(Rzm Spec)	2.13	3.60	4.73	5.80	6.05	6.70	4.83	4.97	4.99	5.11	5.02
808	Beta 5014(Aph)	1.88	3.11	4.41	5.47	5.56	5.72	4.36	4.36	4.36	4.36	4.35
745	Beta 5216(Aph)	1.88	2.62	3.26	3.84	4.24	4.73	3.43	3.73		4.03	
845	Beta 5296(Aph)	1.96	2.94	3.43	4.09	4.41	4.58	3.57	3.54	3.73	3.51	4.11
867	Beta 6376	2.21	3.60	4.73	5.80	6.37	6.37	4.85	4.82	4.79	4.78	4.73
768	Beta 6447(X705)	2.37	3.75	4.41	5.56	6.05	6.54	4.78	4.94	4.92	5.09	4.88
724	Beta 6863(Aph)	2.13	3.43	4.41	5.15	5.56	5.88	4.42	4.49	4.52	4.56	4.57
824	Beta 6904(Aph)	2.28	3.11	4.58	5.80	6.21	6.21	4.70	4.66	4.61	4.62	4.52
801	Beta M701(Aph)(NC)	2.21	3.11	4.41	5.72	5.88	6.05	4.56	4.59	4.59	4.63	4.59
778	Beta M703(Blend)(Aph)(NC)	2.21	3.60	4.58	5.96	6.37	6.54	4.87	4.78	4.71	4.68	4.58
877	Beta M706(Rzm-Aph Spec)(NC)	1.96	2.94	3.92	5.07	5.22	5.88	4.17	4.08	4.00	3.99	3.83
841	Beta M811(Rzm-Aph Spec)(NC)	2.37	3.75	4.58	5.64	5.88	6.21	4.73	4.66		4.59	
741	Beta M813(Rzm&Aph)	2.28	3.75	4.90	5.88	6.05	6.70	4.93	4.91		4.88	
794	Beta M814(Aph)	2.04	2.94	4.09	5.22	5.72	5.88	4.31	4.46		4.60	
893	Beta M815(Aph)	1.96	2.62	3.43	4.58	4.90	5.07	3.75	3.75		3.75	
706	Beta M846(Rzm-Aph Spec)(NC)	2.28	3.75	4.58	5.47	5.39	6.05	4.59				
763	Beta M892 LL(Aph)	2.13	3.43	4.41	5.56	5.56	6.05	4.52	4.34		4.16	
818	Beta M930(Rzm-Aph Spec)(NC)	2.28	3.75	4.41	5.22	5.22	5.56	4.41				
885	Beta M931(Aph)	1.88	2.77	3.60	4.41	4.73	5.39	3.80				
766	Beta M932(Aph)	1.88	2.28	3.60	4.24	4.58	5.22	3.64				
858	Beta X704(Aph)(NC)	2.13	3.43	4.73	5.39	5.88	6.37	4.66	4.59	4.52	4.53	4.38
830	Beta X708(NC)	2.13	3.75	4.90	6.05	6.86	6.54	5.04	5.00	4.99	4.97	4.96
900	Beta X709(Blend)	2.04	3.92	4.90	5.96	6.70	6.54	5.01	4.92	4.95	4.83	5.00
850	Beta X810	2.45	4.24	5.39	6.78	6.86	6.86	5.43	5.19		4.94	
812	Beta X856(Aph Spec)(NC)	2.21	3.60	4.41	5.96	6.37	6.70	4.87	4.80		4.73	
712	Beta X860	2.62	3.75	5.07	5.96	6.37	6.54	5.05	4.96		4.88	
750	Beta X920	2.21	3.60	4.90	6.21	6.54	6.86	5.05				
870	Beta X921	2.04	3.60	4.73	5.72	6.05	6.37	4.75				
829	Beta X922(Rzm)	2.77	4.09	5.22	6.37	6.70	7.03	5.36				
797	Beta X923	2.53	3.11	4.41	5.72	5.88	6.05	4.62				
772	Beta X924(Rzm)	2.45	3.92	5.07	6.05	6.05	6.70	5.04				
896	Beta X925	2.04	3.43	4.58	5.39	5.88	6.05	4.56				
807	Beta X926	2.37	3.75	4.90	6.37	6.70	7.03	5.19				
720	Beta X927	2.37	3.75	5.07	6.21	6.37	6.54	5.05				
752	Beta X928	2.62	3.75	4.73	5.72	6.05	6.86	4.95				
851	Beta X962(Aph)	2.04	3.26	4.09	5.31	5.88	6.54	4.52				
883	Beta X963(Aph Spec)(NC)	2.28	3.75	4.90	6.05	5.72	5.88	4.76				
899	Croplan CL101	2.70	4.09	5.39	6.05	6.21	6.86	5.22	5.17	5.14	5.12	5.08
849	Croplan CL102	2.28	4.09	5.22	6.13	6.37	7.03	5.19	5.14	5.03	5.10	4.80
751	Croplan CL103	2.37	4.09	5.07	6.37	6.70	7.03	5.27	5.09	5.10	4.91	5.11
715	Croplan CL105	2.70	4.41	5.07	5.96	6.37	6.37	5.15				
747	Croplan CL106	2.37	3.92	4.90	5.72	6.21	6.05	4.86				
790	Crystal 205(Aph Spec)	1.88	2.62	3.60	4.73	4.73	5.22	3.80	3.85	3.93	3.90	4.09
702	Crystal 222	2.04	3.26	3.75	5.31	5.72	6.21	4.38	4.24	4.27	4.09	4.35
876	Crystal 261	2.55	4.30	5.44	6.45	7.41	7.05	5.53	5.06	5.18	4.59	5.41
839	Crystal 302(Aph)	2.13	3.43	4.24	5.15	5.72	5.88	4.42	4.27	4.28	4.11	4.32
892	Crystal 309(Aph)	1.96	3.11	3.92	4.82	5.22	5.22	4.05	4.00	4.07	3.95	4.21
770	Crystal 555(Aph Spec)	1.88	2.77	3.60	4.17	4.73	5.72	3.81	3.75		3.69	
749	Crystal 814(X814)	2.11	3.66	4.81	6.07	6.77	6.61	5.01	5.05		5.10	
713	Crystal 815(X815)	2.62	4.24	5.39	6.54	6.86	7.19	5.47	5.36		5.24	
740	Crystal 817(X817)	2.45	3.75	4.58	6.05	6.86	6.70	5.07	4.95		4.83	
789	Crystal 921(Aph)	1.88	2.62	3.26	4.41	4.90	5.22	3.72				
814	Crystal 922(Rzm-Aph Spec)(NC)	1.88	2.62	3.43	4.33	4.90	4.24	3.57				
840	Crystal 951	2.62	3.92	4.90	6.13	6.54	7.03	5.19				
771	Crystal 952(Aph)	2.04	3.43	4.58	5.72	6.54	6.54	4.80				
711	Crystal 953(Aph-Rzm Spec)(NC)	2.37	3.92	5.39	6.45	6.70	6.86	5.28				
873	Crystal 954	2.13	3.26	4.41	5.64	6.54	6.70	4.78				
764	Crystal 955	2.70	3.92	4.90	6.21	6.54	6.54	5.14				
733	Crystal 956(Aph)	1.96	3.26	4.09	5.31	5.39	6.05	4.34				

Table 9

1999 Cercospora Readings for Coded Test Entries
Betaseed Nursery - Shakopee, MN

Code	Description	Average Rating at Each Date *						All Data Adjusted to 5.5 Equivalent				
		7/28**	8/6	8/10	8/13	8/17***	8/24	1999 Mean	2 Yr Mean	3 Yr Mean	1998 Mean	1997 Mean
782	Crystal 957	1.96	3.11	4.41	5.22	5.88	6.21	4.46				
881	Crystal 958	2.21	3.75	4.73	5.88	6.05	6.86	4.91				
835	Crystal 959	2.21	3.60	4.90	5.96	6.54	6.70	4.98				
746	Crystal 960 (Aph)(NC)	1.96	3.11	4.24	5.22	5.72	5.72	4.33				
865	Crystal 9603(Aph)	1.96	2.94	3.92	4.98	5.56	5.88	4.21	4.39	4.45	4.57	4.57
822	Crystal 9720(Aph Spec)	2.04	3.11	4.09	4.90	5.22	5.56	4.16	4.15	4.12	4.15	4.04
792	Crystal 9744(Aph Spec)	1.79	2.77	4.09	4.82	5.22	5.22	3.99	4.05	4.09	4.12	4.16
887	Crystal 977 LL(Aph)	2.45	4.24	5.22	6.21	6.86	6.86	5.31				
784	Crystal 979 LL(Aph)	1.96	3.43	4.24	5.47	5.88	5.88	4.48				
757	Crystal 999(Aph)	2.37	3.60	4.58	5.80	6.05	6.70	4.85				
796	HM 107 RR	2.21	3.43	4.73	5.47	5.88	6.37	4.69	4.73		4.78	
755	HM 110 RR	2.21	3.60	4.73	5.80	6.05	6.54	4.82	4.89		4.96	
769	HM 119 RR	1.96	2.62	3.75	4.73	5.07	5.88	4.00				
803	HM 120 RR	2.53	3.75	5.07	5.88	5.88	6.54	4.94				
844	HM 121 RR	1.64	2.62	3.11	4.17	4.58	4.73	3.47				
869	HM 1642	3.02	4.90	5.88	6.54	6.86	6.37	5.60				
820	HM 1643	2.28	3.75	4.58	5.88	5.56	5.56	4.61	4.52		4.44	
882	HM 1645(Rzm)	1.47	2.62	3.75	4.58	5.07	5.07	3.75				
898	HM 1646(Rzm)(NC)	2.04	3.11	4.58	5.56	5.88	6.54	4.62				
804	HM 7054	1.72	3.26	4.24	5.22	5.72	6.05	4.37	4.48	4.42	4.59	4.30
762	HM 7054 RR	1.88	3.43	4.41	5.56	5.72	5.72	4.45				
714	HM 7057 RR(Aph)	2.04	2.77	3.92	5.07	5.39	5.56	4.13				
742	HM 7057(Aph Spec)	1.88	2.77	3.92	4.66	4.90	5.07	3.86	3.89	3.99	3.92	4.19
842	HM 7063(NC)	2.04	3.43	4.24	5.56	6.37	6.86	4.75	4.84	4.80	4.93	4.72
890	HM 7069(Cougar)(NC)	2.77	4.58	5.88	6.78	7.03	7.52	5.76	5.40	5.27	5.03	5.02
863	HM 7073	1.96	3.43	4.09	5.56	6.37	6.54	4.66	4.65	4.60	4.64	4.50
875	HM 7073 RR(Rzm-Aph)	2.13	3.60	4.58	5.64	6.21	6.86	4.83				
828	HM 7078	2.37	4.09	5.39	6.37	7.19	7.03	5.40	5.22		5.04	
902	HM 7083(Rzm)	1.88	3.11	4.24	5.31	6.05	6.54	4.52	4.60		4.68	
805	HM 7089(Aph)	1.96	3.26	4.09	5.15	5.39	6.05	4.31	4.54		4.77	
847	HM 7090(Rzm)	2.77	4.24	5.39	5.88	6.21	6.70	5.20				
880	HM 7091	1.96	3.11	4.24	5.72	6.05	6.70	4.63				
838	HM 7092	2.53	3.60	4.58	5.47	5.88	6.37	4.73				
904	HM 7093	2.28	4.24	5.39	6.45	6.54	6.54	5.24				
727	HM 7094	2.13	3.26	4.73	5.72	5.88	6.70	4.73				
773	HM 7095	2.04	3.60	4.58	5.64	6.37	6.70	4.81				
739	HM 7097	2.13	3.11	4.41	5.22	5.56	6.70	4.52				
708	HM 7098	2.04	3.43	4.41	5.22	5.39	5.72	4.37				
855	HM 7099	2.13	3.43	4.73	5.64	5.72	6.21	4.65				
788	HM 7100	1.96	2.77	3.92	5.22	5.72	6.21	4.30				
725	HM 7101	2.13	3.11	4.24	5.22	5.72	6.37	4.47				
776	HM 7521	2.37	3.92	4.90	5.47	5.88	6.21	4.79				
736	HM 7522	2.28	3.75	4.90	5.72	6.05	6.54	4.87				
718	HM 7523	2.77	4.09	5.22	6.13	6.37	6.54	5.19				
793	HM 7524	2.45	3.92	5.07	5.72	6.37	6.70	5.04				
821	HM 8277	2.53	4.09	5.22	6.13	6.86	7.03	5.31	5.16	5.11	5.01	5.00
721	HM 8277 RR	2.53	4.24	5.56	6.70	7.35	7.52	5.65	5.49		5.33	
864	HM Agate	2.53	4.58	5.56	6.94	7.68	7.68	5.82	5.37	5.26	4.92	5.04
744	HM Agate RR	2.35	4.93	5.65	6.41	7.11	7.36	5.64				
707	HM Blazer	2.21	3.75	5.07	6.13	6.70	6.86	5.12	4.94	4.86	4.76	4.69
834	HM Blazer RR	2.62	3.92	5.22	6.29	6.86	6.54	5.24				
891	HM E26(Aph)	1.39	2.28	2.94	3.60	4.09	4.24	3.09				
717	HM E38(Aph)	1.88	2.62	3.11	4.41	4.58	4.90	3.58				
886	HM Empire	2.45	4.09	5.39	6.37	7.03	7.19	5.42	4.91	4.94	4.40	5.01
705	HM Glacier	2.37	3.92	5.22	6.37	7.52	7.35	5.46	5.36	5.23	5.25	4.97
760	HM Hector	2.04	3.11	4.58	5.47	5.22	6.05	4.41	4.55	4.65	4.69	4.84
731	HM Horizon	2.37	3.92	4.90	6.05	6.54	6.70	5.08	5.11	5.07	5.15	4.98
816	HM Horizon RR	2.28	3.92	5.07	6.45	7.35	7.68	5.46				
735	HM Resist RR(Aph Spec)	2.13	3.43	4.41	5.47	5.72	6.70	4.64				
861	HM Resist(Aph Spec)	1.96	2.77	3.75	4.90	5.22	5.39	4.01	4.20	4.16	4.40	4.08
799	HM RH3 RR(Rhizoc)	1.90	3.13	3.59	4.55	4.84	5.80	3.97	4.07		4.17	
813	HM RH3(Rhizoc)	1.96	2.62	3.92	5.22	5.39	5.72	4.14	4.13	4.24	4.12	4.46
843	HM RH5(Rhizoc Sp)	1.79	2.45	3.60	4.33	5.07	5.72	3.82	3.73		3.64	
758	HM Shasta	2.70	4.09	5.07	6.37	7.19	7.19	5.43	5.18	5.04	4.93	4.77
854	HM Supreme	1.96	3.60	4.58	4.98	5.22	5.39	4.28	4.24	4.42	4.19	4.79
837	HM Valley	2.37	4.24	5.56	6.21	6.86	7.19	5.40	5.12	5.18	4.84	5.31
798	HM Valley RR	2.86	4.73	5.56	6.54	7.03	7.52	5.71				
722	HM Viking	1.88	3.43	4.09	5.47	5.72	5.88	4.41	4.48	4.53	4.55	4.62
766	HM Yukon	2.04	3.26	4.41	5.56	5.88	6.05	4.54	4.24	4.33	3.95	4.49
759	Holly 98APH03(Aph Spec)(NC)	1.72	2.28	3.26	4.09	4.24	4.90	3.42	3.53		3.63	
857	Holly 98HX806(Aph Spec)(NC)	2.13	3.26	4.41	4.98	5.07	5.39	4.21	4.60		5.00	
831	Holly 98HX811	2.53	4.09	4.90	5.96	6.05	6.37	4.99	5.00		5.02	

Table 9

1999 Cercospora Readings for Coded Test Entries
Betaseed Nursery - Shakopee, MN

Code	Description	Average Rating at Each Date * 7/28**	8/6	8/10	8/13	8/17***	8/24	All Data Adjusted to 5.5 Equivalent 1999 Mean	2 Yr Mean	3 Yr Mean	1998 Mean	1997 Mean
732	Holly 98HX829(Aph Spec)(NC)	1.96	2.77	3.92	4.49	4.90	5.22	3.88	3.68		3.48	
791	Holly 99HX931	2.45	3.60	4.58	5.47	5.88	6.05	4.67				
871	Holly 99HX932	2.13	3.26	4.24	4.82	4.73	5.39	4.10				
817	Holly 99HX933(Rzm Spec)(NC)	2.21	3.75	4.90	5.88	6.37	7.03	5.02				
723	Holly 99HX938	2.45	3.75	4.73	6.13	6.37	6.70	5.03				
753	Holly 99HX940	1.88	2.94	3.92	4.90	5.07	5.56	4.05				
783	Holly 99HX941(Aph Spec)(NC)	2.62	3.92	5.39	6.45	6.86	6.86	5.35				
878	Holly 99HX942(Aph Spec)(NC)	1.96	2.62	3.43	4.24	4.24	4.41	3.49				
832	Holly 99HX957(Aph Spec)(NC)	1.96	3.26	4.09	5.07	5.39	5.72	4.25				
897	Holly 99HX958(Aph Spec)(NC)	2.04	3.26	4.09	4.98	5.39	5.39	4.20				
765	Holly HH-111(96HX401)	2.62	4.24	5.39	6.78	7.19	6.86	5.52	5.17	5.04	4.83	4.77
894	Holly HH-112(97HX701)	2.62	4.24	5.56	6.54	7.19	7.03	5.53	5.31	5.19	5.09	4.95
811	Holly HH-114(96HX413)(Aph Spec)	1.72	2.62	3.60	4.82	4.73	5.22	3.78	3.74	4.02	3.69	4.60
710	Holly HH-115(96HX402)	2.62	4.09	5.22	6.05	6.70	6.86	5.25	5.10	5.08	4.94	5.06
859	Holly HH-505(97HX709)(NC)	2.53	4.24	5.56	6.70	7.19	6.86	5.52	5.24	5.16	4.96	5.00
748	Holly Rival(Rzm-Spec)	1.88	2.77	3.75	5.07	5.39	5.72	4.10	4.13		4.16	
800	KW 3580(Aphan)	2.28	3.92	4.90	6.21	6.70	6.86	5.15	5.13	5.13	5.12	5.12
852	Lion Seeds Apex	2.45	3.60	4.73	5.80	6.21	6.21	4.83	4.99	4.96	5.14	4.90
701	Lion Seeds Lion 9910	2.45	4.09	5.22	6.37	6.70	6.70	5.25				
716	Lion Seeds Topex	2.21	3.75	4.73	6.05	6.54	6.70	5.00	4.96	5.05	4.92	5.22
806	Maribo 9363	2.45	3.75	4.90	5.72	5.88	6.21	4.82	4.80	4.75	4.78	4.66
860	Maribo 9369	2.13	3.43	4.58	5.56	6.05	6.70	4.73	4.69	4.78	4.65	4.97
761	Maribo 9581	2.04	3.26	4.41	5.72	5.72	6.54	4.62	4.47	4.47	4.32	4.48
884	Seedex SX 0811(NC)	2.53	4.09	5.22	6.29	6.54	6.86	5.25	5.12	5.11	4.99	5.08
901	Seedex SX 0813	1.88	2.62	3.43	4.41	5.07	5.07	3.74				
802	Seedex SX 0814(Aph)(NC)	1.96	2.62	3.75	4.98	5.56	5.72	4.10				
827	Seedex SX 0815	1.96	2.94	3.92	4.73	4.90	5.56	4.00				
704	Seedex SX 0913(NC)	2.04	3.60	4.90	5.80	6.54	6.70	4.93	5.08	5.05	5.23	4.99
767	Seedex SX 0914(Aph Spec)(NC)	2.13	3.11	4.09	5.07	5.56	6.05	4.33				
846	Seedex SX 0915	1.64	2.77	3.43	4.00	4.73	4.90	3.58				
862	Seedex SX 0916	2.04	3.43	4.24	4.98	5.39	5.56	4.27				
815	Seedex SX 1012(NC)	2.04	3.11	3.92	4.90	5.22	5.39	4.10	4.14	4.13	4.18	4.10
734	Seedex SX 1017	1.96	2.74	4.07	4.88	4.86	5.28	3.97				
756	Seedex SX 1018(Aph Spec)(NC)	2.13	2.94	4.41	5.47	5.56	6.21	4.45				
787	Seedex SX Bison	2.13	3.43	4.41	5.39	5.56	5.88	4.46	4.50	4.37	4.54	4.11
836	Seedex SX Gladiator	2.45	3.92	5.07	6.13	6.05	6.37	5.00	4.98	4.91	4.96	4.78
728	Seedex SX Laser	1.96	2.77	3.43	4.49	4.90	5.39	3.82	3.94	3.98	4.05	4.06
774	Seedex SX Monarch	2.45	3.60	4.90	5.80	6.21	6.54	4.91	4.99	4.86	5.07	4.65
781	Seedex SX Thunder(0809)	2.37	4.09	5.39	6.29	6.86	7.19	5.36	5.23	5.08	5.10	4.79
795	Van der Have H46109(Aph Spec)	1.96	2.62	3.60	4.33	4.58	5.07	3.70	3.64	3.63	3.59	3.61
719	Van der Have H46140(Aph Spec)(NC)	1.88	2.94	4.09	4.98	5.07	5.39	4.06	4.16		4.26	
819	Van der Have H46175(Rzm-Aph Spec)(NC)	1.72	2.62	4.09	4.73	4.73	5.56	3.91				
868	Van der Have H46177(46109rr)(Spec)(NC)	1.96	3.11	3.75	4.82	5.22	5.72	4.10	4.33		4.56	
895	Van der Have H66156	2.45	3.92	5.22	6.13	6.37	6.70	5.14	5.06	4.99	4.99	4.85
809	Van der Have H66168	2.28	3.92	4.90	5.88	6.37	6.54	4.98	4.97	4.92	4.97	4.82
848	Van der Have H66183	2.62	3.92	5.07	5.80	5.88	6.05	4.89	4.85	4.86	4.81	4.87
777	Van der Have H66240	2.70	4.24	5.22	6.54	7.03	7.03	5.46	5.26	5.12	5.05	4.85
730	Van der Have H66283	2.53	3.92	4.90	5.96	6.37	6.54	5.04	5.04	4.99	5.05	4.88
879	Van der Have H66335(NC)	2.53	3.92	5.07	5.88	6.21	6.37	5.00	4.97	4.99	4.94	5.02
779	Van der Have H66337(NC)	2.13	3.92	5.07	6.13	6.86	6.70	5.14	5.01	5.01	4.88	5.01
709	Van der Have H66392	2.70	4.24	5.07	6.05	5.88	6.54	5.08	5.08		5.08	
743	Van der Have H66393	2.37	3.92	5.22	6.05	6.54	6.86	5.16	5.10		5.05	
866	Van der Have H66451	2.45	4.24	4.90	5.88	6.05	6.54	5.01				
826	Van der Have H66452	2.37	3.75	4.58	5.64	5.72	6.21	4.71				
738	Van der Have H66453	2.62	4.24	5.22	6.05	6.37	6.70	5.20				
874	Van der Have H66454	2.53	4.09	5.07	5.96	6.37	6.21	5.04				
889	Van der Have H66901 LL	2.37	3.92	5.22	6.05	5.88	6.70	5.03				
856	Van der Have H68108(Aph Spec)	1.96	2.45	3.43	4.33	4.90	5.39	3.74	3.69	3.70	3.63	3.73
823	Van der Have H68151(Aph Spec)(NC)	1.88	2.77	3.60	4.41	4.73	4.90	3.72	3.82		3.92	
775	Van der Have H68152(Rzm-Aph Spec)(NC)	2.28	3.26	4.73	5.47	5.56	5.88	4.54	4.58		4.62	
726	Van der Have H68181(Aph Spec)	1.79	3.11	4.09	4.66	4.58	4.73	3.82				
	Trial Mean	2.21	3.50	4.55	5.56	5.92	6.22	4.66				
	CV	15%	15%	12%	10%	10%	9%	8%				
	LSD .05	0.37	0.59	0.64	0.61	0.68	0.63	0.43				

* Lower numbers indicate better Cercospora resistance (1-Ex,9=Poor).
* Ratings adjusted to 5.5 equivalent.
**Average of ratings from 7/28 and 8/2.
***Average of ratings from 8/17 and 8/20.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Commercial Coded Trial - Lattice
Trial 995601, Hector, MN
Planting Date: 04/29/1999 Harvest Date: 10/08/1999
42 Entries 6 Replications 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %				1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val		Mean	%	P-val
Beta 3945	95	307.77	109	0.00	6498.96	101	0.78	1.22	95	0.11	21.11	93	0.05	16.60	107	0.00	2	282.01	82	0.01
Beta 4705 (M705)	89	291.79	103	0.12	6303.82	98	0.83	1.32	102	0.57	21.71	96	0.21	15.90	103	0.08	3	340.38	99	0.86
Beta 5014	112	302.36	107	0.00	6091.22	95	0.19	1.24	96	0.26	20.19	89	0.00	16.37	106	0.00	3	346.41	100	0.95
Beta 5296	117	301.13	106	0.00	6320.09	98	0.67	1.23	95	0.14	20.99	92	0.03	16.28	105	0.00	2	296.68	86	0.06
Beta 6863	104	310.63	110	0.00	6182.31	96	0.34	1.18	92	0.01	19.95	88	0.00	16.72	108	0.00	2	299.25	87	0.07
Beta 6904	85	303.73	107	0.00	6529.52	102	0.69	1.20	93	0.04	21.57	95	0.16	16.39	105	0.00	3	344.10	100	0.97
Beta M701	97	292.32	103	0.10	6689.94	104	0.30	1.21	94	0.07	22.87	101	0.86	15.83	102	0.14	3	306.22	89	0.13
Beta M703	86	302.88	107	0.00	7292.76	113	0.00	1.27	99	0.69	24.06	106	0.11	16.41	106	0.00	3	329.48	96	0.54
Beta M706	106	285.50	101	0.68	6607.11	103	0.45	1.33	103	0.37	23.13	102	0.63	15.60	101	0.55	3	320.64	92	0.34
Beta M811	118	280.10	99	0.56	6108.66	95	0.21	1.23	95	0.17	21.79	96	0.29	15.24	99	0.38	3	337.49	98	0.77
Beta M846	99	283.95	100	0.90	6042.41	94	0.13	1.36	105	0.10	21.23	93	0.07	15.56	101	0.67	3	311.75	90	0.19
Beta M900	79	279.87	99	0.53	6216.38	97	0.41	1.31	101	0.67	22.22	98	0.53	15.30	99	0.54	3	361.38	105	0.51
Crystal 205	101	282.15	100	0.83	5943.57	92	0.06	1.31	101	0.70	21.05	93	0.04	15.41	100	0.85	3	332.48	96	0.62
Crystal 302	84	276.52	98	0.21	6132.73	95	0.25	1.45	112	0.00	22.17	98	0.49	15.27	99	0.46	4	412.38	120	0.01
Crystal 309	116	280.32	99	0.58	6193.27	96	0.36	1.31	101	0.76	22.15	97	0.48	15.31	99	0.57	3	328.92	95	0.53
Crystal 555	105	278.68	98	0.40	5849.82	91	0.02	1.22	95	0.11	21.01	92	0.04	15.16	98	0.23	3	307.31	89	0.14
Crystal 922	109	284.99	101	0.75	6629.80	103	0.42	1.19	92	0.02	23.27	102	0.51	15.44	100	0.97	3	317.08	92	0.27
Crystal 9744	93	284.78	101	0.78	6185.24	96	0.34	1.20	93	0.03	21.75	96	0.23	15.44	100	0.95	2	296.98	86	0.06
HM 7057	120	288.33	102	0.35	5965.35	93	0.07	1.21	94	0.06	20.68	91	0.01	15.62	101	0.50	2	295.30	86	0.05
HM 7073	100	288.09	102	0.37	5807.85	90	0.02	1.25	97	0.38	20.10	88	0.00	15.65	101	0.43	3	346.80	101	0.94
HM Hector	103	293.82	104	0.05	6323.85	98	0.69	1.28	99	0.86	21.49	95	0.13	15.98	103	0.04	3	325.98	95	0.45
HM Resist	88	289.27	102	0.27	6816.09	106	0.13	1.21	94	0.07	23.68	104	0.25	15.67	101	0.38	3	321.07	93	0.34
HM Viking	81	267.96	95	0.01	5964.10	93	0.07	1.42	110	0.00	22.21	98	0.52	14.82	96	0.01	4	429.99	125	0.00
Holly 98 Aph03	83	276.19	97	0.19	6264.49	97	0.52	1.47	114	0.00	22.67	100	0.95	15.28	99	0.47	3	366.25	105	0.40
Holly 98HX806	114	267.90	95	0.00	6970.41	108	0.03	1.33	103	0.42	26.01	114	0.00	14.73	95	0.00	3	398.35	115	0.04
Holly 98HX829	96	292.57	103	0.09	7264.26	113	0.00	1.19	92	0.02	24.81	109	0.01	15.83	102	0.14	2	299.86	87	0.06
Holly 99HX933	90	286.59	101	0.54	6489.62	101	0.80	1.30	100	0.89	22.68	100	0.95	15.62	101	0.51	3	333.85	97	0.66
Holly 99HX941	108	263.96	93	0.00	6708.16	104	0.27	1.35	104	0.21	25.43	112	0.00	14.54	94	0.00	4	437.58	127	0.00
Holly 99HX942	115	274.77	97	0.12	7025.50	109	0.02	1.25	97	0.37	25.65	113	0.00	14.99	97	0.06	3	358.66	104	0.59
Holly 99HX957	98	269.66	95	0.01	6415.89	100	0.97	1.44	112	0.00	23.82	105	0.18	14.93	97	0.03	4	450.00	130	0.00
Holly 99HX958	111	273.30	96	0.07	6938.27	108	0.04	1.43	111	0.00	25.42	112	0.00	15.09	98	0.15	4	436.06	126	0.00
Holly Rival	91	260.28	92	0.00	5690.87	89	0.00	1.46	113	0.00	21.87	96	0.29	14.46	94	0.00	3	334.37	97	0.68
Seedex SX Laser	119	262.31	93	0.00	5447.73	85	0.00	1.28	99	0.86	20.79	91	0.02	14.40	93	0.00	3	323.63	94	0.40
Seedex SX1012	87	281.05	99	0.68	6039.38	94	0.13	1.26	98	0.50	21.47	94	0.13	15.32	99	0.58	3	354.00	103	0.72
Seedex SX1018	102	274.99	97	0.13	5791.73	90	0.01	1.35	104	0.19	21.03	93	0.04	15.10	98	0.15	3	317.60	92	0.28
Van der Have H46109	94	295.65	104	0.02	7595.51	118	0.00	1.24	96	0.20	25.77	113	0.00	16.02	104	0.02	2	278.03	81	0.01
Van der Have H46140	110	291.52	103	0.13	6929.81	108	0.05	1.16	90	0.00	23.77	105	0.20	15.74	102	0.25	2	285.67	83	0.02
Van der Have H46175	82	260.20	92	0.00	7043.09	110	0.02	1.30	101	0.83	27.08	119	0.00	14.32	93	0.00	4	401.58	116	0.03
Van der Have H46177	107	292.42	103	0.09	6532.02	102	0.68	1.23	96	0.19	22.29	98	0.59	15.85	103	0.11	2	294.99	85	0.05
Van der Have H68108	80	277.04	98	0.25	6855.91	107	0.09	1.38	107	0.03	24.76	109	0.01	15.24	99	0.38	3	369.42	107	0.33
Van der Have H68151	113	272.58	96	0.06	6710.61	104	0.26	1.28	99	0.70	24.62	108	0.02	14.91	96	0.03	3	390.46	113	0.07
Van der Have H68152	92	267.96	95	0.01	6507.97	101	0.75	1.37	106	0.07	24.34	107	0.05	14.77	96	0.01	4	469.38	136	0.00
Check of Mean		283.28			6426.62			1.29			22.73			15.46		3.00		344.94		
Coeff. Of Var (%)		4.51			9.36			7.86			8.49			3.81				17.12		
F Value		5.57**			3.50**			3.72**			4.93**			5.59**				3.71**		
Mean LSD (0.05)		15.25	5		715.17	11		0.12	9		2.30	10		0.70	5			71.12	21	
Mean LSD (0.01)		20.11	7		943.22	15		0.16	12		3.04	13		0.92	6			93.80	27	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Boltars %			1999 Emergence (%)			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	2043.55	96	0.23	301.42	97	0.69	0.00			45.37	99	0.94	4.36	85	0.37
Beta 4705 (M705)	89	2217.27	104	0.22	305.00	99	0.83	0.00			55.94	122	0.03	4.67	91	0.59
Beta 5014	112	2005.31	94	0.08	305.05	99	0.83	0.00			38.80	85	0.15	3.32	65	0.04
Beta 5296	117	2019.36	95	0.12	306.24	99	0.87	0.00			44.94	98	0.87	5.07	99	0.93
Beta 6863	104	1887.77	89	0.00	306.74	99	0.89	0.00			45.35	99	0.93	4.45	87	0.43
Beta 6904	85	2039.28	96	0.20	266.36	86	0.04	0.00			48.76	107	0.53	6.27	122	0.20
Beta M701	97	2031.36	95	0.17	291.85	94	0.39	0.00			44.40	97	0.78	4.45	86	0.42
Beta M703	86	2022.58	95	0.13	331.11	107	0.29	0.00			42.26	92	0.47	4.81	93	0.70
Beta M706	106	2238.17	105	0.13	322.59	104	0.52	0.00			50.54	110	0.32	8.88	172	0.00
Beta M811	118	2152.52	101	0.75	259.61	84	0.01	0.00			61.70	135	0.00	4.53	88	0.48
Beta M846	99	2165.79	102	0.61	366.10	118	0.01	0.00			43.65	95	0.66	3.47	67	0.06
Beta M900	79	2163.62	102	0.64	309.86	100	0.98	0.00								
Crystal 205	101	2115.00	99	0.84	329.96	107	0.31	0.00			49.21	108	0.47	5.39	105	0.78
Crystal 302	84	2386.44	112	0.00	336.04	109	0.19	0.00			46.61	102	0.88	3.79	74	0.12
Crystal 309	116	2133.75	100	0.96	325.10	105	0.44	0.00			46.24	101	0.92	2.78	54	0.01
Crystal 555	105	1962.53	92	0.02	313.52	101	0.84	0.00			36.48	80	0.05	4.72	92	0.63
Crystal 922	109	2022.70	95	0.13	269.58	87	0.05	0.00			47.75	104	0.68	3.47	67	0.06
Crystal 9744	93	2044.27	96	0.23	274.97	89	0.09	0.00			30.59	67	0.00	3.49	68	0.06
HM 7057	120	1936.05	91	0.01	312.83	101	0.87	0.00			53.55	117	0.10	4.82	94	0.71
HM 7073	100	2175.44	102	0.52	269.03	87	0.05	0.00			48.91	107	0.51	8.47	165	0.00
HM Hector	103	2046.39	96	0.24	333.63	108	0.24	0.00			37.23	81	0.02	7.12	138	0.02
HM Resist	88	2056.24	97	0.31	274.77	89	0.09	0.00			58.38	128	0.01	5.96	116	0.35
HM Viking	81	2272.37	107	0.05	345.51	112	0.08	0.00			55.03	120	0.05	4.99	97	0.86
Holly 98 Aph03	83	2407.93	113	0.00	365.28	118	0.01	0.00			45.39	99	0.94	2.16	42	0.00
Holly 98HX806	114	2129.28	100	1.00	316.47	102	0.73	0.00			47.32	103	0.74	3.46	67	0.05
Holly 98HX829	96	2081.42	98	0.50	261.27	84	0.02	0.00			37.12	81	0.07	4.34	84	0.36
Holly 99HX933	90	2197.13	103	0.34	300.78	97	0.87	0.27			36.12	79	0.05	5.74	112	0.50
Holly 99HX941	108	2232.47	105	0.15	291.55	94	0.38	0.00			43.26	95	0.60	9.79	190	0.00
Holly 99HX942	115	2025.92	95	0.14	301.19	97	0.68	0.00			41.30	90	0.35	5.56	108	0.64
Holly 99HX957	98	2348.91	110	0.00	326.77	106	0.34	0.00			33.15	72	0.01	3.69	72	0.10
Holly 99HX958	111	2308.62	108	0.01	334.44	108	0.22	0.00			46.70	102	0.84	7.04	137	0.03
Holly Rival	91	2436.90	114	0.00	363.57	117	0.01	0.00			41.25	90	0.35	5.73	111	0.50
Seedex SX Laser	119	2155.06	101	0.72	306.07	99	0.87	0.00			51.20	112	0.29	5.30	103	0.86
Seedex SX1012	87	2052.60	96	0.28	304.69	98	0.81	0.00			38.25	84	0.12	4.13	80	0.25
Seedex SX1018	102	2196.37	103	0.35	344.03	111	0.09	0.00			43.42	95	0.63	7.15	139	0.02
Van der Have H46109	94	2123.11	100	0.93	292.00	94	0.39	0.00			58.72	128	0.01	5.29	103	0.87
Van der Have H46140	110	1964.30	92	0.02	274.48	89	0.09	0.00			42.21	92	0.46	4.94	96	0.81
Van der Have H46175	82	2074.10	97	0.43	311.49	101	0.92	0.00			44.98	98	0.87	4.36	85	0.37
Van der Have H46177	107	2109.82	99	0.78	287.37	93	0.26	0.00			46.14	101	0.93	5.92	115	0.38
Van der Have H68108	80	2190.20	103	0.39	355.29	115	0.03	0.00			51.51	113	0.23	4.22	82	0.29
Van der Have H68151	113	2057.48	97	0.31	297.70	96	0.56	0.00			50.56	111	0.32	5.15	100	1.00
Van der Have H68152	92	2213.20	104	0.24	303.90	98	0.78	0.00			42.32	93	0.47	6.25	122	0.21
											48.77	107	0.53	6.62	129	0.09
Check of Mean		2129.62			309.46											
Coeff. Of Var (%)		7.84			15.57						45.75			5.15		
F Value		3.23**			1.90**						24.82			40.54		
Mean LSD (0.05)		199.96	9		57.31	19					1.93**			3.22**		
Mean LSD (0.01)		263.74	12		75.59	24					13.49	29		2.46	48	
											17.79	39		3.25	63	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Commercial Coded Trial - Lattice
Trial 995402, Lake Lillian, MN
Planting Date: 04/28/1999 Harvest Date: 10/05/1999
42 Entries 6 Replications 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	316.66	112	0.00	7062.64	109	0.03	1.21	96	0.62	22.34	97	0.42	17.04	111	0.00	323.45	78	0.00
Beta 4705 (M705)	89	281.80	100	0.95	5921.37	91	0.04	1.32	107	0.05	21.08	92	0.02	15.41	100	0.76	476.95	111	0.17
Beta 5014	112	300.28	106	0.00	6449.06	100	0.91	1.13	91	0.01	21.47	93	0.06	16.15	105	0.00	438.60	102	0.76
Beta 5296	117	291.32	103	0.07	5877.79	91	0.02	1.16	94	0.07	20.06	87	0.00	15.73	103	0.11	353.80	83	0.04
Beta 6863	104	296.95	105	0.00	5916.63	91	0.03	1.11	90	0.00	19.86	86	0.00	15.96	104	0.01	364.73	85	0.08
Beta 6904	85	304.89	108	0.00	6751.62	104	0.31	1.15	93	0.05	22.12	96	0.27	16.39	107	0.00	390.11	91	0.29
Beta M701	97	300.53	107	0.00	7543.74	116	0.00	1.20	98	0.48	25.13	109	0.01	16.23	106	0.00	350.39	82	0.03
Beta M703	86	296.35	105	0.01	7384.17	114	0.00	1.14	92	0.03	24.94	109	0.01	15.96	104	0.01	382.40	85	0.07
Beta M706	106	285.61	101	0.50	6803.61	105	0.22	1.27	103	0.35	23.62	104	0.29	15.56	101	0.35	484.65	109	0.30
Beta M811	118	282.26	100	0.97	6100.61	94	0.15	1.13	92	0.02	21.45	93	0.09	15.25	99	0.70	426.28	100	0.96
Beta M846	99	274.37	97	0.14	5950.26	92	0.05	1.30	105	0.14	21.74	95	0.12	15.02	98	0.18	491.37	115	0.08
Beta M900	79	282.35	100	0.96	6452.35	100	0.91	1.09	88	0.00	22.72	99	0.74	15.22	99	0.61	415.63	97	0.73
Crystal 205	101	272.72	97	0.07	6202.70	96	0.29	1.26	102	0.63	22.63	98	0.66	14.89	97	0.06	422.40	99	0.88
Crystal 302	84	281.51	100	0.91	6585.65	102	0.69	1.33	108	0.02	23.35	102	0.65	15.42	101	0.73	417.22	97	0.76
Crystal 309	116	284.31	101	0.67	6457.62	100	0.93	1.33	108	0.03	22.66	99	0.68	15.54	101	0.39	409.74	96	0.61
Crystal 555	105	283.13	100	0.84	6483.19	100	0.99	1.24	101	0.88	23.00	100	0.98	15.41	100	0.76	357.97	84	0.05
Crystal 922	109	286.17	101	0.43	6141.97	95	0.20	1.08	87	0.00	21.40	93	0.05	15.38	100	0.88	374.68	88	0.14
Crystal 9744	93	276.80	98	0.31	6011.48	93	0.08	1.15	93	0.05	21.71	94	0.11	14.99	98	0.14	348.37	81	0.03
HM 7057	120	291.99	104	0.06	5905.39	91	0.03	1.13	91	0.02	20.09	87	0.00	15.72	103	0.11	372.56	87	0.12
HM 7073	100	285.09	101	0.56	6039.02	93	0.10	1.27	103	0.35	21.19	92	0.02	15.53	101	0.43	380.58	89	0.18
HM Hector	103	290.89	103	0.09	6467.08	100	0.96	1.22	99	0.60	22.23	97	0.34	15.77	103	0.07	367.23	86	0.09
HM Resist	88	289.51	103	0.15	7127.81	110	0.01	1.15	93	0.04	24.64	107	0.04	15.61	102	0.26	444.78	104	0.64
HM Viking	81	286.96	102	0.35	5970.64	92	0.05	1.27	103	0.42	20.61	90	0.00	15.62	102	0.24	483.03	113	0.12
Holly 98 Aph03	83	265.90	94	0.00	6694.17	103	0.42	1.43	116	0.00	25.11	109	0.01	14.72	96	0.01	545.29	128	0.00
Holly 98HX806	114	278.98	99	0.55	5937.75	92	0.04	1.23	100	0.92	21.29	93	0.03	15.18	99	0.50	443.83	104	0.66
Holly 98HX829	96	289.34	103	0.16	7254.14	112	0.00	1.14	93	0.04	25.08	109	0.01	15.61	102	0.25	388.37	90	0.24
Holly 99HX933	90	287.47	102	0.30	6388.41	99	0.72	1.24	101	0.83	22.21	97	0.33	15.61	102	0.25	409.42	96	0.60
Holly 99HX941	108	254.48	90	0.00	6341.74	98	0.60	1.29	105	0.18	25.05	109	0.01	14.02	91	0.00	641.30	150	0.00
Holly 99HX942	115	273.71	97	0.10	6996.28	108	0.05	1.24	101	0.81	25.54	111	0.00	14.94	97	0.09	440.51	103	0.72
Holly 99HX957	98	256.96	91	0.00	6486.23	100	0.98	1.40	114	0.00	25.24	110	0.00	14.26	93	0.00	657.14	154	0.00
Holly 99HX958	111	252.17	89	0.00	6387.18	99	0.72	1.50	122	0.00	25.47	111	0.00	14.11	92	0.00	650.32	152	0.00
Holly Rival	91	261.18	93	0.00	5470.57	84	0.00	1.39	113	0.00	20.90	91	0.01	14.44	94	0.00	348.75	81	0.03
Seedex SX Laser	119	275.09	98	0.18	6057.37	93	0.11	1.27	103	0.35	21.94	95	0.19	15.02	98	0.19	335.82	78	0.01
Seedex SX1012	87	290.10	103	0.12	6121.34	94	0.17	1.14	92	0.02	21.07	92	0.02	15.65	102	0.20	368.09	86	0.00
Seedex SX1018	102	274.96	97	0.17	6510.94	100	0.91	1.26	102	0.58	23.63	103	0.41	15.00	98	0.16	396.01	93	0.37
Van der Have H46109	94	291.23	103	0.09	7127.45	110	0.02	1.15	93	0.04	24.57	107	0.05	15.71	102	0.12	384.74	85	0.06
Van der Have H46140	110	293.05	104	0.03	6918.25	107	0.10	1.14	93	0.04	23.59	103	0.44	15.80	103	0.05	383.53	85	0.07
Van der Have H46175	82	261.05	93	0.00	6821.19	105	0.20	1.18	96	0.09	24.09	114	0.00	14.21	93	0.00	483.60	113	0.12
Van der Have H46177	107	293.42	104	0.02	6915.98	107	0.10	1.13	92	0.02	23.45	103	0.55	15.79	103	0.06	341.69	80	0.02
Van der Have H68108	80	269.96	96	0.02	6636.40	102	0.56	1.39	112	0.00	24.47	106	0.06	14.88	97	0.06	533.23	125	0.00
Van der Have H68151	113	276.99	98	0.33	6798.92	105	0.23	1.31	106	0.07	24.47	106	0.06	15.15	99	0.43	467.48	114	0.10
Van der Have H68152	92	259.36	92	0.00	6715.05	104	0.38	1.37	111	0.00	25.89	113	0.00	14.33	93	0.00	537.28	126	0.00
Check of Mean		282.09			6480.57			1.23			22.98			15.34			427.95		
Coeff. Of Var (%)		4.33			9.59			8.57			8.23			3.70			19.94		
F Valu		7.56**			3.33**			5.55**			5.20**			7.21**			5.71**		
Mean LSD (0.05)		14.53	5		744.44	11		0.12	10		2.23	10		0.68	4		100.22	23	
Mean LSD (0.01)		19.16	7		981.85	15		0.16	13		2.94	13		0.89	6		132.17	31	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Emergence (%)			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	1923.03	104	0.25	309.08	101	0.93	0.00			40.53	97	0.82	3.67	84	0.28
Beta 4705 (M705)	89	2028.07	109	0.00	306.90	100	0.98	0.00			32.29	77	0.07	3.96	91	0.54
Beta 5014	112	1723.77	93	0.04	255.49	83	0.01	0.00			51.86	124	0.06	4.69	108	0.59
Beta 5296	117	1729.12	93	0.04	306.16	100	0.95	0.53			42.49	102	0.89	4.81	111	0.46
Beta 6863	104	1583.04	85	0.00	305.66	99	0.93	0.00			27.85	67	0.01	4.69	108	0.59
Beta 6904	85	1718.84	93	0.03	289.39	94	0.33	0.00			43.29	104	0.77	4.27	98	0.90
Beta M701	97	1789.99	97	0.30	328.68	107	0.25	0.00			34.31	82	0.16	3.70	85	0.30
Beta M703	86	1649.90	89	0.00	312.27	102	0.79	0.00			31.65	76	0.06	4.11	95	0.71
Beta M706	106	1907.87	103	0.37	313.36	102	0.75	0.00			41.71	100	0.99	3.89	89	0.48
Beta M811	118	1806.72	98	0.45	243.04	79	0.00	0.00			56.04	134	0.01	3.94	91	0.52
Beta M846	99	1835.70	99	0.78	343.00	112	0.06	0.00			44.06	106	0.66	4.48	103	0.84
Beta M900	79	1648.65	89	0.00	255.23	83	0.01	0.00			53.65	129	0.02	5.82	134	0.02
Crystal 205	101	1892.82	102	0.51	312.66	102	0.78	0.00			45.81	109	0.46	6.93	159	0.00
Crystal 302	84	2035.83	110	0.00	341.67	111	0.07	0.00			57.43	138	0.00	4.51	104	0.80
Crystal 309	116	2136.56	115	0.00	309.32	101	0.92	0.00			56.70	136	0.00	3.81	88	0.40
Crystal 555	105	1808.29	98	0.47	264.43	115	0.01	0.00			33.98	81	0.14	4.24	97	0.86
Crystal 922	109	1626.34	88	0.00	263.40	86	0.02	0.00			38.84	93	0.58	5.90	136	0.01
Crystal 9744	93	1782.65	96	0.25	295.00	96	0.51	0.00			61.88	148	0.00	5.12	118	0.22
HM 7057	120	1619.75	87	0.00	301.32	98	0.75	0.00			40.30	97	0.76	4.73	109	0.54
HM 7073	100	2004.73	108	0.01	315.41	103	0.66	0.00			39.91	96	0.73	4.78	110	0.50
HM Hector	103	1840.85	99	0.85	326.42	106	0.31	0.00			47.48	114	0.28	3.70	85	0.31
HM Resist	88	1657.62	89	0.00	282.39	92	0.18	0.00			52.17	125	0.05	4.12	95	0.72
HM Viking	81	1822.52	98	0.62	322.20	105	0.42	0.00			39.54	95	0.67	4.73	109	0.55
Holly 98 Aph03	83	1869.09	101	0.79	407.92	133	0.00	0.00			47.27	113	0.29	4.52	104	0.78
Holly 98HX806	114	1801.20	97	0.40	310.98	101	0.84	0.00			36.07	86	0.28	4.11	94	0.70
Holly 98HX829	96	1812.57	98	0.51	287.23	87	0.03	0.00			47.61	114	0.26	5.26	121	0.15
Holly 99HX933	90	1942.78	105	0.14	296.67	97	0.57	0.00			33.16	79	0.10	3.54	81	0.20
Holly 99HX941	108	1856.83	100	0.95	270.36	88	0.05	0.00			31.14	75	0.04	3.08	71	0.05
Holly 99HX942	115	1876.60	101	0.69	302.65	98	0.80	0.00			38.55	92	0.54	4.70	108	0.58
Holly 99HX957	98	1979.05	107	0.04	323.23	105	0.39	0.00			26.74	64	0.00	3.55	82	0.21
Holly 99HX958	111	2126.86	115	0.00	359.34	117	0.01	0.00			35.65	85	0.25	3.49	80	0.17
Holly Rival	91	2180.14	118	0.00	375.85	122	0.00	0.27			36.44	87	0.31	5.25	121	0.15
Seedex SX Laser	119	1973.03	106	0.05	333.75	109	0.16	0.00			45.25	108	0.51	3.19	73	0.07
Seedex SX1012	87	1743.94	94	0.08	285.75	93	0.25	0.00			52.50	126	0.04	3.85	89	0.43
Seedex SX1018	102	1884.38	102	0.60	330.70	108	0.21	0.00			38.81	93	0.58	4.53	104	0.77
Van der Have H46109	94	1866.77	102	0.58	256.05	83	0.01	0.00			45.02	108	0.53	3.24	75	0.08
Van der Have H46140	110	1883.47	102	0.61	252.88	82	0.00	0.00			36.42	87	0.31	5.85	135	0.02
Van der Have H46175	82	1759.08	95	0.13	252.82	82	0.00	0.00			46.16	111	0.40	4.58	105	0.71
Van der Have H46177	107	1821.24	98	0.61	263.29	86	0.02	0.00			32.96	79	0.09	4.66	107	0.62
Van der Have H68108	80	1945.73	105	0.13	364.63	119	0.00	0.27			32.54	78	0.08	4.55	105	0.76
Van der Have H68151	113	1940.89	105	0.15	318.67	104	0.54	0.00			41.65	100	0.99	3.14	72	0.06
Van der Have H68152	92	1956.46	106	0.09	342.32	112	0.05	0.00			36.01	86	0.27	2.97	68	0.03
Check of Mean		1852.69			307.35						41.75			4.35		
Coeff. Of Var (%)		7.79			14.94						29.62			35.74		
F Valu		5.14**			3.89**						2.52**			1.74**		
Mean LSD (0.05)		171.91	9		52.39	17					14.79	35		1.78	41	
Mean LSD (0.01)		226.72	12		69.09	22					19.50	47		2.35	54	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Commercial Coded Trial - Lattice
Trial 995603, Clara City, MN
Planting Date: 04/28/1999 Harvest Date: 10/06/1999
42 Entries 6 Replications 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	308.34	107	0.00	6684.25	99	0.67	1.18	96	0.16	21.63	92	0.01	16.60	106	0.00	426.62	88	0.17
Beta 4705 (M705)	89	294.15	102	0.24	6947.78	102	0.49	1.25	100	0.98	23.50	100	0.89	15.95	102	0.20	495.92	102	0.79
Beta 5014	112	295.53	103	0.16	6592.71	97	0.42	1.26	100	0.95	22.43	95	0.12	16.02	102	0.12	515.68	106	0.47
Beta 5296	117	289.46	101	0.76	6093.96	90	0.00	1.26	101	0.78	20.98	89	0.00	15.73	101	0.70	455.84	94	0.50
Beta 6863	104	314.11	109	0.00	6396.70	94	0.10	1.11	89	0.00	20.53	87	0.00	16.82	108	0.00	396.26	82	0.04
Beta 6904	85	300.81	105	0.02	6644.51	98	0.56	1.19	95	0.20	22.05	93	0.04	16.23	104	0.02	488.90	101	0.92
Beta M701	97	297.28	103	0.08	7315.33	108	0.03	1.28	101	0.82	24.61	104	0.19	16.12	103	0.05	450.39	93	0.42
Beta M703	86	296.91	103	0.09	8037.24	118	0.00	1.24	99	0.79	26.92	114	0.00	16.08	103	0.07	529.31	109	0.30
Beta M706	106	289.48	101	0.76	6694.30	99	0.70	1.33	106	0.08	23.18	98	0.57	15.80	101	0.52	502.07	104	0.69
Beta M811	118	288.77	100	0.86	6974.78	103	0.42	1.22	98	0.56	24.12	102	0.51	15.66	100	0.95	609.53	126	0.00
Beta M946	99	291.52	101	0.49	6827.23	98	0.51	1.25	100	0.95	22.72	96	0.24	15.83	101	0.48	430.26	89	0.20
Beta M930	79	289.59	101	0.74	6654.62	96	0.59	1.17	94	0.08	23.06	98	0.47	15.55	100	0.97	423.37	87	0.15
Crystal 205	101	290.29	101	0.65	6820.88	101	0.86	1.15	92	0.04	23.50	100	0.89	15.66	100	0.92	391.04	81	0.03
Crystal 302	84	297.10	103	0.08	7160.17	106	0.12	1.33	107	0.07	24.67	102	0.54	16.19	104	0.02	481.68	99	0.94
Crystal 309	116	291.45	101	0.50	6798.89	100	0.95	1.24	100	0.95	23.36	99	0.74	15.81	101	0.47	445.18	92	0.35
Crystal 555	106	304.20	106	0.00	6858.70	101	0.76	1.22	98	0.57	22.60	96	0.18	16.44	105	0.00	349.27	72	0.00
Crystal 922	106	286.65	100	0.82	5999.72	88	0.00	1.17	94	0.09	20.99	89	0.00	15.51	99	0.58	426.31	88	0.17
Crystal 9744	93	289.17	100	0.80	6795.26	100	0.96	1.23	98	0.67	23.65	100	0.96	15.69	100	0.84	412.48	85	0.09
HM 7057	120	287.39	100	0.93	6606.59	97	0.34	1.24	99	0.84	22.71	96	0.24	15.61	100	0.96	420.36	87	0.13
HM 7073	100	280.51	97	0.17	6186.74	91	0.01	1.33	106	0.09	22.06	93	0.04	15.35	98	0.23	565.73	117	0.06
HM Hector	103	297.96	104	0.06	6396.41	94	0.10	1.20	96	0.25	21.57	91	0.01	16.10	103	0.06	397.44	82	0.04
HM Resist	88	297.89	103	0.06	7125.28	105	0.15	1.23	98	0.60	23.91	101	0.70	16.12	103	0.05	539.43	111	0.20
HM Viking	81	282.02	98	0.27	6545.37	96	0.32	1.34	108	0.04	22.31	99	0.70	15.44	99	0.42	556.19	115	0.10
Holly 98 Aph03	83	278.24	97	0.07	7421.86	109	0.01	1.31	105	0.18	26.63	113	0.00	15.22	97	0.09	512.48	106	0.52
Holly 98HX806	114	294.53	102	0.22	6669.07	98	0.63	1.20	97	0.33	22.62	96	0.19	15.94	102	0.22	451.06	93	0.43
Holly 98HX829	96	294.66	102	0.22	7349.78	108	0.02	1.17	94	0.08	24.94	106	0.09	15.90	102	0.29	406.46	84	0.07
Holly 98HX933	90	287.97	100	0.98	6498.25	96	0.23	1.30	104	0.26	22.34	95	0.09	15.69	100	0.84	477.06	98	0.66
Holly 99HX941	108	248.82	86	0.00	5910.30	87	0.46	1.40	112	0.00	28.54	112	0.00	13.84	88	0.00	786.92	162	0.00
Holly 99HX942	115	280.46	97	0.18	6558.93	97	0.34	1.27	102	0.67	23.41	99	0.79	15.30	98	0.18	515.29	106	0.48
Holly 99HX957	98	271.89	94	0.00	6819.89	101	0.68	1.36	109	0.01	25.33	107	0.03	14.95	96	0.00	617.50	127	0.00
Holly 99HX958	111	261.31	91	0.00	6980.32	103	0.41	1.43	114	0.00	26.67	113	0.00	14.49	93	0.00	664.20	137	0.00
Holly Rival	91	274.61	95	0.01	5729.65	84	0.00	1.37	110	0.01	20.78	88	0.00	15.10	97	0.03	427.65	88	0.18
Seedex SX Laser	119	282.76	98	0.34	6515.08	96	0.26	1.18	95	0.15	22.99	97	0.41	15.32	98	0.19	402.16	83	0.05
Seedex SX1012	81	290.22	101	0.66	6714.99	99	0.77	1.17	94	0.08	23.11	98	0.51	15.68	100	0.87	425.95	88	0.17
Seedex SX1018	102	276.04	96	0.03	7121.74	105	0.18	1.31	105	0.15	25.67	109	0.01	15.10	97	0.03	527.94	109	0.31
Van der Have H46109	94	304.08	106	0.00	7136.45	105	0.14	1.14	92	0.02	23.56	100	0.90	16.35	105	0.00	347.82	72	0.00
Van der Have H46140	110	293.03	102	0.33	6493.10	96	0.22	1.12	90	0.01	22.28	94	0.09	15.78	101	0.66	398.38	82	0.04
Van der Have H46175	82	262.89	91	0.00	6676.25	98	0.69	1.29	100	0.90	25.03	106	0.01	14.39	92	0.00	583.07	120	0.02
Van der Have H46177	107	299.91	104	0.02	7522.64	111	0.00	1.12	90	0.01	24.95	106	0.06	16.12	103	0.05	354.41	73	0.00
Van der Have H68108	80	271.66	94	0.00	7232.59	107	0.06	1.38	111	0.00	26.53	112	0.00	14.97	96	0.01	662.12	137	0.00
Van der Have H68151	113	276.32	96	0.03	6525.43	96	0.28	1.29	104	0.30	23.58	100	0.97	15.11	97	0.03	549.54	113	0.13
Van der Have H68152	92	280.28	97	0.15	7493.81	110	0.00	1.34	99	0.78	26.86	114	0.00	15.25	98	0.11	544.63	112	0.16
Check of Mean		287.85			6784.51			1.25			23.61			15.64			484.81		
Coeff. Of Var (%)		4.49			8.23			8.66			7.59			3.60			21.02		
F Valu		5.81**			3.38**			3.01**			5.29**			5.80**			4.77**		
Mean LSD (0.05)		14.97	5		670.94	10		0.13	10		2.14	9		0.69	4		120.27	25	
Mean LSD (0.01)		19.74	7		884.94	13		0.17	13		2.82	12		0.90	6		158.61	33	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Boltars %			1999 Emergence (%)			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	1916.61	99	0.81	252.04	91	0.19	0.00			64.79	103	0.83	3.53	110	0.55
Beta 4705 (M705)	89	1999.23	103	0.34	252.22	91	0.20	0.00			51.57	82	0.00	3.26	93	0.68
Beta 5014	112	1836.84	94	0.07	293.56	106	0.33	0.00			71.09	113	0.02	3.04	87	0.42
Beta 5296	117	1865.56	96	0.32	314.14	114	0.04	0.00			68.96	109	0.09	3.03	87	0.40
Beta 6863	104	1730.57	90	0.00	263.23	95	0.49	0.00			54.46	86	0.01	4.94	141	0.01
Beta 6904	85	1871.31	97	0.37	244.11	89	0.08	0.00			65.00	103	0.59	3.95	113	0.42
Beta M701	97	1877.75	97	0.42	309.54	112	0.06	0.00			57.00	90	0.08	2.26	65	0.03
Beta M703	86	1721.95	89	0.00	305.79	111	0.10	0.00			64.19	102	0.78	3.30	94	0.73
Beta M706	106	2049.82	106	0.09	299.46	109	0.19	0.00			60.01	95	0.36	2.74	78	0.18
Beta M811	118	1748.57	90	0.01	256.25	94	0.34	0.00			66.06	106	0.15	4.95	142	0.01
Beta M946	99	2002.24	104	0.32	283.83	103	0.65	0.00			65.38	104	0.52	3.19	91	0.58
Beta M930	79	1875.33	97	0.40	257.12	93	0.31	0.00			62.30	99	0.81	3.57	102	0.89
Crystal 205	101	1858.55	96	0.28	257.86	94	0.33	0.00			74.79	118	0.00	3.52	101	0.97
Crystal 302	84	1997.41	103	0.35	322.82	117	0.01	0.00			71.82	114	0.01	4.19	120	0.22
Crystal 309	116	2055.41	106	0.08	257.09	93	0.31	0.00			69.32	110	0.07	3.22	92	0.53
Crystal 555	106	1774.25	92	0.02	349.02	127	0.00	0.00			67.83	107	0.18	4.61	132	0.05
Crystal 922	106	1825.71	94	0.12	264.14	96	0.53	0.00			63.65	101	0.84	5.06	145	0.01
Crystal 9744	93	1962.21	101	0.66	282.45	102	0.71	0.00			76.32	121	0.00	4.96	131	0.06
HM 7057	120	1825.03	94	0.12	319.33	116	0.02	0.00			61.07	97	0.55	3.54	101	0.94
HM 7073	100	2133.21	110	0.00	253.18	92	0.22	0.00			70.44	112	0.04	3.86	110	0.51
HM Hector	103	1962.65	102	0.67	258.93	94	0.36	0.00			72.93	115	0.00	3.67	105	0.76
HM Resist	88	1770.62	92	0.02	283.61	103	0.66	0.00			67.13	106	0.25	2.43	70	0.06
HM Viking	81	2078.85	107	0.04	285.71	104	0.58	0.00			65.15	103	0.56	3.09	88	0.47
Holly 98 Aph03	83	2038.66	105	0.13	287.79	104	0.51	0.00			64.13	102	0.77	2.97	85	0.36
Holly 98HX806	114	1943.60	101	0.88	247.89	90	0.13	0.00			56.35	88	0.03	3.42	98	0.89
Holly 98HX829	96	1915.12	99	0.79	245.97	89	0.10	0.00			63.82	101	0.84	3.03	87	0.41
Holly 98HX933	90	2077.83	107	0.04	277.08	101	0.94	0.00			50.70	80	0.00	3.20	92	0.60
Holly 99HX941	108	1878.48	97	0.42	297.01	108	0.24	0.00			60.39	96	0.43	2.48	71	0.07
Holly 99HX942	115	2007.53	104	0.28	256.41	93	0.29	0.00			55.40	88	0.03	2.15	62	0.02
Holly 99HX957	98	2089.40	107	0.05	282.84	103	0.69	0.00			51.29	81	0.00	2.75	79	0.19
Holly 99HX958	111	2184.10	113	0.00	281.27	102	0.76	0.00			53.32	84	0.00	2.63	75	0.13
Holly Rival	91	2271.96	118	0.00	302.61	110	0.14	0.00			65.10	103	0.57	4.73	135	0.03
Seedex SX Laser	119	1912.44	99	0.76	259.65	94	0.38	0.00			68.05	108	0.40	5.24	150	0.00
Seedex SX1012	87	1746.09	90	0.01	284.69	103	0.82	0.00			72.09	115	0.00	3.21	92	0.61
Seedex SX1018	102	2026.84	105	0.18	280.33	102	0.80	0.00			69.56	110	0.06	3.36	96	0.79
Van der Have H46109	94	1957.62	101	0.73	238.68	87	0.04	0.00			54.96	87	0.02	3.36	96	0.82
Van der Have H46140	110	1833.97	95	0.15	237.57	86	0.04	0.00			58.62	93	0.18	5.00	143	0.01
Van der Have H46175	82	1958.48	101	0.72	237.98	86	0.04	0.00			66.54	105	0.33	2.02	58	0.01
Van der Have H46177	107	1864.47	96	0.32	246.02	90	0.13	0.00			60.95	97	0.53	3.51	100	0.98
Van der Have H68108	80	1927.32	100	0.93	319.10	116	0.02	0.00			66.11	105	0.39	3.73	107	0.68
Van der Have H68151	113	2036.49	105	0.14	258.56	94	0.35	0.00			56.61	90	0.06	3.15	90	0.54
Van der Have H68152	92	1850.03	96	0.23	267.67	97	0.66	0.00			46.48	74	0.00	3.02	86	0.40
Check of Mean		1933.58			275.68						63.14			3.49		
Coeff. Of Var (%)		8.61			15.63						12.89			39.38		
F Valu		3.26**			2.14**						4.30**			2.17**		
Mean LSD (0.05)		194.17	10		51.25	19					9.73	15		1.58	45	
Mean LSD (0.01)		256.08	13		67.59	25					12.83	20		2.09	60	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Commercial Coded Trial - Lattice
Trial 995604, DeGraff, MN
Planting Date: 04/27/1999 Harvest Date: 10/01/1999
42 Entries 6 Replications 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %				1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val		Mean	%	P-val
Beta 3945	95	299.28	113	0.00	6574.72	112	0.00	0.91	87	0.00	21.92	99	0.78	15.87	111	0.00	52	520.50	75	0.00
Beta 4705 (M705)	89	276.82	104	0.05	6249.42	106	0.11	1.05	100	0.92	22.58	102	0.58	14.89	104	0.03	71	712.33	103	0.71
Beta 5014	112	274.00	103	0.14	5801.56	99	0.73	1.06	101	0.73	21.16	96	0.21	14.77	103	0.10	77	773.53	111	0.11
Beta 5296	117	287.49	108	0.00	6264.24	107	0.10	0.94	89	0.01	21.85	99	0.71	15.31	107	0.00	53	538.82	78	0.00
Beta 6663	104	288.34	109	0.00	5935.32	101	0.81	0.92	87	0.00	20.56	93	0.04	15.34	107	0.00	56	561.05	81	0.01
Beta 6904	85	286.78	108	0.00	6005.13	102	0.59	0.96	91	0.02	20.97	95	0.13	15.30	107	0.00	62	622.56	90	0.15
Beta M701	97	285.42	107	0.00	6602.55	112	0.00	0.99	95	0.18	23.14	105	0.20	15.27	107	0.00	62	623.18	90	0.16
Beta M703	86	276.95	104	0.05	6249.69	106	0.11	1.02	98	0.55	22.54	102	0.81	14.87	104	0.04	66	662.45	95	0.53
Beta M706	106	270.61	102	0.38	5937.16	101	0.81	1.07	102	0.63	21.78	98	0.64	14.59	102	0.32	67	674.69	97	0.70
Beta M811	118	268.91	101	0.56	6262.02	106	0.10	1.02	97	0.48	23.36	106	0.11	14.46	101	0.62	61	619.75	89	0.14
Beta M846	99	265.57	100	0.99	6249.53	106	0.11	1.19	113	0.00	23.55	106	0.07	14.46	101	0.63	73	734.75	106	0.41
Beta M930	79	277.94	105	0.03	6339.63	108	0.05	1.06	101	0.86	22.87	103	0.35	14.96	104	0.02	64	643.81	93	0.32
Crystal 205	101	245.60	92	0.00	5013.72	85	0.00	1.04	99	0.81	20.43	92	0.03	13.32	93	0.00	66	668.68	96	0.61
Crystal 302	84	259.65	98	0.29	5952.71	101	0.76	1.02	98	0.54	23.01	104	0.26	14.01	98	0.21	74	744.21	107	0.31
Crystal 309	116	268.31	101	0.64	5877.69	100	0.99	1.09	104	0.34	21.98	99	0.83	14.50	101	0.52	67	678.06	98	0.75
Crystal 555	105	267.24	101	0.78	5669.55	96	0.36	1.00	95	0.24	21.14	95	0.20	14.35	100	0.93	54	542.51	78	0.00
Crystal 922	109	265.47	100	0.97	5987.91	87	0.00	0.95	90	0.01	19.22	87	0.00	14.23	99	0.70	67	675.28	97	0.71
Crystal 9744	93	246.33	93	0.00	5439.60	92	0.06	1.08	103	0.43	21.79	98	0.65	13.41	94	0.00	75	758.26	109	0.20
HM 7057	120	277.04	104	0.04	6173.46	105	0.21	0.94	89	0.01	22.29	101	0.84	14.78	103	0.09	55	555.87	80	0.01
HM 7073	100	252.03	95	0.02	5127.76	87	0.00	1.15	109	0.02	20.44	92	0.03	13.74	96	0.02	86	863.66	124	0.00
HM Hector	103	269.10	101	0.54	5787.67	98	0.69	0.98	92	0.04	21.49	97	0.40	14.42	101	0.73	66	660.21	95	0.50
HM Resist	88	265.37	100	0.96	5867.81	100	0.95	1.03	98	0.67	22.14	100	0.99	14.30	100	0.91	74	747.21	108	0.28
HM Viking	81	266.80	100	0.84	5579.32	95	0.19	1.06	101	0.73	20.89	94	0.11	14.41	101	0.77	72	729.60	105	0.47
Holly 98 Aph03	83	261.81	99	0.50	6045.60	103	0.48	1.08	103	0.43	23.06	104	0.24	14.18	99	0.55	69	695.52	100	0.97
Holly 98HX806	114	264.70	100	0.87	6011.05	102	0.57	1.05	100	0.90	22.70	103	0.47	14.29	100	0.88	71	711.54	103	0.72
Holly 98HX829	96	273.21	103	0.18	6417.62	109	0.02	0.99	94	0.12	23.50	106	0.08	14.66	102	0.22	56	565.45	82	0.01
Holly 98HX933	90	264.08	99	0.76	5794.95	99	0.71	1.13	107	0.06	22.01	99	0.86	14.32	100	0.98	79	793.58	114	0.05
Holly 98HX941	108	241.66	91	0.00	5216.37	89	0.00	1.17	111	0.00	21.55	97	0.45	13.26	93	0.00	94	944.82	136	0.00
Holly 98HX942	115	264.81	100	0.88	6618.51	113	0.00	1.03	98	0.56	25.05	113	0.00	14.26	100	0.79	71	713.96	103	0.68
Holly 99HX957	98	248.86	94	0.00	6028.86	103	0.52	1.26	120	0.00	24.19	109	0.01	13.70	96	0.02	92	923.66	133	0.00
Holly 99HX958	111	240.91	91	0.00	5225.92	89	0.00	1.22	116	0.00	21.66	98	0.54	13.25	92	0.00	98	983.84	142	0.00
Holly Rival	91	245.32	92	0.00	5409.73	92	0.04	1.22	116	0.00	22.00	99	0.86	13.49	94	0.00	65	651.56	94	0.40
Seedex SX Laser	119	261.92	99	0.51	5686.66	97	0.40	1.03	98	0.64	21.71	98	0.58	14.12	99	0.42	53	534.74	77	0.00
Seedex SX1012	87	269.93	102	0.45	5823.82	99	0.80	1.01	96	0.50	21.58	97	0.47	14.50	101	0.51	65	665.86	96	0.57
Seedex SX1018	102	257.74	97	0.16	5301.42	90	0.01	1.12	107	0.07	20.69	93	0.06	14.01	98	0.21	64	649.24	94	0.37
Van der Have H46109	94	270.71	102	0.37	5423.70	109	0.02	0.98	94	0.11	23.66	107	0.05	14.52	101	0.47	56	565.66	82	0.01
Van der Have H46140	110	279.42	105	0.02	5904.56	100	0.92	0.90	86	0.00	21.09	95	0.18	14.58	104	0.04	53	531.15	77	0.00
Van der Have H46175	82	229.75	86	0.00	4979.00	85	0.00	1.13	108	0.04	21.85	99	0.71	12.62	88	0.00	92	929.10	134	0.00
Van der Have H46177	107	275.79	104	0.07	6230.27	106	0.13	0.97	92	0.04	22.59	102	0.81	14.75	103	0.11	58	585.31	84	0.00
Van der Have H68108	80	256.89	97	0.23	5788.55	98	0.69	1.05	100	0.94	22.30	101	0.84	13.98	98	0.19	71	710.81	102	0.73
Van der Have H68151	113	260.49	98	0.39	6035.88	103	0.50	1.08	103	0.43	23.29	105	0.14	14.10	98	0.38	77	779.62	112	0.09
Van der Have H68152	92	246.23	93	0.00	6015.52	102	0.56	1.14	109	0.03	24.34	110	0.01	13.46	94	0.00	89	890.90	128	0.00
Check of Mean		265.65			5881.10			1.05			22.14			14.33			69.00	693.75		
Coeff. Of Var (%)		4.89			8.98			9.24			8.08			4.20			1.00	6.50		
F Valu		6.87**			3.84**			4.52**			2.41**			8.66**				5.95**		
Mean LSD (0.05)		15.90	6		650.13	11		0.11	11		2.20	10		0.74	5	14.00		0.14	20	
Mean LSD (0.01)		20.97	8		857.67	15		0.15	14		2.90	13		0.97	7	15.00		4.86	27	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Emergence (%)			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
Beta 3945	95	1343.33	93	0.05	158.73	91	0.30	0.00			43.65	90	0.28	2.85	85	0.26
Beta 4705 (M705)	89	1472.67	102	0.59	157.62	91	0.27	0.00			59.33	123	0.01	3.55	105	0.68
Beta 5014	112	1367.17	95	0.25	167.83	96	0.67	0.00			41.18	85	0.10	3.42	102	0.90
Beta 5296	117	1325.00	92	0.02	174.65	100	0.97	0.00			46.42	96	0.66	4.05	121	0.13
Beta 6663	104	1250.50	87	0.00	175.77	101	0.91	0.00			52.98	110	0.26	3.25	97	0.61
Beta 6904	85	1364.00	94	0.11	148.37	85	0.09	0.00			55.65	115	0.09	3.55	106	0.68
Beta M701	97	1404.67	97	0.42	170.18	98	0.76	0.00			47.02	97	0.77	3.30	98	0.88
Beta M703	86	1384.67	96	0.23	178.53	103	0.77	0.00			43.93	91	0.31	3.18	95	0.69
Beta M706	106	1516.83	105	0.16	174.63	100	0.97	0.00			54.17	112	0.18	4.86	145	0.00
Beta M811	118	1430.67	99	0.77	175.32	101	0.94	0.00			48.02	99	0.95	3.41	102	0.91
Beta M846	99	1527.00	106	0.11	230.49	137	0.00	0.00			35.90	74	0.00	3.00	89	0.43
Beta M930	79	1491.83	103	0.36	191.54	110	0.25	0.00								
Crystal 205	101	1432.00	98	0.65	178.14	102	0.79	0.00			53.67	111	0.22	3.21	96	0.74
Crystal 302	84	1373.67	95	0.16	160.25	92	0.36	0.00			56.83	116	0.08	3.00	89	0.42
Crystal 309	116	1558.83	108	0.03	183.60	105	0.53	0.27			42.25	87	0.16	2.72	81	0.16
Crystal 555	105	1383.67	96	0.23	209.36	120	0.02	0.00			39.00	81	0.03	3.06	91	0.51
Crystal 922	109	1308.50	91	0.01	143.54	82	0.04	0.00			46.15	96	0.62	2.11	63	0.01
Crystal 9744	93	1447.67	100	0.96	168.96	97	0.73	0.00			37.60	78	0.01	2.51	75	0.06
HM 7057	120	1293.33	89	0.00	175.56	101	0.92	0.00			62.70	130	0.00	2.65	79	0.11
HM 7073	100	1488.50	103	0.39	174.51	100	0.98	0.00			51.98	108	0.39	3.64	108	0.54
HM Hector	103	1350.50	93	0.06	151.03	87	0.12	0.00			49.92	103	0.71	4.61	137	0.01
HM Resist	88	1339.83	93	0.04	162.45	93	0.44	0.00			63.28	131	0.00	4.34	129	0.03
HM Viking	81	1425.50	99	0.70	174.14	100	1.00	0.27			50.58	105	0.60	3.02	90	0.44
Holly 98 Aph03	83	1543.50	107	0.05	171.48	98	0.86	0.00			48.50	100	0.96	1.94	58	0.00
Holly 98HX806	114	1493.83	103	0.34	165.29	95	0.55	0.00			44.33	92	0.36	3.37	100	0.98
Holly 98HX829	96	1526.00	106	0.11	155.12	89	0.21	0.00			44.15	91	0.34	2.68	80	0.13
Holly 98HX933	90	1578.00	109	0.01	161.40	93	0.40	0.00			40.97	85	0.09	2.49	74	0.05
Holly 98HX941	108	1462.67	101	0.73	176.21	101	0.89	0.00			43.83	91	0.30	3.64	108	0.54
Holly 98HX942	115	1481.83	103	0.47	141.45	81	0.03	0.00			35.32	73	0.00	3.19	95	0.71
Holly 99HX957	98	1567.67	110	0.01	214.62	123	0.01	0.00			44.15	91	0.34	3.22	96	0.75
Holly 99HX958	111	1539.33	107	0.06	174.95	100	0.96	0.00			46.63	97	0.70	3.88	116	0.25
Holly Rival	91	1800.67	125	0.00	229.86	132	0.00	0.00			45.15	93	0.47	3.60	107	0.60
Seedex SX Laser	119	1459.83	101	0.77	212.92	122	0.01	0.00			53.10	110	0.27	3.00	89	0.43
Seedex SX1012	87	1382.33	96	0.22	160.09	92	0.35	0.00			53.08	110	0.27	4.08	121	0.12
Seedex SX1018	102	1564.33	108	0.02	216.49	124	0.01	0.00			47.23	98	0.61	4.06	121	0.12
Van der Have H46109	94	1439.67	100	0.91	172.38	99	0.91	0.00			56.83	118	0.05	4.87	145	0.00
Van der Have H46140	110	1401.33	97	0.39	136.84	79	0.01	0.00			56.25	116	0.07	3.38	100	0.97
Van der Have H46175	82	1441.00	100	0.93	155.87	90	0.22	0.00			49.48	102	0.78	3.80	113	0.33
Van der Have H46177	107	1444.67	100	0.99	149.26	86	0.10	0.00			45.52	94	0.52	3.48	103	0.80
Van der Have H68108	80	1383.00	96	0.22	180.55	104	0.67	0.00			44.20	92	0.35	2.90	86	0.31
Van der Have H68151	113	1392.17	96	0.30	180.16	103	0.69	0.00			53.18	110	0.28	3.07	91	0.52
Van der Have H68152	92	1489.83	103	0.38	165.26	95	0.56	0.00			47.02	97	0.77	4.21	125	0.06
											48.32	100	1.00	3.05	91	0.49
Check of Mean		1445.29			174.13											
Coeff. Of Var (%)		8.69			20.32						48.30			3.35		
F Valu		3.73**			2.24**						22.19			32.67		
Mean LSD (0.05)		142.97	10		42.26	24					2.30**			2.10**		
Mean LSD (0.01)		188.54	13		55.74	32					12.20	25		1.28	38	
											16.09	33		1.68	50	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Commercial Coded Trial - Lattice
Location SMSC - Four Trials
Trials 995601 995602 995603 995604
42 Entries 24 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 205	101	272.83	98	0.02	5999.96	94	0.02	1.19	99	0.47	21.92	96	0.08	14.83	98	0.01	453.52	93	0.17
ACH 302	84	278.63	100	0.72	6465.22	101	0.66	1.28	107	0.00	23.18	101	0.56	15.22	100	0.86	515.26	106	0.27
ACH 309	116	281.20	101	0.63	6341.26	99	0.75	1.24	103	0.11	22.58	99	0.60	15.30	101	0.44	464.99	95	0.36
ACH 555	105	282.71	101	0.33	6192.12	97	0.23	1.18	97	0.16	21.86	96	0.07	15.31	101	0.40	392.23	80	0.00
ACH 922	109	281.00	100	0.67	5962.73	93	0.01	1.09	91	0.00	21.16	93	0.00	15.14	100	0.73	446.29	91	0.10
ACH 9744	93	273.92	98	0.06	6094.96	95	0.07	1.16	96	0.06	22.16	97	0.20	14.86	98	0.02	455.90	93	0.20
Beta 3945	95	308.06	110	0.00	6713.50	105	0.06	1.13	94	0.00	21.77	95	0.04	16.53	109	0.00	386.61	79	0.00
Beta 4705 (M705)	89	286.07	102	0.04	6362.98	100	0.86	1.23	102	0.23	22.25	97	0.28	15.54	102	0.02	505.93	104	0.47
Beta 5014	112	292.86	105	0.00	6217.87	97	0.29	1.17	97	0.12	21.26	93	0.00	15.81	104	0.00	519.50	106	0.21
Beta 5296	117	292.48	105	0.00	6134.76	96	0.12	1.15	95	0.01	20.99	92	0.00	15.77	104	0.00	410.98	84	0.00
Beta 6563	104	302.31	108	0.00	6100.79	95	0.08	1.08	90	0.00	20.18	88	0.00	16.20	107	0.00	407.23	83	0.00
Beta 6904	85	299.39	107	0.00	6491.38	102	0.55	1.12	93	0.00	21.68	95	0.03	16.09	106	0.00	460.52	94	0.28
Beta M701	97	294.10	105	0.00	7036.47	110	0.00	1.17	97	0.11	23.91	105	0.06	15.87	104	0.00	431.63	88	0.03
Beta M703	86	293.40	105	0.00	7219.08	113	0.00	1.17	97	0.12	24.57	107	0.00	15.84	104	0.00	470.80	97	0.50
Beta M706	106	282.31	101	0.39	6492.55	102	0.55	1.26	104	0.03	22.92	100	0.92	15.37	101	0.21	493.17	101	0.83
Beta M811	118	280.06	100	0.91	6363.70	100	0.86	1.15	96	0.02	22.73	99	0.80	15.16	100	0.80	497.01	102	0.71
Beta M846	99	278.67	100	0.73	6196.16	97	0.24	1.27	106	0.00	22.25	97	0.25	15.21	100	0.91	494.35	101	0.80
Beta M930	79	282.41	101	0.38	6421.93	100	0.86	1.16	96	0.04	22.74	99	0.82	15.28	101	0.53	464.23	95	0.35
HM 7057	120	286.31	102	0.03	6159.76	96	0.16	1.12	93	0.00	21.49	94	0.01	15.44	102	0.09	407.91	84	0.00
HM 7073	100	276.31	99	0.26	5800.18	91	0.00	1.25	104	0.04	20.99	92	0.00	15.06	99	0.37	540.78	111	0.04
HM Hector	103	287.73	103	0.01	6235.59	98	0.34	1.17	97	0.10	21.64	95	0.03	15.56	102	0.01	437.47	90	0.05
HM Resist	88	285.62	102	0.05	6748.85	106	0.03	1.15	96	0.02	23.63	103	0.16	15.43	102	0.09	513.47	105	0.31
HM Viking	81	275.74	99	0.19	6004.71	94	0.02	1.28	106	0.00	21.74	95	0.04	15.06	99	0.37	552.13	113	0.01
Holly 98 Aph03	83	270.62	97	0.00	6616.20	103	0.18	1.32	110	0.00	24.40	107	0.01	14.85	98	0.02	531.09	109	0.09
Holly 98HX806	114	276.74	99	0.33	6390.81	100	0.99	1.20	100	0.81	23.11	101	0.65	15.04	99	0.28	497.93	102	0.69
Holly 98HX829	96	287.80	103	0.01	7080.22	111	0.00	1.12	93	0.00	24.58	107	0.00	15.51	102	0.03	413.03	85	0.00
Holly 99HX933	90	281.96	101	0.46	6300.67	99	0.58	1.24	103	0.12	22.32	98	0.31	15.34	101	0.31	501.78	103	0.58
Holly 99HX941	108	252.57	90	0.00	6218.08	97	0.29	1.30	108	0.00	24.60	108	0.00	13.93	92	0.00	700.43	144	0.00
Holly 99HX942	115	273.39	98	0.04	6810.74	107	0.01	1.20	99	0.72	24.96	109	0.00	14.87	98	0.02	505.64	104	0.48
Holly 99HX957	98	261.49	93	0.00	6426.26	101	0.84	1.37	113	0.00	24.58	107	0.00	14.44	95	0.00	664.34	136	0.00
Holly 99HX958	111	256.84	92	0.00	6362.52	100	0.85	1.39	116	0.00	24.76	108	0.00	14.23	94	0.00	680.59	140	0.00
Holly Rival	91	260.61	93	0.00	5586.07	87	0.00	1.36	113	0.00	21.40	94	0.01	14.39	95	0.00	437.97	90	0.05
Seedex SX Laser	119	270.82	97	0.00	5948.30	93	0.01	1.19	99	0.57	21.94	96	0.09	14.73	97	0.00	396.77	81	0.00
Seedex SX1012	87	282.47	101	0.37	6157.70	96	0.16	1.14	95	0.01	21.76	95	0.04	15.27	101	0.59	455.25	93	0.19
Seedex SX1018	102	271.38	97	0.01	6186.32	97	0.22	1.26	104	0.02	22.77	100	0.86	14.83	98	0.01	470.68	96	0.46
Van der Have H46109	94	280.00	104	0.00	7083.17	111	0.00	1.13	93	0.00	24.43	107	0.00	15.63	103	0.00	390.50	80	0.00
Van der Have H46140	110	268.92	103	0.00	6554.04	103	0.33	1.08	90	0.00	22.66	99	0.71	15.53	102	0.02	395.76	81	0.00
Van der Have H46175	82	253.12	90	0.00	6390.83	100	0.99	1.21	101	0.78	23.19	110	0.00	13.87	91	0.00	601.86	123	0.00
Van der Have H46177	107	290.56	104	0.00	6807.36	106	0.01	1.11	92	0.00	23.35	102	0.37	15.64	103	0.00	391.72	80	0.00
Van der Have H68108	80	289.41	96	0.00	6622.19	104	0.17	1.30	108	0.00	24.54	107	0.00	14.77	97	0.00	570.31	117	0.00
Van der Have H68151	113	271.81	97	0.01	6531.67	102	0.41	1.24	103	0.17	24.05	105	0.03	14.83	98	0.01	549.48	113	0.01
Van der Have H68152	92	263.53	94	0.00	6682.68	105	0.08	1.28	106	0.00	25.32	111	0.00	14.46	95	0.00	610.46	125	0.00
Check of Mean		279.72			6393.20			1.21			22.87			15.19			487.87		
Coeff. Of Var (%)		4.54			9.06			8.55			8.13			3.86			18.90		
F Value		17.16 **			4.61 **			11.89 **			6.38 **			16.10 **			10.10 **		
Mean LSD (0.05)		8.58	3		469.77	7		0.06	5		1.53	7		0.40	3		70.65	14	
Mean LSD (0.01)		11.34	4		620.89	10		0.09	7		2.02	9		0.53	4		93.38	19	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Emergence (%)			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 205	101	1823.05	99	0.81	270.03	101	0.74	0.00			52.66	106	0.20	5.37	131	0.00
ACH 302	84	1942.04	106	0.00	291.64	109	0.02	0.00			58.21	117	0.00	4.65	114	0.18
ACH 309	116	1970.01	107	0.00	269.70	101	0.77	0.07			54.06	109	0.06	4.01	98	0.85
ACH 555	105	1730.81	94	0.00	307.70	115	0.00	0.00			51.77	104	0.37	5.64	138	0.00
ACH 922	109	1694.34	92	0.00	234.16	88	0.00	0.00			50.21	101	0.84	4.83	118	0.08
ACH 9744	93	1810.88	98	0.39	253.51	95	0.20	0.00			63.23	127	0.00	4.95	121	0.04
Beta 3945	95	1806.86	98	0.32	254.50	95	0.24	0.00			46.79	94	0.20	3.61	88	0.26
Beta 4705 (M705)	89	1931.39	105	0.01	256.59	96	0.33	0.00			40.36	81	0.00	3.83	94	0.55
Beta 5014	112	1733.14	94	0.00	255.84	96	0.29	0.00			56.70	114	0.00	4.00	98	0.84
Beta 5296	117	1733.11	94	0.00	276.00	104	0.36	0.13			55.40	111	0.01	3.88	95	0.63
Beta 6563	104	1613.97	88	0.00	262.43	98	0.68	0.00			39.68	79	0.00	4.36	107	0.52
Beta 6904	85	1750.68	95	0.01	237.44	89	0.00	0.00			48.83	98	0.69	4.01	98	0.86
Beta M701	97	1778.32	97	0.06	275.20	103	0.40	0.00			42.18	85	0.00	3.20	78	0.04
Beta M703	86	1696.94	92	0.00	281.72	106	0.14	0.00			47.18	95	0.27	3.87	95	0.61
Beta M706	106	1930.94	105	0.01	278.22	104	0.26	0.00			48.21	97	0.51	4.03	99	0.89
Beta M811	118	1787.20	97	0.12	233.92	88	0.00	0.00			57.01	115	0.00	4.30	105	0.62
Beta M846	99	1880.57	102	0.24	306.54	115	0.00	0.00			52.33	105	0.26	4.90	120	0.06
Beta M930	79	1792.17	97	0.16	254.06	95	0.22	0.00			52.76	106	0.19	4.12	101	0.94
HM 7057	120	1666.91	91	0.00	278.15	104	0.26	0.00			49.76	100	0.98	4.46	109	0.37
HM 7073	100	1952.80	106	0.00	252.93	95	0.18	0.00			52.99	107	0.16	4.32	106	0.58
HM Hector	103	1758.99	96	0.22	268.03	101	0.89	0.00			54.98	111	0.02	3.79	93	0.48
HM Resist	88	1711.85	93	0.00	249.72	94	0.10	0.00			58.41	117	0.00	3.70	91	0.36
HM Viking	81	1899.57	103	0.06	282.42	106	0.12	0.07			49.77	100	0.99	4.02	98	0.87
Holly 98 Aph03	83	1962.33	107	0.00	307.55	115	0.00	0.00			53.23	107	0.13	3.57	87	0.22
Holly 98HX806	114	1837.40	100	0.93	260.30	98	0.53	0.00			42.18	85	0.00	4.12	101	0.94
Holly 98HX829	96	1832.07	100	0.81	231.89	87	0.00	0.00			50.76	102	0.65	4.00	98	0.83
Holly 99HX933	90	1948.70	106	0.00	259.33	97	0.47	0.07			42.50	85	0.00	4.01	98	0.86
Holly 99HX941	108	1858.01	101	0.60	259.59	97	0.49	0.00			46.39	93	0.15	2.82	69	0.00
Holly 99HX942	115	1845.70	100	0.87	252.24	95	0.16	0.00			45.56	92	0.07	3.05	75	0.01
Holly 99HX957	98	1994.14	108	0.00	287.40	108	0.04	0.00			39.29	79	0.00	3.19	78	0.03
Holly 99HX958	111	2037.08	111	0.00	287.16	108	0.05	0.07			42.43	85	0.00	3.22	79	0.04
Holly Rival	91	2172.99	118	0.00	316.01	119	0.00	0.07			48.01	97	0.45	5.11	125	0.02
Seedex SX Laser	119	1878.60	102	0.26	278.86	105	0.23	0.00			56.83	114	0.00	3.98	97	0.80
Seedex SX1012	87	1733.86	94	0.00	258.99	97	0.45	0.00			62.02	125	0.00	4.35	106	0.53
Seedex SX1018	102	1918.71	104	0.03	292.04	110	0.01	0.00			48.66	98	0.65	4.92	120	0.05
Van der Have H46109	94	1853.78	101	0.69	239.59	90	0.01	0.00			47.26	95	0.28	3.47	85	0.14
Van der Have H46140	110	1769.01	96	0.04	226.43	85	0.00	0.00			46.96	94	0.23	5.46	134	0.00
Van der Have H46175	82	1806.50	98	0.32	239.66	90	0.01	0.00			51.70	104	0.39	2.73	67	0.00
Van der Have H46177	107	1813.30	99	0.43	236.53	89	0.00	0.00			45.41	91	0.06	5.42	133	0.00
Van der Have H68108	80	1858.21	101	0.60	303.76	114	0.00	0.07			51.26	103	0.50	4.07	100	0.97
Van der Have H68151	113	1860.45	101	0.55	262.49	98	0.68	0.00			47.56	96	0.34	3.35	82	0.08
Van der Have H68152	92	1878.60	102	0.26	269.19	101	0.80	0.00			37.79	76	0.00	2.99	73	0.01
Check of Mean		1840.29			266.65						49.73			4.09		
Coeff. Of Var (%)		8.30			16.23						21.76			38.35		
F Value		10.12 **			4.94 **						6.86 **			3.00 **		
Mean LSD (0.05)		95.78	5		28.86	11					6.47	13		1.19	29	
Mean LSD (0.01)		126.60	7		38.17	14					8.56	17		1.57	38	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Semi Commercial Coded Trial - Lattice
Trial 995611, Hector, MN
Planting Date: 04/28/1999 Harvest Date: 10/08/1999
30 Entries 6 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	272.13	95	0.01	5984.28	95	0.13	1.32	105	0.09	22.11	100	1.00	14.93	96	0.01	299.54	97	0.69
ACH 921	234	296.44	104	0.03	6565.29	104	0.26	1.24	99	0.73	22.11	100	0.99	16.08	103	0.02	331.01	107	0.30
ACH 952	214	303.16	106	0.00	7134.73	113	0.00	1.21	96	0.19	23.58	107	0.03	16.37	105	0.00	281.22	91	0.22
ACH 953	230	294.82	103	0.06	6550.41	104	0.29	1.38	110	0.00	22.32	101	0.77	16.12	104	0.01	334.15	108	0.24
ACH 999	222	295.54	103	0.04	7252.72	115	0.00	1.25	99	0.75	24.58	111	0.00	16.02	103	0.03	301.72	98	0.77
Beta 6904	233	285.86	100	0.96	6195.81	98	0.57	1.27	101	0.82	21.62	98	0.47	15.54	100	0.99	395.25	128	0.00
Beta M5216	224	277.27	97	0.09	5592.22	89	0.00	1.38	109	0.00	20.10	91	0.00	15.23	98	0.17	328.32	107	0.36
Beta M813	221	302.15	106	0.00	6911.42	109	0.01	1.28	102	0.59	22.78	103	0.33	16.37	105	0.00	270.58	88	0.09
Beta M814	239	313.57	110	0.00	7052.56	112	0.00	1.14	91	0.00	22.50	102	0.57	16.83	108	0.00	254.91	83	0.02
Beta M815	217	289.99	102	0.37	6507.00	103	0.38	1.26	100	0.99	22.43	101	0.64	15.77	101	0.31	335.26	109	0.22
Beta M931	231	277.26	97	0.09	5916.07	94	0.07	1.26	100	0.95	21.30	96	0.23	15.12	97	0.06	374.77	122	0.00
Beta M932	237	302.41	106	0.00	6529.63	103	0.33	1.26	100	0.95	21.65	98	0.49	16.38	105	0.00	337.83	110	0.18
Filler 1	240	289.43	101	0.44	5517.25	87	0.00	1.13	90	0.00	19.06	86	0.00	15.62	100	0.73	252.72	82	0.01
Filler 2	241	285.53	100	0.98	5881.25	93	0.05	1.27	101	0.67	20.61	93	0.03	15.55	100	0.97	309.95	101	0.93
Filler 3	242	258.89	91	0.00	5426.15	86	0.00	1.30	104	0.24	20.98	95	0.09	14.25	92	0.00	347.99	113	0.07
HM 1642	228	281.17	98	0.36	7479.00	118	0.00	1.26	100	0.96	26.57	120	0.00	15.30	98	0.29	301.30	98	0.75
HM 1643	238	296.73	104	0.02	6361.95	101	0.84	1.06	84	0.00	21.47	97	0.34	15.89	102	0.12	309.88	101	0.94
HM 1645	223	271.22	95	0.00	6681.10	106	0.10	1.49	119	0.00	24.60	111	0.00	15.05	97	0.03	280.75	91	0.21
HM 7083	215	277.55	97	0.10	6289.75	100	0.90	1.34	106	0.04	22.61	102	0.47	15.22	98	0.16	400.15	130	0.00
HM 7089	216	285.90	100	0.96	7165.29	113	0.00	1.22	97	0.31	25.04	113	0.00	15.50	100	0.87	238.62	77	0.00
HM 7097	227	279.97	98	0.25	6526.06	103	0.34	1.21	96	0.18	23.26	105	0.09	15.20	98	0.13	253.12	82	0.01
HM 7100	236	278.48	97	0.14	6407.15	101	0.68	1.22	97	0.33	22.97	104	0.21	15.16	97	0.08	253.63	82	0.01
HM 7101	232	282.63	99	0.54	6565.90	104	0.25	1.19	94	0.07	23.25	105	0.10	15.33	99	0.34	239.39	78	0.00
HM E26	235	279.98	98	0.25	5642.59	89	0.00	1.15	92	0.01	20.22	91	0.01	15.16	98	0.09	355.06	115	0.03
HM E38	219	281.51	99	0.40	6047.36	96	0.21	1.30	103	0.31	21.50	97	0.36	15.37	99	0.44	304.11	99	0.85
HM Hector	226	288.05	101	0.62	6081.21	96	0.28	1.28	102	0.53	21.12	95	0.14	15.68	101	0.53	326.14	106	0.41
HM RH5	213	283.56	99	0.67	5858.83	93	0.04	1.20	95	0.11	20.67	93	0.03	15.38	99	0.46	358.09	116	0.02
Seedex Laser	229	276.10	97	0.05	5332.47	84	0.00	1.31	104	0.17	19.27	87	0.00	15.12	97	0.06	279.48	91	0.19
Seedex SX 1017	218	289.53	101	0.43	5726.13	91	0.01	1.21	96	0.18	19.87	90	0.00	15.68	101	0.53	253.89	82	0.01
Van der Have H66454	225	272.50	95	0.01	6366.62	101	0.82	1.36	108	0.01	23.43	106	0.06	14.98	96	0.01	336.04	109	0.21
Check of Mean		285.64			6318.27			1.26			22.12			15.54			308.16		
Coeff. Of Var (%)		4.18			8.54			7.09			7.56			3.51			16.8		
F Value		5.48**			6.76**			4.95**			6.33**			5.80**			4.17**		
Mean LSD (0.05)		13.89	5		615.51	10		0.11	9		1.93	9		0.63	4		62.27	20	
Mean LSD (0.01)		18.34	6		812.85	13		0.14	11		2.55	12		0.84	5		82.25	27	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	2302.57	111	0.00	306.74	99	0.85	0.00			5.89	111	0.55
ACH 921	234	2093.30	101	0.83	288.75	93	0.23	0.00			3.41	64	0.05
ACH 952	214	2038.55	98	0.55	293.12	94	0.34	0.00			4.08	77	0.20
ACH 953	230	2349.87	113	0.00	325.27	105	0.40	0.00			4.08	77	0.20
ACH 999	222	2145.49	103	0.32	285.17	92	0.16	0.00			4.39	83	0.34
Beta 6904	233	1991.06	96	0.19	305.19	98	0.78	0.00			6.00	113	0.47
Beta M5216	224	2234.61	108	0.02	352.92	114	0.02	0.00			6.00	113	0.47
Beta M813	221	2205.07	106	0.06	303.23	98	0.70	0.00			4.11	77	0.21
Beta M814	239	1892.73	91	0.01	291.51	94	0.30	0.00			4.53	85	0.41
Beta M815	217	1944.60	94	0.05	335.63	108	0.16	0.00			4.30	81	0.29
Beta M931	231	2089.25	101	0.87	283.64	91	0.14	0.00			6.11	115	0.41
Beta M932	237	2105.30	101	0.69	293.94	95	0.36	0.00			3.80	72	0.12
Filler 1	240	1916.69	92	0.02	277.68	90	0.07	0.00			5.54	104	0.81
Filler 2	241	2018.51	97	0.37	338.36	109	0.12	0.00			8.74	165	0.00
Filler 3	242	2165.02	104	0.20	307.46	99	0.88	0.00			8.29	156	0.00
HM 1642	228	2076.09	100	0.97	311.49	100	0.94	0.00			3.51	66	0.06
HM 1643	238	1677.24	81	0.00	261.82	84	0.01	0.00			6.08	115	0.42
HM 1645	223	2636.85	127	0.00	351.42	113	0.02	0.00			5.02	94	0.76
HM 7083	215	2218.33	107	0.04	301.10	97	0.61	0.00			5.64	106	0.73
HM 7089	216	2020.19	97	0.38	319.74	103	0.59	0.00			4.45	84	0.37
HM 7097	227	2008.81	97	0.30	308.17	99	0.91	0.00			5.11	96	0.84
HM 7100	236	2050.01	99	0.67	309.69	100	0.98	0.00			6.17	116	0.37
HM 7101	232	1972.59	95	0.12	309.24	100	0.96	0.00			6.19	116	0.36
HM E26	235	1761.63	85	0.00	297.56	96	0.48	0.00			5.90	111	0.54
HM E38	219	2078.91	100	1.00	341.75	110	0.08	0.00			4.73	89	0.54
HM Hector	226	2035.85	98	0.52	332.55	107	0.21	0.00			5.56	105	0.80
HM RH5	213	1950.89	94	0.06	279.35	90	0.09	0.00			5.69	107	0.69
Seedex Laser	229	2122.09	102	0.52	350.85	113	0.02	0.00			7.45	140	0.03
Seedex SX 1017	218	2035.06	98	0.52	303.28	98	0.79	0.00			4.81	91	0.60
Van der Have H66454	225	2222.79	107	0.03	339.36	109	0.10	0.00			3.76	71	0.11
Check of Mean		2078.66			310.2						5.31		
Coeff. Of Var (%)		7.59			13.44						44.46		
F Value		7.08**			1.74*						1.81*		
Mean LSD (0.05)		190.73	9		50.78	16					2.73	51	
Mean LSD (0.01)		251.94	12		67.08	22					3.6	68	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Semi Commercial Coded Trial - Lattice
Trial 995612, Lake Lillian, MN
Planting Date: 04/28/1999 Harvest Date: 10/06/1999
30 Entries 6 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	277.17	97	0.10	5480.39	101	0.81	1.31	110	0.01	23.37	104	0.27	15.17	98	0.21	421.42	103	0.70
ACH 921	234	290.16	102	0.37	6725.01	105	0.24	1.23	103	0.41	23.17	103	0.39	15.74	102	0.26	460.65	113	0.11
ACH 952	214	296.99	104	0.03	7456.68	116	0.00	1.21	102	0.66	25.13	112	0.00	16.06	104	0.01	460.12	113	0.11
ACH 953	230	290.20	102	0.37	6734.79	105	0.23	1.25	105	0.17	23.15	103	0.40	15.76	102	0.23	469.48	115	0.06
ACH 999	222	292.89	103	0.15	7427.58	116	0.00	1.27	106	0.07	25.29	113	0.00	15.92	103	0.06	398.28	97	0.74
Beta 6904	233	295.75	104	0.05	5983.36	93	0.10	1.16	97	0.39	20.22	90	0.01	15.95	103	0.05	454.64	111	0.16
Beta M5216	224	282.57	99	0.56	5636.98	88	0.00	1.12	93	0.05	19.94	89	0.00	15.24	99	0.33	362.40	89	0.15
Beta M813	221	283.79	99	0.73	6629.27	103	0.42	1.15	96	0.26	23.30	104	0.31	15.34	99	0.57	422.79	103	0.67
Beta M814	239	287.90	101	0.65	6526.16	102	0.68	1.20	100	0.96	22.66	101	0.80	15.59	101	0.62	412.46	101	0.91
Beta M815	217	294.17	103	0.09	6242.23	97	0.50	1.14	96	0.20	21.18	94	0.13	15.85	102	0.11	407.21	100	0.96
Beta M931	231	302.34	106	0.00	7449.85	116	0.00	1.18	99	0.73	24.63	110	0.01	16.30	105	0.00	400.76	98	0.80
Beta M932	237	300.80	105	0.00	6585.23	103	0.52	1.12	94	0.07	21.83	97	0.46	16.16	104	0.00	438.14	107	0.37
Filler 1	240	304.02	106	0.00	5982.92	93	0.10	1.08	90	0.01	19.77	88	0.00	16.28	105	0.00	290.78	71	0.00
Filler 2	241	279.97	98	0.28	6178.81	96	0.36	1.24	104	0.28	22.12	99	0.70	15.24	98	0.33	478.21	117	0.03
Filler 3	242	238.10	83	0.00	5056.66	79	0.00	1.40	117	0.00	21.28	95	0.16	13.30	86	0.00	557.75	136	0.00
HM 1642	228	291.37	102	0.26	7252.83	113	0.00	1.12	94	0.07	24.90	111	0.00	15.69	101	0.36	402.43	98	0.84
HM 1643	238	282.94	99	0.61	6568.81	103	0.51	1.21	101	0.82	23.33	104	0.30	15.35	99	0.60	474.32	116	0.04
HM 1645	223	267.43	94	0.00	6042.54	94	0.15	1.28	107	0.03	22.55	100	0.91	14.65	95	0.00	422.16	103	0.68
HM 7083	215	284.78	100	0.88	6385.26	99	0.90	1.23	103	0.36	22.47	100	0.99	15.47	100	0.99	423.03	103	0.66
HM 7089	216	292.60	102	0.17	5608.27	87	0.00	1.15	96	0.29	19.11	85	0.00	15.78	102	0.19	358.24	88	0.12
HM 7097	227	284.83	100	0.89	6796.48	106	0.15	1.20	101	0.83	23.84	106	0.10	15.45	100	0.91	312.88	77	0.00
HM 7100	236	281.56	99	0.45	6390.22	100	0.92	1.21	101	0.75	22.73	101	0.74	15.29	99	0.43	328.46	80	0.01
HM 7101	232	289.53	101	0.44	7186.78	112	0.00	1.18	99	0.77	24.83	111	0.01	15.66	101	0.43	320.59	78	0.01
HM E26	235	278.68	98	0.18	5993.49	93	0.11	1.15	96	0.22	21.50	96	0.25	15.08	97	0.10	430.47	105	0.51
HM E38	219	284.22	100	0.79	6184.16	96	0.37	1.15	96	0.22	21.77	97	0.42	15.36	99	0.62	355.47	87	0.10
HM Hector	226	291.78	102	0.23	6556.43	102	0.60	1.20	101	0.86	22.61	101	0.84	15.79	102	0.19	380.07	93	0.37
HM RH5	213	284.15	100	0.78	6239.86	97	0.50	1.13	94	0.09	21.98	98	0.57	15.33	99	0.55	433.13	106	0.45
Seedex Laser	229	264.77	93	0.00	5005.59	78	0.00	1.27	106	0.09	18.77	84	0.00	14.51	94	0.00	439.67	107	0.34
Seedex SX 1017	218	281.63	99	0.44	6275.38	98	0.59	1.15	96	0.28	22.28	99	0.84	15.23	98	0.31	347.34	85	0.06
Van der Have H6645	225	289.91	102	0.40	6916.41	108	0.06	1.18	98	0.64	23.82	106	0.10	15.68	101	0.40	408.45	99	0.94
Check of Mean		285.57			6417.35			1.2			22.45			15.47			408.99		
Coeff. Of Var (%)		4.31			9.65			8.38			8.88			3.68			16.93		
F Value		5.90**			5.45**			2.65**			4.17**			5.95**			3.12**		
Mean LSD (0.05)		14.53	5		742.51	12		0.12	10		2.37	11		0.67	4		91.58	22	
Mean LSD (0.01)		19.19	7		980.75	15		0.16	13		3.13	14		0.89	6		120.95	30	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	2077.91	116	0.00	310.49	103	0.65	0.00			4.83	119	0.13
ACH 921	234	1764.81	99	0.75	315.20	104	0.47	0.00			5.16	127	0.03
ACH 952	214	1791.33	100	0.92	298.11	98	0.79	0.00			3.34	82	0.15
ACH 953	230	1931.29	108	0.03	284.55	94	0.29	0.00			3.76	92	0.54
ACH 999	222	1862.85	104	0.23	342.70	113	0.02	0.00			3.38	83	0.17
Beta 6904	233	1688.80	95	0.14	280.30	93	0.19	0.00			3.83	94	0.64
Beta M5216	224	1857.59	104	0.27	239.02	79	0.00	0.00			4.71	116	0.20
Beta M813	221	1781.50	100	0.96	261.95	87	0.02	0.00			3.64	90	0.40
Beta M814	239	1766.26	99	0.77	306.78	101	0.81	0.00			3.74	92	0.52
Beta M815	217	1689.15	95	0.14	284.93	94	0.30	0.00			3.94	97	0.80
Beta M931	231	1793.20	100	0.90	294.42	97	0.63	0.00			3.46	85	0.23
Beta M932	237	1671.51	94	0.08	263.03	87	0.02	0.00			4.15	102	0.87
Filler 1	240	1630.46	91	0.02	300.88	99	0.91	0.00			5.07	125	0.05
Filler 2	241	1792.61	100	0.91	309.20	102	0.71	0.00			3.58	88	0.33
Filler 3	242	2003.68	112	0.00	348.39	115	0.01	0.00			3.05	75	0.04
HM 1642	228	1744.65	98	0.53	258.18	85	0.01	0.28			3.39	83	0.18
HM 1643	238	1611.70	90	0.01	336.13	111	0.05	0.00			4.78	118	0.15
HM 1645	223	2032.63	114	0.00	301.25	100	0.93	0.00			3.26	80	0.11
HM 7083	215	1838.16	103	0.41	315.75	104	0.45	0.00			3.01	74	0.04
HM 7089	216	1751.24	98	0.60	294.60	97	0.64	0.00			4.08	100	0.97
HM 7097	227	1766.80	99	0.78	349.05	115	0.01	0.00			4.28	105	0.66
HM 7100	236	1835.08	103	0.44	330.57	109	0.11	0.00			2.97	73	0.03
HM 7101	232	1682.98	94	0.12	352.67	116	0.00	0.00			4.66	115	0.24
HM E26	235	1622.97	91	0.01	296.22	98	0.70	0.00			5.62	138	0.00
HM E38	219	1700.22	95	0.19	305.48	101	0.87	0.00			5.55	137	0.00
HM Hector	226	1823.49	102	0.56	310.30	103	0.66	0.00			4.22	104	0.76
HM RH5	213	1730.04	97	0.40	255.73	84	0.01	0.00			5.19	128	0.03
Seedex Laser	229	1838.47	103	0.41	331.09	109	0.10	0.00			3.75	92	0.53
Seedex SX 1017	218	1687.05	95	0.13	317.31	105	0.40	0.00			4.29	106	0.65
Van der Have H6645	225	1765.90	100	0.99	287.48	95	0.38	0.00			3.28	81	0.11
Check of Mean		1785.14			302.73						4.07		
Coeff. Of Var (%)		8.76			13.99						30.52		
F Value		3.05**			2.79**						2.33**		
Mean LSD (0.05)		184.32	10		48.76	16					1.42	35	
Mean LSD (0.01)		243.45	14		64.39	21					1.87	46	

* Significant at 5% ** Significant at 1%. Ns Not Significant
2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Semi Commercial Coded Trial - Lattice
Trial 995613, Clara City, MN
Planting Date: 04/28/1999 Harvest Date: 10/03/1999
30 Entries 6 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	306.67	100	0.99	7422.25	109	0.07	1.16	106	0.17	24.19	109	0.05	16.50	100	0.78	339.34	95	0.58
ACH 921	234	315.33	103	0.09	7524.28	110	0.03	1.18	108	0.06	24.00	108	0.07	16.95	103	0.03	401.51	113	0.14
ACH 952	214	318.98	104	0.02	7212.90	106	0.23	1.16	106	0.16	22.66	102	0.68	17.10	104	0.00	424.12	119	0.03
ACH 953	230	305.71	100	0.84	7468.90	109	0.05	1.18	107	0.07	24.31	109	0.04	16.46	100	0.91	491.84	138	0.00
ACH 999	222	307.54	100	0.88	8230.92	120	0.00	1.13	103	0.44	26.57	119	0.00	16.52	101	0.72	400.35	112	0.15
Beta 6904	233	319.95	104	0.01	6901.16	101	0.83	1.14	103	0.40	21.59	97	0.49	17.14	104	0.00	411.16	115	0.07
Beta M5216	224	303.35	99	0.50	5953.45	87	0.01	1.24	113	0.00	19.44	87	0.00	16.41	100	0.90	344.81	97	0.71
Beta M813	221	313.45	102	0.19	7870.80	115	0.00	1.11	101	0.80	25.06	113	0.00	16.79	102	0.13	352.58	99	0.90
Beta M814	239	318.92	104	0.02	7483.51	110	0.04	1.05	96	0.28	23.64	106	0.15	16.99	103	0.02	319.79	90	0.23
Beta M815	217	314.41	102	0.13	6864.12	98	0.60	1.03	94	0.14	21.14	95	0.25	16.74	102	0.19	344.53	97	0.70
Beta M931	231	314.16	102	0.15	7142.18	105	0.33	1.04	94	0.16	22.77	102	0.60	16.74	102	0.20	357.53	100	0.97
Beta M932	237	318.30	104	0.02	7195.67	105	0.26	1.10	100	1.00	22.53	101	0.78	17.01	103	0.01	377.53	106	0.49
Filler 1	240	307.39	100	0.90	6350.48	93	0.13	1.00	91	0.03	20.76	93	0.12	16.38	100	0.80	319.11	90	0.23
Filler 2	241	314.15	102	0.15	7043.63	103	0.51	1.06	96	0.38	22.35	100	0.93	16.77	102	0.15	307.51	86	0.11
Filler 3	242	277.90	91	0.00	6373.47	93	0.15	1.14	103	0.42	22.90	103	0.51	15.04	91	0.00	400.14	112	0.15
HM 1642	228	309.14	101	0.64	6659.61	97	0.59	1.08	99	0.72	21.71	98	0.57	16.54	101	0.67	342.62	96	0.66
HM 1643	238	312.46	102	0.26	7554.41	111	0.02	1.01	92	0.05	24.21	109	0.05	16.64	101	0.38	361.15	101	0.87
HM 1645	223	278.56	91	0.00	6811.66	97	0.49	1.28	117	0.00	23.91	107	0.09	15.21	93	0.00	442.63	124	0.01
HM 7083	215	291.40	95	0.00	6023.09	88	0.01	1.13	103	0.48	20.76	93	0.12	15.69	95	0.00	420.72	118	0.04
HM 7089	216	311.58	102	0.34	7567.87	111	0.02	1.02	93	0.08	24.18	109	0.05	16.61	101	0.44	303.66	85	0.09
HM 7097	227	308.64	101	0.71	6995.66	102	0.61	1.06	96	0.39	22.62	102	0.71	16.49	100	0.81	266.16	75	0.00
HM 7100	236	304.39	99	0.64	6333.12	93	0.12	1.07	97	0.51	20.72	93	0.11	16.29	99	0.52	248.51	70	0.00
HM 7101	232	308.71	101	0.70	6580.15	96	0.43	1.04	95	0.19	21.40	96	0.37	16.47	100	0.87	265.43	75	0.00
HM E26	235	308.72	101	0.70	6325.35	93	0.11	1.01	92	0.05	20.39	92	0.05	16.44	100	1.00	318.80	89	0.22
HM E38	219	299.45	98	0.15	6159.24	90	0.04	1.06	96	0.34	20.51	92	0.07	16.03	98	0.08	350.25	98	0.84
HM Hector	226	308.43	101	0.74	6006.09	88	0.01	1.10	100	0.94	19.36	87	0.00	16.52	101	0.71	348.63	98	0.80
HM RH5	213	301.16	98	0.27	6013.42	88	0.01	1.10	100	0.96	20.06	90	0.02	16.15	98	0.21	422.62	119	0.03
Seedex Laser	229	298.68	97	0.11	6192.88	91	0.05	1.12	102	0.70	20.62	93	0.09	16.06	98	0.10	298.01	84	0.06
Seedex SX 1017	218	302.21	99	0.37	6351.13	93	0.13	1.08	98	0.67	21.00	94	0.19	16.20	99	0.30	345.94	97	0.74
Van der Have H66454	225	302.97	99	0.46	6751.89	99	0.80	1.10	100	0.95	22.47	101	0.83	16.25	99	0.42	361.16	101	0.87
Check of Mean		306.76			6832.12			1.1			22.26			16.44			356.27		
Coeff. Of Var (%)		3.96			11.23			9.51			10.75			3.36			20.21		
F Value		3.96**			3.74*			2.16**			3.28**			4.39*			3.10**		
Mean LSD (0.05)		14.44	5		905.9	13		0.13	11		2.75	12		0.65	4		86.74	24	
Mean LSD (0.01)		19.07	6		1196.46	18		0.17	15		3.63	16		0.86	5		114.58	32	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	2084.96	112	0.00	220.91	96	0.63	0.00			3.60	117	0.18
ACH 921	234	1799.75	97	0.42	293.50	128	0.00	0.00			3.11	101	0.92
ACH 952	214	1939.26	105	0.20	228.46	99	0.93	0.00			2.25	73	0.04
ACH 953	230	1945.97	105	0.17	215.53	94	0.44	0.00			2.18	71	0.03
ACH 999	222	1921.18	104	0.32	224.07	97	0.75	0.00			3.00	101	0.95
Beta 6904	233	1948.70	105	0.16	213.55	93	0.38	0.00			2.82	92	0.54
Beta M5216	224	2010.66	108	0.02	299.63	130	0.00	0.00			3.72	121	0.11
Beta M813	221	1752.31	95	0.13	269.00	117	0.04	0.00			2.66	87	0.31
Beta M814	239	1778.56	96	0.26	227.75	99	0.90	0.00			2.73	89	0.39
Beta M815	217	1725.54	93	0.06	215.15	93	0.43	0.00			2.64	86	0.29
Beta M931	231	1752.19	95	0.13	209.42	91	0.28	0.00			2.82	92	0.54
Beta M932	237	1859.60	100	0.93	217.03	94	0.49	0.00			2.48	81	0.14
Filler 1	240	1671.91	90	0.01	214.71	93	0.42	0.00			3.09	101	0.96
Filler 2	241	1832.22	99	0.75	225.42	98	0.80	0.00			3.35	109	0.49
Filler 3	242	1942.93	105	0.19	219.83	96	0.59	0.00			2.89	94	0.66
HM 1642	228	1972.11	106	0.08	191.72	83	0.05	0.00			3.20	104	0.74
HM 1643	238	1644.48	89	0.00	217.65	95	0.51	0.00			4.24	138	0.00
HM 1645	223	2243.58	121	0.00	239.62	104	0.61	0.00			2.90	94	0.67
HM 7083	215	1941.39	105	0.19	206.77	90	0.22	0.00			4.12	134	0.01
HM 7089	216	1744.60	94	0.10	221.76	96	0.66	0.00			2.22	72	0.04
HM 7097	227	1861.11	100	0.91	232.95	101	0.88	0.00			3.75	122	0.09
HM 7100	236	1771.89	96	0.22	269.67	117	0.04	0.00			3.01	98	0.88
HM 7101	232	1756.31	95	0.15	246.48	107	0.39	0.00			2.50	81	0.15
HM E26	235	1683.98	91	0.01	216.69	94	0.46	0.00			3.80	124	0.07
HM E38	219	1684.06	91	0.01	245.64	107	0.42	0.00			3.20	104	0.75
HM Hector	226	1871.38	101	0.79	228.21	99	0.92	0.00			3.95	129	0.03
HM RH5	213	1838.10	99	0.81	206.85	90	0.22	0.00			2.52	82	0.17
Seedex Laser	229	1887.39	102	0.62	253.39	110	0.22	0.00			2.94	96	0.75
Seedex SX 1017	218	1786.71	96	0.32	236.22	103	0.75	0.00			3.59	117	0.19
Van der Have H66454	225	1962.00	106	0.11	196.15	85	0.08	0.00			2.72	89	0.39
Check of Mean		1853.83			230.13						3.07		
Coeff. Of Var (%)		6.66			19.27						32.39		
F Value		3.80**			1.79*						1.93**		
Mean LSD (0.05)		190.32	10		54.03	23					1.13	37	
Mean LSD (0.01)		251.38	14		71.38	31					1.5	49	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Semi Commercial Coded Trial - Lattice
Trial 995614, Degraff, MN
Planting Date: 04/28/1999 Harvest Date: 10/03/1999
30 Entries 6 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	275.32	99	0.53	5773.72	103	0.62	1.03	105	0.20	20.94	104	0.34	14.79	99	0.61	623.94	107	0.35
ACH 921	234	290.29	104	0.07	5720.37	102	0.76	1.02	104	0.34	19.66	98	0.61	15.52	104	0.04	613.37	106	0.48
ACH 952	214	295.82	106	0.01	6309.82	112	0.02	1.04	106	0.15	21.11	105	0.25	15.62	106	0.00	628.46	108	0.30
ACH 953	230	274.82	98	0.48	5451.68	97	0.55	1.05	108	0.05	19.82	99	0.74	14.80	99	0.63	729.54	126	0.00
ACH 999	222	287.73	103	0.16	6006.96	107	0.20	0.95	97	0.51	20.64	103	0.54	15.35	103	0.15	545.30	94	0.44
Beta 6904	233	278.41	100	0.90	5469.04	97	0.59	0.98	101	0.85	19.80	99	0.73	14.90	100	0.90	672.31	116	0.05
Beta M5216	224	270.58	97	0.16	5212.54	93	0.16	1.00	103	0.53	19.28	96	0.35	14.55	97	0.17	627.47	108	0.31
Beta M813	221	283.91	102	0.44	5941.66	106	0.29	0.99	101	0.75	20.95	104	0.33	15.18	102	0.39	590.49	102	0.83
Beta M814	239	290.12	104	0.08	5564.74	99	0.83	0.95	97	0.52	19.21	96	0.31	15.46	104	0.06	546.20	94	0.46
Beta M815	217	286.52	103	0.23	5501.24	98	0.66	0.90	92	0.05	19.35	96	0.39	15.22	102	0.31	527.84	91	0.25
Beta M931	231	270.20	97	0.14	5484.98	97	0.62	1.00	102	0.62	20.26	101	0.85	14.51	97	0.13	632.97	109	0.26
Beta M932	237	293.99	105	0.02	6133.11	109	0.09	0.90	93	0.07	20.94	104	0.34	15.59	104	0.02	565.61	97	0.75
Filler 1	240	285.13	102	0.33	5558.91	99	0.81	0.92	94	0.14	19.55	97	0.53	15.16	102	0.42	468.21	81	0.02
Filler 2	241	286.33	103	0.24	5742.21	102	0.70	0.94	96	0.36	20.02	100	0.93	15.26	102	0.26	547.39	94	0.47
Filler 3	242	260.10	93	0.00	5084.06	90	0.07	1.07	109	0.02	19.22	96	0.31	14.06	94	0.00	618.66	107	0.41
HM 1642	228	276.63	99	0.68	6081.65	108	0.12	0.98	100	0.98	21.81	109	0.05	14.80	99	0.64	641.25	110	0.19
HM 1643	238	278.98	100	0.97	5753.31	102	0.67	0.92	94	0.14	20.47	102	0.67	14.86	100	0.80	659.73	114	0.09
HM 1645	223	247.33	89	0.00	4850.34	86	0.01	1.25	128	0.00	19.34	96	0.38	13.61	91	0.00	719.95	124	0.00
HM 7083	215	269.71	97	0.12	5472.70	97	0.60	1.02	105	0.27	20.36	101	0.77	14.50	97	0.13	701.39	121	0.01
HM 7089	216	282.52	101	0.59	6579.46	117	0.00	0.88	90	0.01	23.19	115	0.00	15.01	100	0.79	486.51	84	0.04
HM 7097	227	291.26	104	0.05	6113.93	109	0.10	0.90	92	0.04	20.99	104	0.31	15.46	103	0.07	379.80	65	0.00
HM 7100	236	287.46	103	0.18	6129.35	109	0.09	0.93	95	0.25	21.39	106	0.14	15.31	102	0.19	476.94	82	0.03
HM 7101	232	286.96	103	0.20	5533.48	98	0.75	0.95	97	0.45	19.47	97	0.47	15.30	102	0.20	414.45	71	0.00
HM E26	235	277.92	100	0.84	4501.46	80	0.00	0.96	98	0.00	16.24	81	0.00	14.77	99	0.56	554.07	95	0.57
HM E38	219	277.54	99	0.79	5662.72	101	0.91	0.97	99	0.87	20.18	100	0.93	14.85	99	0.75	531.84	92	0.29
HM Hector	226	272.71	98	0.29	5189.91	92	0.14	0.98	100	0.94	18.76	93	0.13	14.62	98	0.27	609.91	105	0.52
HM RH5	213	285.57	102	0.30	6064.07	108	0.14	0.90	92	0.05	21.00	104	0.30	15.17	102	0.40	519.62	90	0.19
Seedex Laser	229	258.70	93	0.00	5001.29	89	0.03	1.05	108	0.06	19.46	97	0.46	13.99	94	0.00	634.42	109	0.24
Seedex SX 1017	218	277.51	99	0.78	5504.85	98	0.67	1.01	104	0.34	19.67	98	0.62	14.89	100	0.86	535.18	92	0.33
Van der Have H66454	225	275.23	99	0.52	5472.14	97	0.59	0.99	101	0.82	19.98	99	0.89	14.76	99	0.53	612.64	106	0.49
Check of Mean		279.18			5628.86			0.98			20.10			14.94			580.51		
Coeff. Of Var (%)		5.15			12.11			10.16			10.23			4.44			18.53		
F Value		3.18**			2.33**			3.50**			1.81*			3.07**			3.18**		
Mean LSD (0.05)		17.37	6		833.85	15		0.11	12		2.47	12		0.8	5		130.7	23	
Mean LSD (0.01)		22.94	8		1101.69	20		0.15	15		3.27	16		1.06	7		172.68	30	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Boilers %			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	1538.50	108	0.03	159.21	96	0.63	0.00			3.08	109	0.59
ACH 921	234	1447.00	102	0.67	171.19	104	0.64	0.00			3.17	112	0.46
ACH 952	214	1471.00	103	0.37	167.12	101	0.88	0.00			3.16	112	0.46
ACH 953	230	1531.50	107	0.04	146.45	89	0.13	0.00			2.66	94	0.71
ACH 999	222	1385.33	97	0.44	159.92	97	0.67	0.00			2.28	80	0.23
Beta 6904	233	1326.67	93	0.06	161.76	98	0.78	0.00			3.90	138	0.02
Beta M5216	224	1496.83	105	0.16	161.31	98	0.75	0.00			2.80	99	0.95
Beta M813	221	1505.83	106	0.12	147.31	89	0.15	0.00			2.48	88	0.45
Beta M814	239	1399.67	98	0.62	173.71	105	0.50	0.00			2.25	80	0.21
Beta M815	217	1400.17	98	0.63	135.30	82	0.02	0.00			2.78	98	0.91
Beta M931	231	1445.67	101	0.69	163.00	99	0.86	0.00			2.80	99	0.95
Beta M932	237	1373.43	96	0.31	126.39	76	0.00	0.00			2.66	94	0.71
Filler 1	240	1437.83	101	0.80	161.82	98	0.78	0.00			3.27	116	0.34
Filler 2	241	1387.00	97	0.46	161.52	98	0.76	0.27			3.18	113	0.44
Filler 3	242	1501.42	105	0.14	191.15	116	0.04	0.00			2.81	99	0.97
HM 1642	228	1379.50	97	0.37	143.09	87	0.08	0.00			3.00	106	0.71
HM 1643	238	1137.50	80	0.00	165.39	100	0.99	0.00			3.46	122	0.16
HM 1645	223	1724.33	121	0.00	227.41	138	0.00	0.00			2.48	88	0.44
HM 7083	215	1471.33	103	0.37	152.68	92	0.32	0.00			2.55	90	0.54
HM 7089	216	1347.00	95	0.13	147.66	89	0.16	0.00			2.84	100	0.98
HM 7097	227	1346.17	94	0.13	192.73	117	0.03	0.00			2.60	92	0.61
HM 7100	236	1402.83	98	0.66	189.59	115	0.05	0.00			2.23	79	0.19
HM 7101	232	1395.33	98	0.56	220.03	133	0.00	0.00			2.07	73	0.10
HM E26	235	1266.33	89	0.00	132.60	80	0.01	0.00			2.57	91	0.57
HM E38	219	1406.67	99	0.75	179.13	108	0.27	0.00			3.92	139	0.02
HM Hector	226	1438.50	101	0.79	149.91	91	0.22	0.00			3.36	119	0.24
HM RH5	213	1290.52	91	0.01	154.10	93	0.37	0.00			3.07	108	0.60
Seedex Laser	229	1475.83	104	0.32	195.47	118	0.02	0.00			2.93	103	0.83
Seedex SX 1017	218	1524.00	107	0.06	179.22	108	0.27	0.00			2.56	91	0.56
Van der Have H66454	225	1497.67	105	0.16	142.07	86	0.07	0.28			1.94	68	0.05
Check of Mean		1425.11			165.28						2.83		
Coeff. Of Var (%)		6.95			10.41						30.92		
F Value		3.98**			3.48**						1.08ns		
Mean LSD (0.05)		145.5	10		35.56	22					1.29	46	
Mean LSD (0.01)		192.15	13		46.96	28					1.71	60	

* Significant at 5%. ** Significant at 1%. Ns Not Significant
2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

American Crystal Sugar Co. - Technical Service Center
Southern Minnesota Semi Commercial Coded Trial - Lattice
Location SMSC - Four Trials
Trials 995611 995612 995613 995614
30 Entries 24 Reps X Loc 2 Rows/Plot 1 Samples/Plot

Entry	Source	1999 Rec/T (lbs)			1999 Rec/A (lbs)			1999 Loss to Mol.			1999 Yield (T/A)			1999 Sugar %			1999 Na (ppm)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	283.01	98	0.06	6416.90	102	0.54	1.21	107	0.00	22.63	104	0.15	15.36	98	0.12	421.34	102	0.69
ACH 921	234	298.08	103	0.01	6619.23	105	0.10	1.17	103	0.11	22.20	102	0.45	16.07	103	0.00	451.40	109	0.06
ACH 952	214	303.40	105	0.00	7025.07	112	0.00	1.15	102	0.36	23.12	106	0.03	16.32	105	0.00	450.67	109	0.07
ACH 953	230	291.30	101	0.54	6582.44	104	0.15	1.22	108	0.00	22.49	103	0.22	15.78	101	0.23	505.90	122	0.00
ACH 999	222	295.62	102	0.05	7221.26	115	0.00	1.15	101	0.50	24.29	112	0.00	15.93	102	0.03	411.28	99	0.91
Beta 6804	233	294.99	102	0.08	6133.15	97	0.39	1.13	100	0.98	20.80	96	0.13	15.88	102	0.06	482.60	117	0.00
Beta M5216	224	283.70	98	0.09	5611.99	89	0.00	1.18	105	0.02	19.73	91	0.00	15.37	99	0.14	414.48	100	0.96
Beta M813	221	295.60	102	0.05	6840.81	109	0.01	1.13	100	0.82	23.05	106	0.03	15.91	102	0.04	409.19	99	0.83
Beta M814	239	302.85	105	0.00	6657.81	106	0.07	1.09	96	0.07	21.96	101	0.71	16.23	104	0.00	382.05	92	0.12
Beta M815	217	296.33	102	0.03	6255.75	99	0.82	1.09	96	0.04	21.11	97	0.31	15.90	102	0.05	402.31	97	0.58
Beta M931	231	291.15	101	0.57	6492.37	103	0.32	1.12	99	0.57	22.21	102	0.44	15.68	101	0.60	441.02	107	0.17
Beta M932	237	303.85	105	0.00	6614.60	105	0.11	1.09	97	0.10	21.76	100	0.96	16.29	104	0.00	429.52	104	0.42
Filler 1	240	296.90	103	0.02	5855.77	93	0.02	1.04	91	0.00	19.75	91	0.00	15.88	102	0.07	332.14	80	0.00
Filler 2	241	291.45	101	0.51	6209.61	99	0.64	1.13	100	0.90	21.30	98	0.48	15.70	101	0.49	411.14	99	0.91
Filler 3	242	258.46	89	0.00	5466.97	87	0.00	1.22	108	0.00	21.07	97	0.28	14.15	91	0.00	482.78	117	0.00
HM 1642	228	289.39	100	0.97	6833.25	108	0.01	1.11	98	0.25	23.86	109	0.00	15.58	100	0.89	423.75	102	0.61
HM 1643	238	292.74	101	0.29	6568.27	104	0.17	1.05	92	0.00	22.36	103	0.31	15.68	101	0.57	452.29	109	0.06
HM 1645	223	265.69	92	0.00	6015.78	96	0.15	1.32	117	0.00	22.53	104	0.20	14.61	94	0.00	468.05	113	0.01
HM 7083	215	281.21	97	0.01	6042.36	96	0.19	1.19	105	0.02	21.51	99	0.71	15.25	98	0.02	486.28	118	0.00
HM 7089	216	293.13	101	0.24	6724.08	107	0.03	1.07	94	0.00	22.88	105	0.07	15.72	101	0.41	345.96	84	0.00
HM 7097	227	291.06	101	0.58	6602.54	105	0.12	1.09	96	0.06	22.69	104	0.12	15.64	100	0.76	303.32	73	0.00
HM 7100	236	288.28	100	0.76	6325.77	100	0.89	1.11	98	0.37	21.97	101	0.70	15.53	100	0.64	325.26	79	0.00
HM 7101	232	292.26	101	0.36	6487.82	103	0.33	1.09	97	0.09	22.26	102	0.39	15.71	101	0.48	307.82	74	0.00
HM E26	235	286.46	99	0.38	5649.46	90	0.00	1.05	93	0.00	19.66	90	0.00	15.37	99	0.14	413.82	100	0.99
HM E38	219	285.40	99	0.23	6004.20	95	0.13	1.12	99	0.51	20.99	97	0.23	15.39	99	0.17	387.14	94	0.19
HM Hector	226	289.86	100	0.86	5946.91	94	0.07	1.14	101	0.79	20.47	94	0.04	15.63	100	0.82	417.60	101	0.84
HM RH5	213	288.55	100	0.82	6015.57	95	0.15	1.08	95	0.02	20.86	96	0.16	15.51	99	0.55	434.34	105	0.30
Seedex Laser	229	274.85	95	0.00	5391.34	86	0.00	1.19	105	0.02	19.56	90	0.00	14.93	96	0.00	411.38	99	0.92
Seedex SX 1017	218	287.61	99	0.61	5979.45	95	0.10	1.11	98	0.39	20.73	95	0.10	15.49	99	0.50	372.12	90	0.04
Van der Have H66454	225	285.41	99	0.23	6383.94	101	0.66	1.16	102	0.32	22.42	103	0.27	15.42	99	0.26	427.59	103	0.48
Check of Mean		289.29			6299.15			1.13			21.73			15.6			413.49		
Coeff. Of Var (%)		4.4			10.42			8.8			9.37			3.75			19.25		
F Value		9.12**			5.40**			6.96**			3.81**			8.83**			6.42**		
Mean LSD (0.05)		9.24	3		551.63	9		0.07	6		1.75	8		0.44	3		57.1	14	
Mean LSD (0.01)		12.24	4		730.92	12		0.09	8		2.32	11		0.58	4		75.64	18	

Entry	Source	1999 K (ppm)			1999 Am. N (ppm)			1999 Bolters %			1999 Tare (%)		
		Mean	%	P-val	Mean	%	P-val	Mean	%	P-val	Mean	%	P-val
ACH 309	220	2001.05	112	0.00	249.45	99	0.81	0.00			4.36	114	0.16
ACH 921	234	1777.57	100	0.81	267.71	106	0.16	0.00			3.70	97	0.75
ACH 952	214	1811.81	101	0.44	246.25	98	0.60	0.00			3.22	84	0.12
ACH 953	230	1938.64	109	0.00	243.74	97	0.45	0.00			3.16	83	0.09
ACH 999	222	1831.72	103	0.18	253.18	100	0.92	0.00			3.28	86	0.17
Beta 6804	233	1734.86	97	0.13	240.36	95	0.29	0.00			4.14	108	0.41
Beta M5216	224	1899.32	106	0.00	262.93	104	0.33	0.00			4.34	114	0.18
Beta M813	221	1806.41	101	0.54	244.63	97	0.50	0.00			3.25	85	0.14
Beta M814	239	1714.19	96	0.04	251.01	100	0.92	0.00			3.31	87	0.19
Beta M815	217	1690.13	95	0.01	244.96	97	0.52	0.00			3.40	89	0.27
Beta M931	231	1768.38	99	0.61	236.45	94	0.16	0.00			3.86	101	0.92
Beta M932	237	1749.53	98	0.29	224.88	89	0.02	0.00			3.27	86	0.16
Filler 1	240	1663.17	93	0.00	238.26	95	0.22	0.00			4.23	111	0.29
Filler 2	241	1757.03	98	0.40	259.06	103	0.53	0.07			4.69	123	0.03
Filler 3	242	1902.69	107	0.00	265.89	105	0.22	0.00			4.24	111	0.28
HM 1642	228	1794.97	101	0.78	225.28	89	0.02	0.07			3.29	86	0.17
HM 1643	238	1513.26	85	0.00	243.64	97	0.45	0.00			4.66	122	0.03
HM 1645	223	2160.67	121	0.00	279.24	111	0.02	0.00			3.39	89	0.27
HM 7083	215	1868.74	105	0.02	243.94	97	0.47	0.00			3.86	101	0.91
HM 7089	216	1713.59	96	0.04	245.67	97	0.57	0.00			3.40	89	0.28
HM 7097	227	1742.12	98	0.20	270.90	107	0.09	0.00			3.91	102	0.81
HM 7100	236	1764.21	99	0.53	274.79	109	0.04	0.00			3.57	94	0.52
HM 7101	232	1700.82	95	0.01	282.99	112	0.01	0.00			3.85	101	0.94
HM E26	235	1590.87	89	0.00	237.85	94	0.20	0.00			4.48	117	0.09
HM E38	219	1721.10	96	0.06	268.25	106	0.15	0.00			4.34	114	0.18
HM Hector	226	1791.70	100	0.86	254.41	101	0.84	0.00			4.24	111	0.27
HM RH5	213	1704.26	95	0.02	223.19	89	0.01	0.00			4.13	108	0.42
Seedex Laser	229	1829.52	102	0.20	282.98	112	0.01	0.00			4.25	111	0.26
Seedex SX 1017	218	1758.68	98	0.42	258.89	103	0.54	0.00			3.82	100	0.99
Van der Have H66454	225	1869.63	105	0.01	241.76	96	0.36	0.07			2.93	77	0.02
Check of Mean		1785.69			252.08						3.82		
Coeff. Of Var (%)		8.64			15.97						40.56		
F Value		12.68**			2.11**						1.64*		
Mean LSD (0.05)		96.27	5		31.76	13					1.1	29	
Mean LSD (0.01)		127.56	7		42.07	17					1.46	38	

* Significant at 5% ** Significant at 1% Ns Not Significant
2nd column for each trait is percent of check. General Mean used as check.
3rd column for trait is probability that detection of a diff. (from check mean) of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is significant.

EVALUATION OF 1999 SMSC APPROVED VARIETY PERFORMANCE

OBJECTIVE:

Increase the scope of coded trial information using 1999 SMSC approved varieties at locations other than coded trial sites.

EXPERIMENTAL PROCEDURE:

Trials were planted and data collected from three locations in 1999. Varieties were replicated six times in a randomized complete block design. Experimental units were 3.67 ft. wide (2 rows) by 30 ft. long. Yield data were collected by harvesting entire experimental unit. Experiment specifications are listed in Table 1.

Table 1. Location, planting date, and harvest date of the evaluation of 1999 SMSC approved variety performance experiment.

Experiment Number	Location	Planting Date	Harvest Date
9913	Hancock	April 28	Sept. 27
*9914	Willmar	April 30	Oct. 14
9915	Redwood Falls	April 29	Sept. 20

* No CLS fungicide applications to facilitate varietal leafspot tolerance (Table3)

Table 2. Comparions of varieties commonly grown in SMBSC production area, Hancock location (exp 9913)

Varieties	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of test mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of test mean	Tons per Acre (tons)	Tons per Acre (%) of test mean	Sucrose (%)	Sucrose (%) of test mean	Loss to Molasses (%)	Loss to Molasses (%) of test mean
KW 6770	7487	91	295	95	25.38	96	15.77	95	1.02	101
HM Hector	7585	93	306	98	24.82	94	16.30	99	1.02	101
Beta 5296	7736	94	323	104	23.93	91	17.16	104	0.99	99
Beta 3945	7803	95	314	101	24.83	94	16.69	101	0.98	97
Beta 5014	7956	97	295	95	26.94	102	15.91	96	1.15	114
HM Viking	7997	98	287	92	27.85	106	15.43	93	1.08	107
ACH 205	7914	97	309	99	25.62	97	16.45	99	1.00	100
Seedex Laser	7863	96	325	105	24.19	92	17.20	104	0.95	94
Beta 5014 tach	7914	97	319	103	24.78	94	16.93	102	0.97	96
Pat ACH 302	8088	99	309	99	26.18	99	16.48	100	1.03	102
HM Resist	8106	99	315	101	25.74	98	16.80	102	1.05	104
HM 7057	8136	99	310	100	26.24	99	16.60	100	1.09	108
ACH 302	8348	102	310	100	26.92	102	16.47	100	0.96	96
HM Resist Tach	8339	102	313	101	26.68	101	16.67	101	1.04	103
ACH 309	8383	102	317	102	26.43	100	16.87	102	1.01	100
Beta 6904	8416	103	318	102	26.50	100	16.88	102	1.00	99
HM Niagra	8610	105	311	100	27.68	105	16.52	100	0.97	96
HM 7057 Tach	8670	106	317	102	27.38	104	16.79	101	0.95	95
Beta 6863	9011	110	307	99	29.32	111	16.32	99	0.95	94
VDH 46109	9489	116	314	101	30.23	115	16.65	101	0.96	95
	8192.50	**100**	**310.71**	**100**	**26.38**	**100**	**16.54**	**100**	**1.01**	**100**
C.V. %	8.99		4.89		8.65		3.99		15.03	
LSD (0.05)	703.20		17.40		1.67		0.56		0.17	

Table 3. Comparison of varieties commonly grown in SMSC production area, Willmar location (exp 9914) (not sprayed for CLS)

Varieties	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of test mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of test mean	Tons per Acre (tons)	Tons per Acre (%) of test mean	Sucrose (%)	Sucrose (%) of test mean	Loss to Molasses (%)	Loss to Molasses (%) of test mean	SMSC Rating 9-1-99	CLS1 (%) of test mean	SMSC Rating 10-15-99	CLS2 (%) of test mean	SMSC Rating average	CLS Coded trial Rating average
KW 6770	7183.39	87	246.88	94	29.10	93	14.15	95	1.81	102	3.67	130	7.00	114	5.33	wasn't tested
HM Hector	7334.70	89	264.79	100	27.70	89	14.96	100	1.72	97	3.50	124	7.67	125	5.58	4.41
Beta 6904	7693.34	93	270.72	103	28.42	91	15.20	102	1.66	94	4.17	147	7.33	120	5.75	4.7
Beta 6863	7820.47	95	259.21	98	30.17	96	14.74	99	1.78	101	3.50	124	6.67	109	5.08	4.42
HM Viking	7855.37	95	251.31	95	31.26	100	14.34	96	1.77	100	3.67	130	7.17	117	5.42	4.41
ACH 205	7916.89	96	247.65	94	31.97	102	14.13	94	1.75	99	3.00	106	5.17	84	4.08	3.8
HM Niagra	7985.79	97	257.80	98	30.98	99	14.73	98	1.84	104	2.83	100	6.83	111	4.83	wasn't tested
Seedex Laser	8011.28	97	255.44	97	31.36	100	14.61	98	1.84	104	2.67	94	5.67	92	4.17	3.82
Pat ACH 302	8087.49	98	258.87	98	31.24	100	14.86	99	1.92	109	2.50	88	5.83	95	4.17	4.42
Beta 5296	8151.62	99	269.01	102	30.30	97	15.23	102	1.78	101	1.67	59	4.83	79	3.25	3.57
ACH 309	8174.39	99	265.42	101	30.80	98	14.97	100	1.70	97	2.17	77	5.33	87	3.75	4.05
ACH 302	8204.30	99	260.25	99	31.53	101	14.93	100	1.91	109	3.17	112	5.67	92	4.42	4.42
Beta 5014 tach	8207.75	99	277.41	105	29.59	95	15.70	105	1.83	104	3.00	106	6.50	106	4.75	4.36
Beta 3945	8512.78	103	288.49	109	29.51	94	16.11	108	1.68	95	2.83	100	6.00	98	4.42	3.9
Beta 5014	8594.76	104	285.81	108	30.07	96	15.95	107	1.66	94	2.50	88	6.33	103	4.42	4.36
HM Resist Tach	8626.47	105	263.58	100	32.73	105	14.93	100	1.75	99	3.29	116	6.67	109	4.98	4.41
HM 7057 Tach	8867.39	107	262.10	99	33.83	108	14.86	99	1.76	100	2.33	82	6.17	101	4.25	3.86
HM Resist	8973.32	109	257.91	98	34.79	111	14.66	98	1.76	100	3.00	106	6.50	106	4.75	4.41
HM 7057	9144.96	111	257.55	98	35.51	114	14.76	99	1.88	106	2.17	77	6.00	98	4.09	3.86
VDH 46109	9677.59	117	279.15	106	34.67	111	15.43	103	1.47	84	1.00	35	3.33	54	2.17	3.7
MEAN	8251.20	100	263.97	100	31.28	100	14.96	100	1.76	100	2.83	100	6.13	100	4.48	4.16
C.V.	8.04		5.58		6.78		4.32		8.55		25.10		11.79		17.83	
LSD	759.32		16.863		2.4302		0.7411		0.1727		0.83		0.84		0.65	

Table 4. Comparions of varieties commonly grown in SMBSC production area, Redwood Falls location (exp 9915)

Varieties	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of test mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of test mean	Tons per Acre (tons)	Tons per Acre (%) of test mean	Sucrose (%)	Sucrose (%) of test mean	Loss to Molasses (%)	Loss to Molasses (%) of test mean
Seedex Laser	5801	85	285	96	20.37	88	15.42	97	1.18	101
Beta 5296	5953	87	287	97	20.72	90	15.45	97	1.09	92
Beta 5014	6404	94	289	98	22.13	96	16.17	101	1.70	145
Beta 5014 tach	6621	97	291	98	22.75	99	16.34	102	1.79	152
KW 6770	6634	97	289	98	22.92	100	15.64	98	1.17	100
HM 7057	6591	97	305	103	21.59	94	16.29	102	1.02	87
HM Hector	6697	98	291	98	23.03	100	15.70	98	1.16	99
Pat ACH 302	6684	98	295	100	22.64	98	16.04	100	1.27	108
HM Resist Tach	6670	98	299	101	22.28	97	15.83	99	0.86	73
ACH 309	6744	99	288	97	23.40	102	15.61	98	1.20	102
HM Viking	6990	103	296	100	23.61	103	15.89	100	1.08	92
HM 7057 Tach	6988	103	298	101	23.46	102	16.02	100	1.13	96
ACH 205	7086	104	281	95	25.26	110	15.20	95	1.17	100
Beta 3945	6978	102	317	107	22.02	96	16.91	106	1.07	91
Beta 6863	7108	104	306	103	23.22	101	16.48	103	1.17	100
HM Niagra	7175	105	302	102	23.79	103	16.26	102	1.18	101
HM Resist	7225	106	292	99	24.75	107	15.59	98	0.99	84
ACH 302	7239	106	304	103	23.82	103	16.22	102	1.02	87
VDH 46109	7299	107	305	103	23.95	104	16.41	103	1.17	99
Beta 6904	7375	108	297	100	24.85	108	15.91	100	1.07	91
	6813.14	**100**	**295.87**	**100**	**23.03**	**100**	**15.97**	**100**	**1.17**	**100**
C.V. %	9.56		6.93		8.52		5.06		18.87	
LSD (0.05)	674.70		15.48		1.64		0.63		0.16	

EVALUATION OF SUGARBEET VARIETIES FOR RHIZOMANIA TOLERANCE

OBJECTIVE:

Evaluate Rhizomania tolerant varieties for yield and quality in the presence or absence of soil-borne diseases.

EXPERIMENTAL PROCEDURE:

Data was gathered from three of four locations planted in 1999. Varieties were replicated six times in a randomized complete block design. Experimental units were 11 ft. wide (6 rows) by 30 ft. long, except at Willmar location which were 3.67 ft. wide (2 rows) by 30 ft. long. Yield data were collected by harvesting center two rows except at Willmar where entire experimental unit was harvested. Disease occurrence is listed with the experiment specifications in Table 1.

Table 1. Location, planting date, harvest date, and disease occurrence for evaluation of sugarbeet varieties for rhizomania tolerance experiment.

Exp. #	Location	Planting Date	Harvest Date	BNYVV	BSBMV	Aphano.
9901	Degraff	May 24	Sept. 29	+	+	-
9902	Gluek	May 19	Sept. 25	+	+	+
*9903	Bird Island	May 4	N/A	N/A	N/A	N/A
9904	Bird Island	May 4	Oct. 8	+	+	-
**9905	Willmar	April 30	Oct. 13	-	-	-

* Site abanded due to chemical misapplication residue
** No CLS fungicide applications to facilitate varietal leafspot tolerance (Table 5B)

Beta 6904 and HM Resist were used as check varieties. Locations were tissue sampled and visually examined to determine presence or absence of disease.

Table 2. Comparison of varieties with rhizomania resistance , DeGraff site, 1999 data.

BNYVV , BSBMV and Aphanomyces present

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre %) of mea	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (tons)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
98 040715 01	1	2993	101.63	266	107.53	11.23	94.86	14.38	105.74	1.06	87.42
HM 7083	2	3097	105.16	252	101.79	12.28	103.69	13.83	101.71	1.22	100.86
98 060186	3	3424	116.28	263	106.00	13.04	110.09	14.24	104.72	1.11	91.61
98 060105	4	2005	68.08	230	93.00	8.70	73.47	12.86	94.55	1.34	110.38
98 060662	5	3241	110.07	240	97.05	13.48	113.82	13.33	98.03	1.31	108.07
HM 7073	6	3103	105.36	245	98.67	12.69	107.16	13.48	99.12	1.25	103.70
H 46177	7	2893	98.22	245	98.83	11.81	99.75	13.36	98.25	1.12	92.33
H 44175	8	2796	94.95	219	88.18	12.80	108.06	12.18	89.57	1.26	103.87
H 68152	9	3014	102.35	223	90.15	13.49	113.95	12.55	92.28	1.38	114.12
BETA 4705	10	3136	106.49	263	106.28	11.91	100.56	14.41	105.96	1.24	102.69
BETA M930	11	3868	131.35	269	108.57	14.38	121.42	14.47	106.43	1.02	84.48
BETA M813	12	3404	115.58	250	101.08	13.59	114.76	13.73	100.95	1.21	99.63
BETA M706	13	2829	96.06	249	100.57	11.35	95.86	13.68	100.62	1.22	101.14
BETA 846	14	3975	134.99	275	110.79	14.48	122.28	14.78	108.67	1.05	86.90
BETA X924	15	2865	97.28	257	103.67	11.15	94.17	14.01	103.01	1.16	96.23
BETA M811	16	3964	134.59	264	106.38	15.04	126.98	14.25	104.77	1.07	88.32
SXRM1	17	2609	88.59	235	94.96	11.09	93.62	13.03	95.81	1.26	104.50
BETA X922	18	3199	108.63	255	102.90	12.55	105.95	13.94	102.47	1.19	98.06
ACH 922	19	2045	69.43	238	95.87	8.61	72.68	13.10	96.30	1.22	100.75
ACH 953	20	2892	98.20	246	99.09	11.78	99.46	13.60	100.02	1.32	109.50
RIVAL	21	2436	82.73	232	93.52	10.51	88.78	12.97	95.35	1.38	114.04
99 HX933	22	1952	66.27	245	98.74	7.98	67.36	13.45	98.88	1.21	100.30
SXRM2	23	2232	75.80	228	91.99	9.79	82.70	12.67	93.19	1.28	105.46
BETA 6904 (CHECK1)	24	2751	93.40	248	100.14	11.09	93.61	13.66	100.43	1.25	103.41
HM RESIST (CHECK 2	25	2721	92.40	251	101.25	10.85	91.58	13.67	100.53	1.13	93.13
SXRM3	26	3124	106.09	255	103.00	12.24	103.38	13.96	102.65	1.20	99.08
	Mean	2945.00	100.00	247.80	100.00	11.84	100.00	13.60	100.00	1.21	100.00
	C.V. %	15.46		7.76		14.42		6.37		10.83	
	LSD (0.05)	519		22		1.95		0.99		0.15	

Table 3. Comparison of varieties with rhizomania resistance Gluek site, 1999 data.

BNYVV and Aphanomyces present

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (tons)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
98 040715 01	1	3032	94.51	192	99.84	15.78	95.34	10.99	99.56	1.38	97.61
HM 7083	2	2832	88.28	197	102.18	14.40	87.02	11.28	102.25	1.45	102.72
98 060186	3	3925	122.35	204	105.97	19.25	116.29	11.56	104.74	1.36	96.33
98 060105	4	1308	40.77	163	84.61	8.03	48.53	9.54	86.46	1.40	99.06
98 060662	5	4400	137.17	185	95.92	23.84	144.03	10.77	97.64	1.54	109.31
HM 7073	6	4027	125.54	194	100.76	20.77	125.49	11.07	100.33	1.38	97.39
H 46177	7	2786	86.85	201	104.41	13.87	83.78	11.42	103.47	1.37	97.05
H 44175	8	2807	87.50	174	90.63	16.10	97.24	10.04	90.98	1.32	93.37
H 68152	9	3719	115.93	189	98.04	19.71	119.10	10.83	98.18	1.40	99.16
BETA 4705	10	3734	116.41	207	107.62	18.03	108.95	11.79	106.85	1.44	101.62
BETA M930	11	4046	126.12	208	107.84	19.50	117.79	11.73	106.29	1.35	95.74
BETA M813	12	3737	116.50	206	106.89	18.17	109.78	11.68	105.83	1.39	98.61
BETA M706	13	3062	95.44	201	104.28	15.26	92.18	11.38	103.15	1.35	95.46
BETA 846	14	4540	141.51	198	102.67	22.98	138.82	11.34	102.77	1.46	103.49
BETA X924	15	3724	116.07	203	105.56	18.33	110.75	11.57	104.87	1.41	100.18
BETA M811	16	4886	152.30	208	107.95	23.52	142.10	11.82	107.14	1.44	101.65
SXRM1	17	2935	91.49	175	90.79	16.80	101.49	10.10	91.49	1.36	96.24
BETA X922	18	3122	97.33	199	103.25	15.72	94.95	11.37	103.02	1.43	101.42
ACH 922	19	2856	89.04	197	102.23	14.52	87.73	11.11	100.69	1.27	90.23
ACH 953	20	3549	110.62	197	102.23	18.04	108.99	11.35	102.88	1.52	107.31
RIVAL	21	3483	108.58	182	94.78	19.10	115.39	10.72	97.14	1.60	113.24
99 HX933	22	1699	52.97	180	93.33	9.46	57.16	10.35	93.82	1.37	97.11
SXRM2	23	2329	72.60	181	94.17	12.85	77.65	10.58	95.87	1.52	107.45
BETA 6904 (CHECK1)	24	2432	75.83	195	101.14	12.50	75.51	11.13	100.86	1.40	98.93
HM RESIST (CHECK 2)	25	1837	57.27	182	94.48	10.11	61.05	10.49	95.07	1.40	99.07
SXRM3	26	2599	81.01	189	98.41	13.72	82.90	10.89	98.65	1.42	100.26
	Mean	3207.92	100.00	192.43	100.00	16.55	100.00	11.03	100.00	1.41	100.00
	C.V. %	10.66		6.15		7.81		5.15		6.84	
	LSD (0.	391.4400		13.5440		1.4771		0.6494		0.1104	

Table 4. Comparison of varieties with rhizomania resistance Bird Island site, 1999 data.
BNYVV present

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (tons)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
98 040715 01	1	5100	95.58	258	114.11	19.79	84.43	14.11	110.67	1.22	83.98
HM 7083	2	5437	101.91	213	94.09	25.59	109.16	12.04	94.43	1.41	97.08
98 060186	3	5253	98.46	218	96.37	24.14	102.98	12.24	96.03	1.36	93.35
98 060105	4	2490	46.67	183	81.15	13.59	57.96	10.92	85.66	1.75	120.68
98 060662	5	6496	121.76	220	97.22	29.59	126.23	12.50	98.04	1.52	104.40
HM 7073	6	6107	114.47	237	104.82	25.80	110.07	13.21	103.65	1.37	94.58
H 46177	7	5884	110.28	228	101.00	25.79	110.05	12.83	100.67	1.42	98.07
H 44175	8	6036	113.14	227	100.58	26.57	113.38	12.80	100.42	1.44	99.20
H 68152	9	5948	111.49	225	99.50	26.47	112.94	12.79	100.37	1.56	107.15
BETA 4705	10	5998	112.42	260	115.16	23.06	98.40	14.31	112.30	1.31	90.02
BETA M930	11	7317	137.14	253	112.09	28.90	123.31	14.00	109.85	1.34	92.40
BETA M813	12	5424	101.66	239	105.62	22.74	97.01	13.30	104.32	1.37	94.18
BETA M706	13	4636	86.89	233	102.98	19.93	85.05	13.13	103.02	1.50	103.38
BETA 846	14	7492	140.41	244	108.08	30.69	130.95	13.70	107.48	1.49	102.88
BETA X924	15	6429	120.50	248	109.77	25.93	110.64	13.78	108.15	1.39	95.53
BETA M811	16	6780	127.08	242	107.31	27.98	119.36	13.54	106.27	1.43	98.15
SXRM1	17	5152	96.57	197	87.13	26.18	111.71	11.32	88.78	1.48	101.64
BETA X922	18	5596	104.88	244	107.92	22.96	97.95	13.62	106.87	1.43	98.70
ACH 922	19	5770	108.15	230	102.03	25.04	106.84	12.86	100.87	1.33	91.78
ACH 953	20	4745	88.94	220	97.28	21.60	92.15	12.51	98.13	1.52	104.77
RIVAL	21	5057	94.78	212	94.03	23.81	101.60	12.20	95.73	1.58	108.91
99 HX933	22	3367	63.10	193	85.44	17.45	74.44	11.17	87.66	1.52	104.90
SXRM2	23	3717	69.67	205	90.77	18.13	77.36	11.77	92.31	1.52	104.34
BETA 6904 (CHECK1)	24	4333	81.21	231	102.23	18.77	80.06	12.86	100.87	1.31	90.26
HM RESIST (CHECK 2)	25	3013	56.47	194	85.89	15.53	66.27	11.33	88.91	1.63	112.44
SXRM3	26	5142	96.37	220	97.42	23.37	99.70	12.56	98.54	1.56	107.23
	Mean	5335.34	100.00	225.85	100.00	23.44	100.00	12.74	100.00	1.45	100.00
	C.V. %	12.63		10.51		8.11		8.67		9.62	
	LSD (0.05)	769.1700		27.1190		2.1705		1.2623		0.1596	

Table 5A. Comparison of varieties (not sprayed for Cercospora Leaf Spot) with rhizomania resistance for yield and quality, Willmar location, 1999 data.

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
98 040715 01	1	6934	100.13	261	103.83	26.54	96.28	14.71	102.67	1.66	94.07
HM 7083	2	6939	100.21	250	99.39	27.78	100.78	14.18	98.96	1.69	95.84
98 060186	3	6100	88.08	254	100.85	24.13	87.54	14.31	99.87	1.65	93.52
98 060105	4	6075	87.73	252	100.12	24.20	87.80	14.24	99.38	1.67	94.73
98 060662	5	6408	92.54	236	94.02	27.11	98.35	13.73	95.83	1.92	108.78
HM 7073	6	6107	88.19	247	98.33	24.72	89.66	14.17	98.87	1.82	103.27
H 46177	7	8075	116.60	257	102.11	31.48	114.18	14.45	100.83	1.61	91.55
H 44175	8	8157	117.79	238	94.75	34.15	123.89	13.71	95.67	1.80	102.04
H 68152	9	6839	98.75	248	98.46	27.67	100.39	14.09	98.33	1.72	97.67
BETA 4705	10	6704	96.81	267	106.08	25.18	91.35	15.19	105.99	1.86	105.49
BETA M930	11	8508	122.85	260	103.50	32.73	118.74	14.66	102.35	1.66	94.25
BETA M813	12	6494	93.78	245	97.60	26.49	96.08	14.05	98.05	1.79	101.62
BETA M706	13	7765	112.13	264	105.09	29.41	106.68	15.08	105.28	1.87	106.37
BETA 846	14	8326	120.23	253	100.78	32.83	119.11	14.51	101.28	1.83	104.12
BETA X924	15	6581	95.03	253	100.71	25.94	94.11	14.56	101.65	1.91	108.30
BETA M811	16	8389	121.14	266	105.69	31.60	114.64	14.85	103.65	1.57	89.30
SXRM1	17	6413	92.61	225	89.51	28.51	103.42	13.05	91.09	1.80	102.19
BETA X922	18	6082	87.82	250	99.39	24.36	88.37	14.41	100.54	1.92	109.00
ACH 922	19	7560	109.17	266	105.62	28.49	103.35	14.77	103.10	1.50	85.15
ACH 953	20	6578	94.99	256	101.97	25.76	93.44	14.65	102.23	1.82	103.53
RIVAL	21	5862	84.65	219	86.92	26.82	97.28	13.01	90.82	2.08	118.08
99 HX933	22	6122	88.41	262	104.10	23.41	84.92	14.74	102.87	1.66	94.06
SXRM2	23	6310	91.12	233	92.76	27.13	98.40	13.43	93.74	1.78	101.34
BETA 6904 (CHECK1)	24	6816	98.43	266	105.82	25.64	93.01	15.09	105.30	1.79	101.54
HM RESIST (CHECK 2	25	7035	101.58	258	102.64	27.25	98.85	14.62	102.01	1.71	97.01
SXRM3	26	6874	99.26	251	99.98	27.40	99.39	14.28	99.65	1.71	97.19
	Mean	6925	100.00	251	100.00	27.57	100.00	14.33	100.00	1.76	100.00
	C.V. %	8		6		6.15		4.32		10.49	
	LSD (0.05)	619		16		1.94		0.71		0.21	

Table 5B. Comparison of varieties (not sprayed for Cercospora Leaf Spot) with rhizomania resistance for cercospora leaf spot tolerance, Willmar Location, 1999 Data

Varieties	CLS 1	CLS 1 (%) of mean	CLS 2	CLS 2 (%) of mean	CLS 3	CLS 3 (%) of mean	CLS AVG	CLS AVG (%) of mean
98 040715 01	2.17	101.81	4.000	99.20	6.333	104.33	4.17	102.14
HM 7083	2.33	109.64	4.333	107.47	6.667	109.82	4.47	109.49
98 060186	2.50	117.47	4.167	103.34	6.333	104.33	4.33	106.22
98 060105	2.00	93.98	4.000	99.20	6.000	98.84	3.98	97.64
98 060662	2.50	117.47	4.500	111.61	6.333	104.33	4.43	108.67
HM 7073	2.17	101.81	4.833	119.87	6.833	112.57	4.63	113.58
H 46177	1.50	70.48	3.167	78.54	5.333	87.86	3.33	81.71
H 44175	1.33	62.65	2.833	70.27	4.500	74.13	2.88	70.68
H 68152	1.67	78.31	3.667	90.94	5.500	90.60	3.60	88.25
BETA 4705	3.00	140.96	4.833	119.87	7.333	120.80	5.05	123.79
BETA M930	1.33	62.65	2.667	66.14	4.167	68.64	2.75	67.41
BETA M813	3.17	148.80	5.167	128.14	7.333	120.80	5.23	128.28
BETA M706	2.33	109.64	4.000	99.20	5.833	96.09	4.05	99.28
BETA 846	1.67	78.31	3.000	74.40	4.667	76.87	3.12	76.40
BETA X924	2.83	133.13	5.000	124.01	7.167	118.06	5.02	122.97
BETA M811	1.33	62.65	2.500	62.00	4.333	71.38	2.72	66.59
SXRM1	2.50	117.47	4.667	115.74	6.667	109.82	4.62	113.17
BETA X922	2.67	125.30	5.333	132.27	7.500	123.55	5.17	126.65
ACH 922	1.50	70.48	3.167	78.54	4.833	79.62	3.17	77.62
ACH 953	3.00	140.96	5.333	132.27	7.500	123.55	5.27	129.10
RIVAL	1.83	86.14	4.167	103.34	5.833	96.09	3.95	96.83
99 HX933	2.83	133.13	5.167	128.14	7.167	118.06	5.05	123.79
SXRM2	2.17	101.81	4.000	99.20	6.333	104.33	4.17	102.14
BETA 6904 (CHECK1)	2.00	93.98	3.833	95.07	6.000	98.84	3.93	96.42
HM RESIST (CHECK 2	1.83	86.14	3.500	86.80	6.000	98.84	3.80	93.15
SXRM3	1.17	54.82	3.000	74.40	5.333	87.86	3.18	78.03
	2.13	100.00	4.03	100.00	6.07	100.00	4.08	100.00
	29.620		21.180		12.070		15.87	
	1.980		0.976		0.837		0.7394	

EVALUATION OF SUGARBEET VARIETIES FOR APHANOMYCES TOLERANCE

OBJECTIVE:

Evaluate aphanomyces tolerant varieties for yield and quality in the presence or absence of soil-borne diseases.

EXPERIMENTAL PROCEDURE:

Trials were planted and data collected from four locations in 1999. Varieties were replicated six times in a randomized complete bock design. Experimental units were 11 ft. wide (6 rows) by 30 ft. long, except at Willmar location which were 3.67 ft. wide (2 rows) by 30 ft. long. Stand count data were determined by counting live beets in 12 ft. of row of center two rows except at Willmar where no counts were taken. Yield data were collected by harvesting center two rows of six row plot except at Willmar where the whole plot was harvested. Disease occurrence is listed with the experiment specifications in Table 1.

Table 1. Location, planting date, harvest date, and disease occurrence for the evaluation of sugarbeet varieties for Aphanomyces tolerance experiment.

Exp. #	Location	Planting Date	Harvest Date	Stand Count Dates		BNYVV	BSBMV	Aphano.
				1st	2nd			
9906	Olivia	May 27	Sept. 24	June 21	July 14	+	-	+
9907	Buffalo Lake	May 28	Sept. 22	June 21	July 14	+	+	+
9908	Hector	May 28	Sept. 20	June 21	July 14	-	-	-
*9909	Willmar	April 30	Oct. 14	N/A	N/A	-	-	-

* No CLS fungicide applications to facilitate varietal leafspot tolerance (Table 5B)

Beta 6904, HM Resist, and ACH 309 were used as check varieties. Foliage and roots were visually evaluated for disase presence or absence.

Table 2. Comparison of varieties with aphanomyces tolerance, Olivia location ,1999 data

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean	1st stand count	2nd stand count
HM E38	1	2635	88.80	238	97.02	11.07	92.02	13.02	96.34	1.11	89.55	40	37
HM 7092	2	1295	43.65	221	89.93	5.87	48.80	12.36	91.47	1.32	106.71	37	34
HM 7092	3	1953	65.80	229	93.32	8.53	70.89	12.53	92.70	1.07	86.54	35	33
HM 7057	4	2822	95.11	246	100.20	11.48	95.43	13.46	99.62	1.16	93.83	43	42
HM 7097	5	2857	96.27	237	96.47	12.07	100.33	13.00	96.24	1.16	93.97	42	40
HM E26	6	2266	76.35	243	99.17	9.31	77.41	13.30	98.41	1.13	90.87	35	32
HM 7073	7	3422	115.31	266	108.21	12.88	107.14	14.47	107.11	1.19	96.16	46	45
HM RESIST	8	2249	75.80	234	95.38	9.61	79.90	13.15	97.31	1.44	116.46	40	37
H 46109	9	2691	90.68	235	95.65	11.46	95.32	12.93	95.70	1.19	96.17	44	40
H 46140	10	4075	137.33	265	108.07	15.36	127.76	14.46	107.00	1.19	96.35	47	46
H 46175	11	3895	131.26	244	99.36	15.97	132.82	13.43	99.38	1.23	99.66	44	42
H 46177	12	3843	129.50	251	102.30	15.31	127.28	13.72	101.57	1.17	94.33	46	46
H 68108	13	3821	128.75	244	99.33	15.67	130.31	13.46	99.62	1.27	102.45	45	43
H 6852	14	4025	135.63	245	99.79	16.43	136.65	13.41	99.24	1.16	93.78	47	44
H 681A	15	2323	78.27	222	90.62	10.44	86.84	12.43	92.01	1.31	105.81	36	33
H 682	16	2637	88.86	229	93.25	11.52	95.80	12.84	95.04	1.40	112.78	42	37
BETA 6863	17	2911	98.10	250	101.97	11.63	96.72	13.73	101.63	1.22	98.23	40	35
BETA 5014	18	2961	99.76	249	101.42	11.89	98.89	13.80	102.11	1.35	108.95	38	32
BETA M811	19	4371	147.28	252	102.77	17.33	144.07	13.99	103.57	1.38	111.43	48	46
BETA 5296	20	3007	101.32	254	103.30	11.86	98.60	13.97	103.39	1.29	104.29	37	31
BETA 6904	21	2756	92.89	256	104.20	10.78	89.62	13.82	102.28	1.03	83.28	35	32
BETA M706	22	3552	119.69	263	107.17	13.50	112.28	14.44	106.88	1.29	104.04	42	38
BETA 5216	23	2727	91.88	254	103.50	10.73	89.25	13.92	103.01	1.22	98.13	39	35
BETA 3945	24	3053	102.86	269	109.42	11.37	94.51	14.60	108.04	1.17	94.39	41	39
ACH 302	25	2373	79.95	244	99.53	9.71	80.77	13.56	100.36	1.34	108.60	34	33
ACH 309	26	2638	88.89	242	98.64	10.90	90.60	13.51	99.98	1.40	113.25	37	36
ACH 205	27	2076	69.96	235	95.55	8.85	73.61	12.96	95.94	1.24	99.80	41	38
ACH 9744	28	2210	74.46	241	97.99	9.19	76.40	13.10	96.97	1.08	86.88	39	38
98 APH 05	29	3331	112.26	245	99.62	13.62	113.29	13.56	100.35	1.33	107.52	43	41
98 HX 806	30	3502	118.02	236	96.10	14.85	123.48	13.01	96.28	1.21	98.06	42	41
98 HX 829	31	3537	119.18	248	100.92	14.28	118.73	13.52	100.05	1.13	91.46	42	40
99 HX 941	32	3462	116.66	247	100.69	14.01	116.49	13.46	99.63	1.10	89.18	44	40
SX 108	33	3073	103.56	251	102.42	12.23	101.66	13.72	101.51	1.15	92.50	39	37
BETA 6904 (CHECK 1)	34	2869	96.69	246	100.25	11.66	96.96	13.60	100.64	1.29	104.55	38	34
HM RESIST (CHECK 2	35	1792	60.40	220	89.65	8.15	67.73	12.39	91.66	1.38	111.60	41	39
ACH 309 (CHECK 3)	36	2295	77.34	240	97.96	9.55	79.38	13.29	98.32	1.26	101.94	39	38
Mean		2968	100.00	245	100.00	12.03	100.00	13.51	100.00	1.24	100.00	41	38
C.V. %		23.71		8.38		20.92		6.72		14.76		13.8	16.2
LSD (0.05)		536		19		2.36		0.88		0.26		5	7

Table 3. Comparison of varieties with aphanomyces tolerance, Buffalo Lake location ,1999 data

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean	1st stand count	2nd stand count
HM E38	1	1464	49.99	236	94.13	6.21	53.44	13.01	94.89	1.23	102.82	27	25
HM 7092	2	1696	57.90	238	94.89	7.14	61.40	13.0117	94.90	1.13	95.01	25	22
HM 7092	3	2414	82.41	242	96.67	9.97	85.78	13.36	97.44	1.26	105.50	25	22
HM 7057	4	2141	73.08	261	104.06	8.22	70.67	14.0383	102.39	1.01	84.88	31	30
HM 7097	5	3241	110.66	265	105.64	12.26	105.41	14.2783	104.14	1.05	88.39	32	28
HM E26	6	2454	83.79	246	98.29	9.97	85.78	13.55	98.83	1.25	104.51	23	20
HM 7073	7	4066	138.81	262	104.56	15.53	133.59	14.3983	105.01	1.31	109.78	33	30
HM RESIST	8	2286	78.03	257	102.64	8.89	76.49	13.9667	101.87	1.12	93.71	28	25
H 46109	9	2916	99.54	253	101.19	11.51	98.98	13.8267	100.85	1.16	97.21	33	28
H 46140	10	3331	113.72	252	100.83	13.20	113.49	13.84	100.94	1.22	102.12	36	34
H 46175	11	3258	111.22	239	95.54	13.62	117.13	13.2633	96.74	1.30	109.28	34	30
H 46177	12	3636	124.12	260	103.94	13.97	120.16	14.1617	103.29	1.15	96.39	34	30
H 68108	13	3016	102.96	232	92.65	13.00	111.83	12.855	93.76	1.26	105.42	31	29
H 6852	14	3706	126.51	256	102.43	14.45	124.28	14.0517	102.49	1.23	103.11	33	32
H 681A	15	2898	98.92	264	105.50	10.97	94.35	14.24	103.86	1.03	86.66	26	22
H 682	16	2382	81.32	240	95.78	9.93	85.44	13.215	96.38	1.22	102.77	30	25
BETA 6863	17	3299	112.63	254	101.62	12.97	111.53	13.8717	101.17	1.15	96.50	30	24
BETA 5014	18	2067	70.56	240	95.68	8.63	74.21	13.2867	96.91	1.31	109.82	27	22
BETA M811	19	5762	196.71	274	109.44	21.03	180.86	14.8	107.94	1.10	92.24	35	34
BETA 5296	20	2450	83.63	243	96.98	10.09	86.77	13.34	97.30	1.20	100.61	26	23
BETA 6904	21	3024	103.22	252	100.58	12.01	103.27	13.755	100.32	1.16	97.63	24	20
BETA M706	22	4049	138.23	249	99.60	16.24	139.65	13.7917	100.59	1.32	111.00	32	25
BETA 5216	23	2446	83.51	243	97.07	10.07	86.57	13.4267	97.93	1.27	106.91	28	24
BETA 3945	24	3351	114.39	259	103.25	12.96	111.48	14.1967	103.54	1.27	106.63	31	27
ACH 302	25	2567	87.62	256	102.44	10.01	86.07	13.8317	100.88	1.01	84.56	20	18
ACH 309	26	2241	76.51	237	94.62	9.46	81.37	13.115	95.65	1.27	106.53	24	22
ACH 205	27	1407	48.05	231	92.35	6.09	52.35	12.8033	93.38	1.24	104.20	27	26
ACH 9744	28	1977	67.48	242	96.80	8.16	70.14	13.2133	96.37	1.09	91.86	27	25
98 APH 05	29	3365	114.89	269	107.34	12.52	107.70	14.5633	106.22	1.13	94.42	32	28
98 HX 806	30	2038	69.59	230	91.68	8.88	76.38	12.7467	92.97	1.27	106.46	32	28
98 HX 829	31	2114	72.18	251	100.15	8.43	72.52	13.64	99.48	1.10	92.51	30	26
99 HX 941	32	2288	78.11	263	105.04	8.70	74.83	14.135	103.09	0.98	82.63	31	28
SX 108	33	2400	81.94	248	99.10	9.67	83.20	13.5617	98.91	1.16	96.99	26	25
BETA 6904 (CHECK 1	34	2726	93.07	264	105.56	10.32	88.72	14.3333	104.54	1.12	93.86	28	23
HM RESIST (CHECK	35	1893	64.63	226	90.14	8.39	72.15	12.6583	92.32	1.37	115.21	26	25
ACH 309 (CHECK 3)	36	2203	75.22	238	94.93	9.27	79.73	13.155	95.95	1.27	106.67	27	25
	Mean	2929	100.00	250	100.00	11.63	100.00	13.71	100.00	1.19	100.00	29.15	25.81
	C.V. %	18.26		10.07		13.67		7.80		12.15		17.4	19.5
	LSD (0.05)	381.0400		23.3210		1.3867		1.0352		0.2057		6	8

Table 4. Comparison of varieties with aphanomyces tolerance, Hector location ,1999 data

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean	1st stand count	2nd stand count
HM E38	1	5454	98.99	274	99.17	19.91	99.77	14.73	99.46	1.03	103.55	42	35
HM 7092	2	5580	101.29	281	101.77	19.85	99.48	15.03	101.48	0.97	97.46	40	34
HM 7092	3	5499	99.81	282	101.94	19.53	97.86	15.02	101.41	0.94	94.05	38	33
HM 7057	4	5549	100.73	294	105.40	18.88	94.63	15.59	105.25	0.89	89.36	43	37
HM 7097	5	5628	102.16	279	101.07	20.16	101.03	14.92	100.73	0.96	95.89	44	39
HM E26	6	4978	90.35	280	101.38	17.77	89.08	14.97	101.09	0.97	97.01	35	30
HM 7073	7	5577	101.24	285	103.15	19.57	98.10	15.20	102.63	0.95	95.34	42	37
HM RESIST	8	5613	101.88	272	98.58	20.61	103.30	14.75	99.59	1.13	113.60	40	37
H 46109	9	5687	103.23	277	100.11	20.57	103.07	14.80	99.92	0.97	97.26	46	43
H 46140	10	6048	109.77	277	100.21	21.85	109.49	14.81	99.99	0.97	96.94	49	45
H 46175	11	4842	87.89	262	94.85	18.48	92.62	14.20	95.87	1.10	110.06	38	37
H 46177	12	4680	84.95	267	96.51	17.55	87.98	14.37	97.00	1.03	103.77	39	37
H 68108	13	5756	104.49	272	98.41	21.17	106.12	14.63	98.81	1.04	104.37	47	44
H 6852	14	6205	112.63	264	95.41	23.54	117.99	14.21	95.95	1.03	103.53	48	45
H 681A	15	5633	102.25	268	97.17	20.99	105.18	14.46	97.64	1.04	104.15	46	43
H 682	16	4881	88.60	277	100.23	17.63	88.36	14.70	99.25	0.85	85.73	42	39
BETA 6863	17	5438	98.71	283	102.34	19.24	96.41	15.09	101.87	0.95	95.34	40	37
BETA 5014	18	5336	96.85	279	100.86	19.15	95.98	14.89	100.51	0.95	95.74	37	35
BETA M811	19	5019	91.10	271	98.28	18.49	92.66	14.61	98.62	1.03	103.40	38	35
BETA 5296	20	5551	100.75	284	102.97	19.51	97.80	15.19	102.59	0.97	97.33	37	36
BETA 6904	21	5768	104.70	275	99.40	21.01	105.28	14.75	99.59	1.02	102.21	45	42
BETA M706	22	5927	107.59	273	98.91	21.69	108.72	14.68	99.14	1.02	102.26	44	38
BETA 5216	23	5453	98.98	275	99.60	19.82	99.33	14.77	99.72	1.01	101.39	38	34
BETA 3945	24	6029	109.44	273	98.87	22.08	110.64	14.64	98.85	0.98	98.55	45	43
ACH 302	25	5634	102.26	281	101.77	20.04	100.43	15.13	102.17	1.07	107.67	45	43
ACH 309	26	5474	99.36	278	100.64	19.69	98.68	14.94	100.87	1.04	104.04	37	33
ACH 205	27	5412	98.24	269	97.50	20.09	100.71	14.43	97.43	0.96	96.46	41	35
ACH 9744	28	6332	114.94	290	105.06	21.82	109.35	15.49	104.62	0.98	98.45	49	44
98 APH 05	29	5790	105.10	263	95.27	22.00	110.27	14.30	96.57	1.14	114.59	48	46
98 HX 806	30	5652	102.59	261	94.60	21.63	108.40	14.17	95.68	1.10	110.74	45	41
98 HX 829	31	5619	101.99	272	98.38	20.68	103.63	14.54	98.16	0.95	95.12	44	39
99 HX 941	32	6034	109.52	274	99.21	22.01	110.33	14.65	98.92	0.95	94.90	46	42
SX 108	33	5090	92.39	271	98.24	18.76	94.00	14.57	98.37	1.00	100.24	40	37
BETA 6904 (CHECK 1)	34	5745	104.27	294	106.47	19.53	97.89	15.64	105.59	0.93	93.33	36	33
HM RESIST (CHECK 2)	35	5322	96.61	287	103.95	18.53	92.89	15.28	103.17	0.92	92.29	39	38
ACH 309 (CHECK 3)	36	5496	99.77	283	102.59	19.39	97.20	15.16	102.37	0.99	99.27	40	38
Mean		5509	100.00	276	100.00	19.95	100.00	14.81	100.00	1.00	100.00	42	38
C.V. %		10.89		6.29		9.35		5.18		10.84		15.6	18.3
LSD (0.05)		516.4700		16.5100		1.9270		0.7558		0.1599		4	5

Table 5A. Comparison of varieties with aphanomyces tolerance (not sprayed for cercospora leaf spot), for yield and quality, Willmar location, 1999 data.

Varieties	code	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
HM E38	1	6623	87.35	261	98.83	25.34	88.34	14.77	99.12	1.70	101.38
HM7092	2	7193	94.85	260	98.20	27.69	96.54	14.67	98.47	1.68	100.58
HM 7057	3	7231	95.36	257	97.31	28.10	97.96	14.67	98.48	1.80	107.76
HM 7097	4	6821	89.95	262	98.89	26.08	90.91	14.78	99.21	1.70	101.68
HM 7089	5	7443	98.16	270	102.26	27.52	95.94	15.09	101.30	1.57	93.70
HM E26	6	7796	102.81	273	103.41	28.50	99.37	15.24	102.33	1.57	93.80
HM 7073	7	7280	96.01	262	98.89	27.83	97.03	14.76	99.08	1.68	100.58
HM RESIST	8	7923	104.48	265	100.20	29.89	104.22	14.90	100.05	1.65	98.78
H 46109	9	7402	97.61	279	105.30	26.58	92.66	15.49	103.95	1.56	93.30
H 46140	10	8874	117.04	269	101.63	33.02	115.10	15.05	101.00	1.61	95.99
H 46175	11	7814	103.05	254	96.18	30.72	107.08	14.38	96.50	1.66	98.98
H 46177	12	9169	120.92	276	104.29	33.24	115.89	15.31	102.76	1.52	90.71
H 68108	13	8377	110.47	255	96.42	32.85	114.51	14.58	97.89	1.83	109.45
H 6852	14	6782	89.44	250	94.60	27.11	94.50	14.24	95.56	1.73	103.17
H 681A	15	8663	114.25	259	97.75	33.51	116.83	14.53	97.56	1.61	96.09
H 682A	16	8067	106.39	256	96.95	31.46	109.68	14.47	97.15	1.65	98.68
BETA 6863	17	7140	94.16	273	103.22	26.15	91.18	15.35	103.03	1.70	101.58
BETA 5014	18	7177	94.66	279	105.61	25.70	89.58	15.63	104.93	1.67	99.58
BETA M811	19	7972	105.13	265	100.31	30.05	104.76	14.94	100.26	1.67	99.88
BETA 8296	20	6860	90.47	265	100.29	25.86	90.16	14.91	100.11	1.65	98.68
BETA 6904	21	7104	93.68	263	99.55	26.98	94.06	14.88	99.89	1.72	102.57
BETA M706	22	7155	94.36	264	99.79	27.11	94.51	14.86	99.75	1.66	99.48
BETA 5216	23	6968	91.90	266	100.68	26.17	91.23	15.10	101.38	1.79	106.86
BETA 3945	24	7012	92.48	282	106.52	24.89	86.77	15.77	105.83	1.68	100.38
ACH 302	25	7566	99.78	261	98.72	28.98	101.02	14.82	99.46	1.76	105.36
ACH 309	26	7881	103.93	261	98.53	30.24	105.43	14.77	99.17	1.74	104.27
ACH 205	27	7374	97.25	248	93.88	29.70	103.54	14.16	95.07	1.75	104.47
ACH 9744	28	7818	103.11	256	96.63	30.59	106.65	14.43	96.83	1.65	98.49
98 APH 05	29	8122	107.11	264	99.94	30.73	107.12	14.81	99.43	1.60	95.40
98 HX806	30	6620	87.31	264	99.90	25.06	87.35	14.92	100.14	1.71	101.97
99HX829	31	8914	117.55	271	102.31	32.94	114.84	15.12	101.50	1.59	95.10
99HX941	32	8732	115.16	277	104.78	31.51	109.85	15.42	103.54	1.57	93.70
SX108	33	6911	91.14	261	98.59	26.50	92.40	14.73	98.90	1.70	101.38
BETA 6904 (CHECK1)	34	6872	90.63	266	100.67	25.81	89.98	15.08	101.23	1.77	105.66
HM RESIST (CHECK2)	35	7669	101.13	265	100.31	28.91	100.77	14.85	99.70	1.59	94.90
ACH 309 (CHECK3)	36	7652	100.91	261	98.67	29.32	102.22	14.82	99.45	1.77	105.66
Mean		7583	100.00	264	100.00	28.68	100.00	14.90	100.00	1.67	100.00
C.V. %		10		5		9.19		3.76		8.82	
LSD (0.05)		1049		14		3.75		0.64		0.17	

Table 5b. Comparison of varieties with aphanomyces tolerance (not sprayed for cercospora leaf spot), for cercospora leaf spottolerance, Willmar location, 1999 data.

Varieties	code	CLS 1	CLS 1 (%) of mean	CLS 2	CLS 2 (%) of mean	CLS 3	CLS 3 (%) of mean	CLS AVG	CLS AVG (%) of mean
HM E38	1	1.667	92.07	3.000	82.23	5.500	98.02	3.40	92.12
HM7092	2	2.500	138.11	4.333	118.78	6.833	121.78	4.53	122.83
HM 7057	3	2.000	110.49	3.833	105.08	5.833	103.96	3.90	105.67
HM 7097	4	2.167	119.69	4.000	109.64	6.000	106.93	4.07	110.19
HM 7089	5	2.500	138.11	4.500	123.35	6.667	118.81	4.57	123.73
HM E26	6	1.500	82.86	2.833	77.66	4.500	80.20	2.93	79.48
HM 7073	7	3.000	165.73	5.167	141.62	7.500	133.66	5.23	141.80
HM RESIST	8	2.167	119.69	4.167	114.21	6.500	115.84	4.28	116.06
H 46109	9	1.500	82.86	2.667	73.10	4.667	83.17	2.95	79.93
H 46140	10	1.500	82.86	3.167	86.80	4.833	86.14	3.18	86.24
H 46175	11	1.167	64.45	3.000	82.23	4.667	83.17	2.93	79.48
H 46177	12	1.500	82.86	3.500	95.94	5.167	92.08	3.40	92.12
H 68108	13	1.500	82.86	2.833	77.66	4.667	83.17	3.00	81.28
H 6852	14	1.833	101.28	3.667	100.51	5.500	98.02	3.67	99.35
H 681A	15	1.500	82.86	3.833	105.08	5.500	98.02	3.60	97.54
H 682A	16	1.333	73.66	3.667	100.51	5.500	98.02	3.48	94.38
BETA 6863	17	2.167	119.69	4.333	118.78	6.333	112.87	4.28	116.06
BETA 5014	18	2.333	128.90	4.333	118.78	6.500	115.84	4.40	119.22
BETA M811	19	1.333	73.66	3.167	86.80	5.000	89.11	3.17	85.80
BETA 8296	20	1.167	64.45	3.167	86.80	4.833	86.14	3.03	82.19
BETA 6904	21	2.333	128.90	3.500	95.94	6.000	106.93	3.97	107.48
BETA M706	22	1.667	92.07	3.833	105.08	5.667	100.99	3.72	100.70
BETA 5216	23	1.500	82.86	3.667	100.51	5.667	100.99	3.62	97.99
BETA 3945	24	2.500	138.11	4.500	123.35	6.667	118.81	4.55	123.28
ACH 302	25	2.000	110.49	4.167	114.21	5.667	100.99	3.93	106.57
ACH 309	26	1.500	82.86	3.167	86.80	5.333	95.05	3.32	89.87
ACH 205	27	1.667	92.07	3.833	105.08	6.000	106.93	3.85	104.32
ACH 9744	28	1.833	101.28	3.833	105.08	5.667	100.99	3.77	102.06
98 APH 05	29	1.667	92.07	3.333	91.37	5.500	98.02	3.48	94.38
98 HX806	30	1.500	82.86	2.833	77.66	4.333	77.23	2.92	79.03
99HX829	31	1.500	82.86	3.167	86.80	4.500	80.20	3.07	83.09
99HX941	32	1.167	64.45	3.667	100.51	4.833	86.14	3.23	87.61
SX108	33	1.833	101.28	3.167	86.80	5.333	95.05	3.45	93.48
BETA 6904 (CHECK1)	34	2.000	110.49	4.333	118.78	6.667	118.81	4.33	117.41
HM RESIST (CHECK2	35	2.167	119.69	4.167	114.21	6.333	112.87	4.22	114.25
ACH 309 (CHECK3)	36	2.000	110.49	3.000	82.23	5.333	95.05	3.43	93.02
	Mean	1.81	100.00	3.65	100.00	5.61	100.00	3.69	100.00
	C.V. %	40.030		25.870		16.450		20.55	
	LSD (0.05)	0.826		1.075		1.052		0.8642	

USE OF CHEMICAL FOR CONTROL OF APHANOMYCES

OBJECTIVE:

Evaluate performance of various fungicides and nitrogen for influence on soil borne diseases.

EXPERIMENTAL PROCEDURE:

Trials were planted and data collected from two locations in 1999. HM Resist and HM Hector were varieties planted. Treatments included untreated varieties, seed treated with Tachigaren at 45 g/kg, Vapam or Quadris fungicides, 30 or 60 pounds nitrogen in the form of urea applied and cultivated in at the 4-leaf crop stage, and combinations of each. Vapam and Quadris treatments were applied with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. Treatment dates are listed with the experiment specifications in Table 1.

Experiment design was a randomized complete block. Experimental units were 11 ft. wide (6 rows) by 30 ft. long. All data were collected from center two rows.

Table 1. Location, planting date, fungicide treatments, nitrogen application, stand count dates, and harvest dates for the use of chemical for control of Aphanomyces experiment.

Exp. #	Location	Planting Date	Fungicide Treatments	Nitrogen Application	Stand Count Dates		Harvest
					1st	2nd	
9910	Buffalo Lake	June 21	June 14	July 14	June 21	July 14	Sept. 23
9911	Hector	June 14	June 14	July 14	June 21	July 14	Sept. 20

Table 2. Comparison of chemical control with tolerant and susceptible varieties as influenced by root diseases influence on yield, quality, and stand count (exp 9911).
Ahpanomyces, and rhizomania present

Varieties*		Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of test mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of test mean	Tons per Acre (tons)	Tons per Acre (%) of test mean	Sucrose (%)	Sucrose (%) of test mean	Loss to Molasses (%)	Loss to Molasses (%) of test mean	June 14 Stand count	July 21 Stand count
Hector without Tach	Untreated	1715	94	214	95	8.02	100	12.18	95	1.48	97	25	22
Resist without Tach	Untreated	1698	93	239	106	7.10	88	13.41	105	1.45	94	30	28
Resist with Tach	Tachigaren	1669	92	232	103	7.19	89	13.08	102	1.46	95	38	37
Hector with Tach	Tachigaren	1874	103	223	99	8.40	104	12.67	99	1.52	99	35	32
Resist with Tach	Tachigaren + Vapam	1752	96	231	103	7.58	94	13.03	102	1.47	96	37	31
Hector with Tach	Tachigaren + Vapam	2414	133	249	110	9.69	120	13.93	109	1.48	97	34	33
Resist with Tach	Tachigaren + Quadris	1374	76	210	93	6.56	81	12.14	95	1.66	108	40	35
Hector with Tach	Tachigaren + Quadris	1884	104	234	104	8.04	100	13.26	104	1.54	101	36	35
Resist with Tach	Tachigaren + Vapam + Quadris	1340	74	222	98	6.05	75	12.69	99	1.61	105	39	38
Hector with Tach	Tachigaren + Vapam + Quadris	1986	109	237	105	8.39	104	13.38	105	1.55	101	35	33
Resist with Tach	Tachigaren + Nitrogen 30 lbs	1747	96	221	98	7.90	98	12.56	98	1.50	98	38	36
Hector with Tach	Tachigaren + Nitrogen 30 lbs	1515	83	219	97	6.93	86	12.54	98	1.61	105	33	30
Resist with Tach	Tachigaren + Nitrogen 60 lbs	1391	77	214	95	6.49	81	12.31	96	1.60	104	38	32
Hector with Tach	Tachigaren + Nitrogen 60 lbs	1877	103	227	101	8.27	103	12.86	100	1.51	99	34	34
Resist with Tach	Tachigaren + Vapam + Quadris + Nitrogen 3	2182	120	210	93	10.39	129	12.07	94	1.55	101	38	36
Hector with Tach	Tachigaren + Vapam + Quadris + Nitrogen 3	2191	121	243	108	9.01	112	13.63	106	1.47	96	36	35
Resist with Tach	Tachigaren + Vapam + Quadris + Nitrogen 6	2060	113	210	93	9.80	122	12.10	94	1.58	103	40	36
Hector with Tach	Tachigaren + Vapam + Quadris + Nitrogen 6	2110	116	244	108	8.64	107	13.69	107	1.47	96	38	35
Resist without Tach	Nitrogen 30 lbs	2145	118	216	96	9.94	123	12.34	96	1.55	101	27	20
Hector without Tach	Nitrogen 30 lbs	1589	87	224	99	7.11	88	12.76	100	1.59	103	28	26
Resist without Tach	Nitrogen 60 lbs	1355	75	210	93	6.44	80	12.10	94	1.58	103	31	30
Hector without Tach	Nitrogen 60 lbs	2102	116	229	101	9.20	114	12.92	101	1.49	97	24	20
		1816.87	**100**	**225.36**	**100**	**8.05**	**100**	**12.80**	**100**	**1.53**	**100**	**34.27**	**31.55**
C.V. %		19.43		15.49		16.29		15.28		22.59		18.5	16.3
LSD (0.05)		382.13		17.62		2.28		0.91		0.40		4	7

Hector = susceptible variety
Resist = tolerant variety
Nitrogen applied June 20
Tachigaren at 45 gram rate
Vapam applied at 9 gal
Quadris applied at planting at a rate of .15 oz ai/1000 ft rw

Table 3. Comparison of chemical control with tolerant and susceptible varieties as influenced by root diseases influence on yield, quality, and stand count (exp 9911).
Ahpanomyces, rhizoctonia present

Varieties		Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of test mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of test mean	Tons per Acre (tons)	Tons per Acre (%) of test mean	Sucrose (%)	Sucrose (%) of test mean	Loss to Molasses (%)	Loss to Molasses (%) of test mean	June 14 Stand count	July 21 Stand count
Hector without Tach	Untreated	2288	104	217	98	10.57	106	12.36	100	1.54	109	35	32
Resist without Tach	Untreated	2814	87	217	99	12.98	88	12.28	99	1.44	102	40	38
Resist with Tach	Tachigaren	3469	107	220	100	15.77	107	12.33	99	1.34	95	48	47
Hector with Tach	Tachigaren	3378	104	225	102	15.03	102	12.54	101	1.31	93	45	42
Resist with Tach	Tachigaren + Vapam	3520	81	225	103	15.61	79	12.52	101	1.24	88	47	41
Hector with Tach	Tachigaren + Vapam	3346	97	223	101	15.02	95	12.55	101	1.41	100	44	43
Resist with Tach	Tachigaren + Quadris	3700	114	225	102	16.45	112	12.75	103	1.51	107	50	45
Hector with Tach	Tachigaren + Quadris	3731	95	222	101	16.80	94	12.54	101	1.43	102	46	45
Resist with Tach	Tachigaren + Vapam + Quadris	3369	104	224	102	15.06	102	12.66	102	1.48	105	49	48
Hector with Tach	Tachigaren + Vapam + Quadris	3526	82	222	101	15.88	81	12.54	101	1.44	102	45	43
Resist with Tach	Tachigaren + Nitrogen 30 lbs	3217	99	214	97	15.03	102	12.11	98	1.40	99	48	46
Hector with Tach	Tachigaren + Nitrogen 30 lbs	3340	103	220	100	15.17	103	12.45	100	1.43	101	43	40
Resist with Tach	Tachigaren + Nitrogen 60 lbs	3319	123	216	98	15.33	124	12.37	100	1.55	110	48	42
Hector with Tach	Tachigaren + Nitrogen 60 lbs	3097	96	214	97	14.50	98	12.11	98	1.42	101	44	44
Resist with Tach	Tachigaren + Vapam + Quadris + Nitrogen 30 lbs	3436	106	220	100	15.61	106	12.45	100	1.44	102	48	46
Hector with Tach	Tachigaren + Vapam + Quadris + Nitrogen 30 lbs	3666	113	219	100	16.72	114	12.23	99	1.27	90	46	45
Resist with Tach	Tachigaren + Vapam + Quadris + Nitrogen 60 lbs	3263	101	226	103	14.47	98	12.69	102	1.41	100	50	46
Hector with Tach	Tachigaren + Vapam + Quadris + Nitrogen 60 lbs	3239	100	225	102	14.43	98	12.58	101	1.35	96	48	45
Resist without Tach	Nitrogen 30 lbs	2638	101	215	98	12.29	104	12.14	98	1.40	100	37	30
Hector without Tach	Nitrogen 30 lbs	2891	89	220	100	13.17	89	12.18	99	1.34	95	38	38
Resist without Tach	Nitrogen 60 lbs	2671	108	206	94	12.97	115	11.82	95	1.53	108	41	40
Hector without Tach	Nitrogen 60 lbs	2722	84	224	102	12.14	82	12.57	101	1.36	97	34	30
		3234.33	**100**	**219.87**	**100**	**14.73**	**100**	**12.40**	**100**	**1.41**	**100**	**44.27**	**41.56**
C.V. %		12.99		14.44		13.98		3.62		13.56		17.1	19.8
LSD (0.05)		479.77		11.16		2.36		0.51		0.22		6	7

Hector = susceptible variety
Resist = tolerant variety
Nitrogen applied June 20
Tachigaren at 45 gram rate
Vapam applied at 9 gal
Quadris applied at planting at a rate of .15 oz ai/1000 ft rw

CURRENT AND POTENTIAL SMBSC WEED CONTROL PROGRAMS

OBJECTIVE:

Evaluate the performance of potential weed control options and combinations, in addition to current weed control options.

EXPERIMENTAL PROCEDURE:

Experimental design was a randomized complete block. Data was accumulated from four locations planted in 1999. Treatments that included Roundup or Liberty herbicide had tolerant varieties seeded, respectively. Conventional plots were seeded to VDH 46109. Applications were made to the center four rows of six row by 30 ft. plots with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. Treatments included Roundup, Liberty, and the micro-rate alone; the micro-rate with twice the recommended Upbeet rate; combinations including Roundup, Liberty, or the micro rate following Dual II magnum ppi; Roundup, Liberty, or the micro-rate plus Frontier postemergence; and Roundup, Liberty, or the micro rate plus Dual II Magnum postemergence. Weed control evaluation dates were June 27 and July 26. No postemergence grass weed control products were applied to any of the treatments in order to compare the micro rate to the micro rate with pre-emerge and layby Frontier and Dual II Magnum. This is responsible for the decreased yields of the micro-rate alone treatments. Experiment and treatment specifications are presented in Table 1.

Table 1. Specifications for the SMBSC current and potential weed control options experiment.

Exp. #	Location	Pre-emerge Dual Treatments	Planting Date	Post-emerge Micro-Rate Based Treatments			Round-up or Liberty Based Treatments		Hand Harvested
				1	2	3	1	2	
9916	Hancock	April 28	April 28	May 18	May 25	June 2	June 2	June 15	N/A
9917	Buffalo Lake	April 26	April 29	May 18	May 25	June 2	June 2	June 15	Sept. 16
9918	Redwood Falls	April 29	April 29	May 18	May 27	June 2	May 27	June 16	Sept. 16
9919	Willmar	April 26	April 29	May 18	May 26	June 3	June 3	June 16	N/A

Table 1. Injury and efficacy data for SMSC weed control program trial, Hancock Location

TREATMENT	RATE	Injury	Injury (%) of mean	Purslane	Purslane (%) of mean	Redroot Pigweed 1	Redroot Pigweed 1 (%) of mean	Redroot Pigweed 2	Redroot Pigweed 2 (%) of mean	Yellow Foxtail 1	Yellow Foxtail 1 (%) of mean	Yellow Foxtail 2	Yellow Foxtail 2 (%) of mean	Common Lmbsqrtr 1	Common Lambsqrtr 1 (%) of mean	Common Lmbsqrtr 2	Common Lambsqrtr 2 (%) of mean	Wood Sorrel	Wood Sorrel (%) of mean
Roundup/Roundup	1 qt /1 qt	0	0.00	93.75	104.79	95.50	107.02	91.75	112.32	91.25	105.59	85.00	106.72	96.25	110.02	89.50	111.44	96.50	108.57
Liberty/Liberty	27 oz./27 oz.	0	0.00	96.75	108.15	97.75	109.54	90.75	111.10	96.25	111.37	90.50	104.72	93.50	106.87	85.00	105.83	88.00	99.01
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	0	0.00	92.25	103.12	91.00	101.96	78.00	95.49	73.50	85.05	65.00	75.21	85.25	97.44	76.25	94.94	91.00	102.38
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	5	230.30	95.25	106.47	91.00	101.96	76.25	93.35	60.00	92.57	76.25	88.23	85.25	97.44	76.25	94.94	94.50	106.32
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	4	172.73	99.00	110.66	99.00	110.94	91.25	111.71	98.00	113.40	91.75	106.17	98.00	112.02	91.75	114.24	98.50	110.82
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	1	57.58	99.00	110.66	99.00	110.94	92.25	112.93	98.50	113.98	91.00	105.30	99.00	113.16	90.50	112.68	98.75	111.10
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	1	57.58	94.00	105.07	93.25	104.50	85.00	104.06	98.50	113.98	91.75	106.17	95.00	108.59	83.75	104.28	91.00	102.38
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	10	450.61	94.50	105.63	91.50	102.54	83.00	101.61	91.25	105.59	83.25	96.33	89.75	102.59	83.00	103.34	94.25	106.04
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5% (3X)	15	690.91	99.00	110.66	99.00	110.94	92.25	112.93	93.00	107.61	85.75	99.22	99.00	113.16	91.75	114.24	98.25	110.54
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	0	0.00	85.75	95.85	85.00	95.25	68.75	84.17	88.00	101.83	83.25	96.33	88.75	101.44	81.75	101.79	75.50	84.94
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	0	0.00	95.50	106.75	97.25	108.98	90.50	110.79	98.00	113.40	90.00	104.14	96.00	109.73	89.25	111.12	99.50	108.57
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Frontier+Betanex+Upbeet+Stinger+MSO	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	3	115.15	96.75	108.15	94.50	105.90	86.25	105.59	85.50	98.93	77.50	89.68	86.25	98.59	78.75	98.05	97.75	109.98
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Frontier+Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%	1	57.58	89.00	99.49	88.00	98.61	85.00	104.06	88.25	102.12	82.50	95.46	83.50	95.44	76.25	94.94	93.25	104.91
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	0	0.00	97.25	108.71	97.25	108.98	91.25	111.71	97.75	113.11	88.25	102.12	96.25	110.02	88.25	109.88	99.00	111.38
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	0	0.00	97.25	108.71	96.75	108.42	87.50	107.12	97.50	112.82	88.25	102.12	95.25	108.87	89.75	111.75	99.00	111.38
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	0	0.00	86.50	96.93	93.50	104.78	87.00	106.51	94.50	109.35	87.00	100.67	96.75	110.59	90.50	112.68	87.25	98.16
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	98.00	109.55	99.00	110.94	92.25	112.93	87.75	101.54	78.75	91.12	91.00	104.02	83.75	104.28	98.00	110.26
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	1	57.58	88.25	98.65	87.25	97.77	83.00	101.61	84.50	97.76	77.50	89.66	87.50	100.02	80.00	99.61	91.75	103.23
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
Check 119 219 316 409		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean		2.171	100.00	89.46	100.00	89.237	100.00	81.564	100.00	86.421	100.00	79.645	92.16	87.467	100.00	80.316	100.00	89.882	100.00
C.V. %		194.73		7.28		6.87		7.66		6.79		6.88		9.43		9.36		10.62	
LSD (0.05)		5.100		9.22		8.677		8.500		8.700		7.700		16.000		10.900		13.500	

Table 2. Injury and efficacy data for SMSC weed control program trial, Buffalo Lake Location

Treatment	Rate	Injury	Injury (%) of mean	Stand	Stand (%) of mean	Lmbsqrtr 1	Lmbsqrtr 1 (%) of mean	Lmbsqrtr 2	Lmbsqrtr 2 (%) of mean	Green Foxtail 1	Green Foxtail 1 (%) of mean	Green Foxtail 2	Green Foxtail 2 (%) of mean	Redroot Pigweed 1	Redroot Pigweed (%) of mean	Redroot Pigweed 2	Redroot Pigweed (%) of mean	Venice Mallow	Venice Mallow (%) of mean
Roundup/Roundup	1 qt./1 qt.	3	292.31	94	102.12	91.50	111.57	93.00	122.86	85.50	107.99	97.75	127.51	82.25	100.66	90.50	106.93	91.50	108.66
Liberty/Liberty	27 oz./27 oz.	0	0.00	96	106.19	88.25	107.60	83.00	109.65	84.50	106.73	85.50	111.53	87.25	106.78	81.75	96.60	88.50	105.09
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	5	584.62	90	99.98	80.00	97.55	56.25	74.31	71.00	89.68	25.00	32.61	82.75	101.27	71.25	84.19	90.25	107.17
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	0	0.00	97	105.37	71.25	86.88	56.25	74.31	59.25	74.84	42.50	55.44	73.50	89.95	85.50	101.03	83.25	98.86
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	0	0.00	88	95.62	94.25	114.92	96.50	127.48	97.00	122.52	99.00	129.15	93.75	114.73	94.00	111.07	90.25	107.17
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	1	146.15	85	92.10	85.75	104.56	94.25	124.51	92.25	116.52	99.00	129.15	86.75	106.17	94.25	111.37	86.00	102.13
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	0	0.00	90	97.25	95.50	116.44	90.25	119.22	96.75	122.20	99.00	129.15	96.00	117.49	96.75	114.32	94.25	111.92
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (3	0	0.00	90	97.52	86.25	105.17	70.25	92.80	80.50	109.26	78.75	102.73	88.00	107.70	85.50	101.03	92.25	109.55
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5%	0	0.00	81	87.77	92.50	112.79	71.75	94.79	91.50	115.57	80.50	105.01	95.25	116.57	85.50	101.03	94.25	111.92
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	4	438.46	93	101.04	90.75	110.65	97.25	128.47	92.25	116.52	98.50	128.49	81.50	99.74	97.25	114.91	85.00	100.94
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	0	0.00	95	102.94	89.25	108.82	91.00	120.22	82.25	103.89	98.75	128.82	81.50	99.74	93.25	110.18	87.25	103.61
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Frontier+Betanex+Upbeet+Stinger+MSO	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	89	96.16	79.50	96.94	64.50	85.21	70.25	88.73	55.00	71.75	83.00	101.58	85.00	100.44	85.25	101.23
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Frontier+Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	96	103.75	81.25	99.07	67.25	88.84	76.75	96.94	72.25	94.25	86.00	105.25	89.75	106.05	84.75	100.64
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	0	0.00	94	102.12	90.75	110.65	97.75	129.13	89.50	113.05	98.25	128.17	90.25	110.45	98.75	114.32	83.50	99.16
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	4	438.46	95	102.67	92.00	112.18	95.25	125.83	92.50	116.84	99.00	129.15	85.00	104.03	92.00	106.71	93.25	110.73
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	0	0.00	97	104.56	87.75	107.00	86.25	113.94	86.00	108.63	99.00	129.15	83.00	101.58	95.25	112.55	92.75	110.14
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	93	100.50	85.50	104.25	63.75	84.22	77.75	98.21	65.00	84.79	89.25	109.23	87.50	103.39	90.25	107.17
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5	0	0.00	94	101.58	76.25	92.97	63.75	84.22	72.75	91.89	63.75	83.16	87.50	107.09	86.25	101.91	87.50	103.91
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																		
Check 119 219 316 409		0	0.00	96	103.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean		**0.855**	**100.00**	**92.289**	**100.00**	**82.013**	**100.00**	**75.697**	**100.00**	**79.171**	**100.00**	**76.658**	**100.00**	**81.711**	**100.00**	**84.632**	**100.00**	**84.211**	**100.00**
C.V. %		**418.78**		**5.89**		**9.42**		**9.24**		**11.34**		**15.89**		**10.00**		**7.68**		**10.59**	
LSD (0.05)		**5.071**		**7.443**		**10.940**		**13.099**		**12.700**		**17.240**		**11.570**		**9.204**		**12.633**	

Table 3. Yield and quality data for SMSC weed control program trial, Buffalo Lake location.

Treatment	Rate	Rec. Suc. per Acre (lbs)	Rec. Suc. per Acre (%) of mean	Rec. Suc. per Ton (lbs)	Rec. Suc. per Ton (%) of mean	Tons per Acre (lbs)	Tons per Acre (%) of mean	Sucrose (%)	Sucrose (%) of mean	Loss to Molasses (%)	Loss to Molasses (%) of mean
Roundup/Roundup	1 qt./1 qt.	6033	133.91	259	102.42	23.38	137.79	14.10	102.26	1.17	100.63
Liberty/Liberty	27 oz./27 oz.	6072	134.77	292	115.55	20.79	122.56	15.82	114.76	1.23	106.23
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	1833	40.68	287	113.82	6.49	38.22	15.53	112.68	1.16	100.20
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	1098	24.37	226	89.51	4.78	28.16	12.44	90.26	1.14	98.47
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	6625	147.06	254	100.45	26.12	153.95	13.96	101.25	1.28	109.89
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	5897	130.90	250	99.17	23.53	138.66	13.77	99.91	1.25	107.95
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	5081	112.79	261	103.43	19.22	113.27	14.29	103.66	1.23	106.23
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (3X	2544	56.47	270	107.01	9.63	56.73	14.66	106.36	1.15	99.33
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5% (	2650	58.82	278	110.31	9.57	56.39	15.15	109.90	1.22	105.37
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	8488	188.40	271	107.26	31.35	184.80	14.87	107.91	1.33	114.85
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	7705	171.02	275	109.02	28.06	165.36	15.01	108.87	1.24	107.09
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Frontier+Betanex+Upbeet+Stinger+MSO	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	2113	46.90	272	107.84	7.81	46.05	14.81	107.45	1.19	102.72
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Frontier+Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%	3779	83.89	278	110.00	13.61	80.21	15.10	109.56	1.22	104.94
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	8119	180.22	269	106.70	30.10	177.38	14.74	106.93	1.27	109.46
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	6910	153.38	239	94.83	28.74	169.41	13.24	96.04	1.27	109.46
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	6288	139.56	269	106.72	23.21	136.80	14.73	106.87	1.26	108.38
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	2233	49.56	282	111.69	7.86	46.33	15.27	110.75	1.17	100.63
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	2132	47.32	263	104.25	8.13	47.92	14.42	104.59	1.26	108.17
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
Check 119 219 316 409		0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean		4505.23	100.00	252.44	100.00	16.97	100.00	13.78	100.00	1.16	100.00
C.V. %		22		10		17.36		8.99		5.96	
LSD (0.05)		1379		35.3		4.17		1.75		0.09	

Table 4. Injury and efficacy data for SMSC weed control program trial, Willmar Location

TREATMENT	RATE	Injury	Injury (%) of mean	Stand	Stand (%) of mean	Green Foxtail 1	Green Foxtail 1 (%) of mean	Green Foxtail 2	Green Foxtail 2 (%) of mean
Roundup/Roundup	1 qt./1 qt.	84	117.80	0.00	0.00	99.00	110.50	88.75	109.64
Liberty/Liberty	27 oz./27 oz.	91	128.00	2.50	108.57	98.75	110.22	90.00	111.18
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	83	116.40	11.25	488.57	84.25	94.04	78.75	97.29
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	84	117.80	8.75	380.00	77.25	86.22	66.25	81.84
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	41	58.02	0.00	0.00	99.00	110.50	91.25	112.73
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	28	38.68	0.00	0.00	99.00	110.50	89.25	110.26
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	48	66.81	0.00	0.00	99.00	110.50	87.75	108.40
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (3	26	36.92	2.50	108.57	97.75	109.11	89.25	110.26
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5%	30	42.20	1.25	54.29	95.00	106.04	85.00	105.01
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	87	122.73	0.00	0.00	99.00	110.50	88.25	109.02
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	87	122.38	0.00	0.00	98.25	109.66	90.00	111.18
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
b) Frontier+Betanex+Upbeet+Stinger+MSO	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	88	123.08	2.50	108.57	88.25	98.50	80.00	98.83
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
b) Frontier+Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%	78	109.72	12.50	542.86	85.25	95.15	77.50	95.74
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	73	102.68	0.00	0.00	99.00	110.50	90.00	111.18
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	75	105.50	0.00	0.00	98.75	110.22	90.50	111.80
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	92	129.76	0.00	0.00	99.00	110.50	90.50	111.80
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	87	122.73	1.25	54.29	90.00	100.46	79.50	98.21
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5	84	118.51	1.25	54.29	95.75	106.87	85.50	105.62
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%								
Check 119 219 316 409		86	120.27	0.00	0.00	0.00	0.00	0.00	0.00
Mean		71.092	100.00	2.30	100.00	89.592	100.00	80.947	100.00
C.V. %		13.61		236.74		5.39		6.34	
LSD (0.05)		13.696		7.72		6.831		7.261	

Table 5. Injury and efficacy data for SMSC weed control program trial, Redwood Falls Location

TREATMENT	RATE	Injury	Injury (%) of mean	Stand	Stand (%) of mean	Common Lmbsqrtr 1	Common Lambsqrtr 1 (%) of mean	Common Lmbsqrtr 2	Common Lambsqrtr 2 (%) of mean	Green Foxtail 1	Green Foxtail 1 (%) of mean	Green Foxtail 2	Green Foxtail 2 (%) of mean	Redroot Pigweed 1	Redroot Pigweed 1 (%) of mean	Redroot Pigweed 2	Redroot Pigweed 2 (%) of mean
Roundup/Roundup	1 qt./1 qt.	3	292.31	94.25	102.12	91.50	111.57	93.00	122.86	85.50	107.99	97.75	127.51	82.25	100.66	90.50	106.93
Liberty/Liberty	27 oz./27 oz.	0	0.00	98.00	106.19	88.25	107.60	83.00	109.65	84.50	106.73	85.50	111.53	87.25	106.78	81.75	96.60
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	5	584.62	89.50	96.98	80.00	97.55	56.25	74.31	71.00	89.68	25.00	32.61	82.75	101.27	71.25	84.19
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	0	0.00	97.25	105.37	71.25	86.88	56.25	74.31	59.25	74.84	42.50	55.44	73.50	89.95	85.50	101.03
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	0	0.00	88.25	95.62	94.25	114.92	96.50	127.48	97.00	122.52	99.00	129.15	93.75	114.73	94.00	111.07
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	1	146.15	85.00	92.10	85.75	104.56	94.25	124.51	92.25	116.52	99.00	129.15	86.75	106.17	94.25	111.37
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	0	0.00	89.75	97.25	95.50	116.44	90.25	119.22	96.75	122.20	99.00	129.15	96.00	117.49	96.75	114.32
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (	0	0.00	90.00	97.52	86.25	105.17	70.25	92.80	86.50	109.26	78.75	102.73	88.00	107.70	85.50	101.03
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5%	0	0.00	81.00	87.77	92.50	112.79	71.75	94.79	91.50	115.67	80.50	105.01	95.25	116.57	85.50	101.03
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	4	438.46	93.25	101.04	90.75	110.65	97.25	128.47	92.25	116.52	96.50	128.49	81.50	99.74	97.25	114.91
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	0	0.00	95.00	102.94	89.25	108.82	91.00	120.22	82.25	103.89	98.75	128.82	81.50	99.74	93.25	110.18
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
b) Frontier+Betanex+Upbeet+Stinger+MS	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	88.75	96.16	79.50	96.94	64.50	85.21	70.25	88.73	55.00	71.75	83.00	101.58	85.00	100.44
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
b) Frontier+Betanex+Upbeet+Stinger+MS	8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	95.75	103.75	81.25	99.07	67.25	88.84	76.75	96.94	72.25	94.25	86.00	105.25	89.75	106.05
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	0	0.00	94.25	102.12	90.75	110.65	97.75	129.13	89.50	113.05	98.25	128.17	90.25	110.45	96.75	114.32
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	4	438.46	94.75	102.67	92.00	112.18	95.25	125.83	92.50	116.84	99.00	129.15	85.00	104.03	92.00	108.71
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	0	0.00	96.50	104.56	87.75	107.00	86.25	113.94	86.00	108.63	99.00	129.15	83.00	101.58	95.25	112.55
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	0	0.00	92.75	100.50	85.50	104.25	63.75	84.22	77.75	98.21	65.00	84.79	89.25	109.23	87.50	103.39
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5	0	0.00	93.75	101.58	76.25	92.97	63.75	84.22	72.75	91.89	63.75	83.16	87.50	107.09	86.25	101.91
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%																
Check 119 219 316 409		0	0.00	95.75	103.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean		0.855	100.00	92.29	100.00	82.013	100.00	75.697	100.00	79.171	100.00	76.658	100.00	81.711	100.00	84.632	100.00
C.V. %		418.79		5.70		9.42		12.21		11.34		15.89		10.01		7.68	
LSD (0.05)		5.072		7.44		10.941		13.090		12.707		17.249		11.578		9.204	

Table 6. Yield and quality data for SMSC weed control program trial, Redwood Falls Location

TREATMENT	RATE	Tons	Tons (%) of mean	Sugar	Sugar (%) of mean	LTM	LTM (%) of mean	RST	RST (%) of mean	RSA	RSA (%) of mean
Roundup/Roundup	1 qt./1 qt.	24	128.83	13.29	104.12	1.58	104.33	234.13	104.12	5669.40	126.46
Liberty/Liberty	27 oz./27 oz.	23	122.71	13.84	108.47	1.46	95.92	247.67	110.14	5734.10	127.90
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (3X)	13	67.21	14.02	109.84	1.30	85.37	254.38	113.13	3214.00	71.69
Betanex+Upbeet+Stinger+MSO	8 oz.+1/4 oz.+1.3 oz.+1.5% (3X)	8	42.70	13.00	101.85	3.14	207.17	197.08	87.65	1669.00	37.23
Dual/Roundup/Roundup	1 qt./1 qt./1 qt.	23	121.33	12.70	99.52	1.71	112.90	219.73	97.72	5003.50	111.61
Dual/Roundup/Roundup	1.67 pt./1 qt./1 qt.	22	117.50	12.94	101.38	1.67	110.26	225.32	100.20	5000.30	111.54
Dual/Liberty/Liberty	1 qt./27 oz./27 oz.	21	110.88	13.59	106.47	1.56	102.68	240.51	106.96	5031.00	112.22
Dual/Betanex+Upbeet+Stinger+MSO	1 qt./8 oz.+1/8 oz.+1.3 oz.+1.5% (3	23	122.78	13.73	107.61	1.36	89.66	247.41	110.03	5698.30	127.11
Dual/Betanex+Upbeet+Stinger+MSO	1.67 pt./8 oz./1/8 oz.+1.3 oz.+1.5%	21	113.27	14.15	110.88	1.40	92.46	254.93	113.37	5478.60	122.21
Frontier+Roundup/Roundup	25 oz.+1 qt./1 qt.	23	121.78	12.98	101.67	1.63	107.30	226.96	100.93	5189.30	115.75
Frontier+Liberty/Liberty	25 oz.+27 oz./27 oz.	18	95.21	13.76	107.83	1.54	101.20	244.46	108.72	4380.00	97.70
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Frontier+Betanex+Upbeet+Stinger+MSO	25 oz.+8 oz.+1/8 oz.+1.3 oz.+1.5%	22	115.39	13.05	102.28	1.57	103.50	229.61	102.11	4974.80	110.97
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Frontier+Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%	15	79.71	13.17	103.18	1.49	98.23	233.50	103.84	3493.10	77.92
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
Dual+Roundup/Roundup	1 qt.+1 qt./1 qt.	24	125.15	12.89	100.97	1.68	110.76	224.07	99.65	5272.40	117.61
Dual+Roundup/Roundup	1.67 pt.+1 qt./1 qt.	23	124.71	13.30	104.20	1.58	104.16	234.28	104.19	5517.20	123.07
Dual+Liberty/Liberty	1 qt.+27 oz./27 oz.	24	129.08	14.20	111.29	1.39	91.80	256.15	113.91	6233.70	139.05
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Dual+Betanex+Upbeet+Stinger+MSO	1 qt.+8 oz.+1/8 oz.+1.3 oz.+1.5%	19	102.21	13.93	109.16	1.34	88.18	251.85	112.00	4835.50	107.86
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
a) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
b) Dual+Betanex+Upbeet+Stinger+MSO	1.67 pt.+8 oz.+1/8 oz.+1.3 oz.+1.5	11	59.54	13.94	109.26	1.43	94.11	250.32	111.32	2784.90	62.12
c) Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5%										
Check 119 219 316 409		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mean		**18.804**	**100.00**	**12.76**	**100.00**	**1.517**	**100.00**	**224.861**	**100.00**	**4483.111**	**100.00**
C.V. %		**11.48**		**4.76**		**36.14**		**7.76**		**14.84**	
LSD (0.05)		**3.056**		**0.86**		**0.776**		**24.720**		**941.900**	

DUAL BY TILLAGE TRIAL

OBJECTIVE:

Determine the influence, if any, of the type of fall tillage to corn ground proceeding sugarbeet on fall or spring applied Dual II Magnum efficacy.

EXPERIMENTAL PROCEDURE:

The experiments were established in the fall of 1998 with moldboard plow and disk-chisel tillage operations performed. Tillage and herbicide treatments were replicated four times in randomized complete block design. Dual II Magnum fall applied treatments were made on November 4, 1998. Spring applied Dual II Magnum was applied April 23 in granular form. Treatments that received postemergence applications were made to the center four rows of six row by 30 ft. plots with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. Yield data was established by sampling ten ft. of row from each of center two rows of 6 row plots on September 20. Samples were weighed and analyzed for quality.

Table 1. Sugar beet yield and quality with Fall and spring applied Dual II Magnum as influenced by fall tillage type.

Fall Tillage Type	Application Timing	Herbicide Treatment	Ton/ ACRE	Ton/ ACRE % of Mean	Sugar Percent	Sugar Percent % of Mean	LTM	LTM % of Mean	RST	RST % of Mean	RSA	RSA % of Mean
Disk Chiesel	Fall	Dual	13.10	84.80	16.78	105.87	1.02	87.90	315.17	107.28	4136.77	91.67
Disk Chiesel	Spring	Dual	13.31	86.14	16.37	103.29	1.02	87.65	307.06	104.52	4086.10	90.54
Disk Chiesel	Fall Postemergence	Dual * Micro rate (3x)	19.00	123.01	16.17	102.03	1.14	98.23	300.63	102.33	5704.54	126.41
Disk Chiesel	Spring Postemergence	Dual * Micro rate (3x)	20.43	132.26	15.65	98.75	1.15	99.29	289.98	98.71	5923.27	131.25
Disk Chiesel	Postemergence	* Micro rate (3x)	16.20	104.86	16.14	101.83	1.16	100.15	299.53	101.96	4840.38	107.26
Disk Chiesel		Check	9.24	59.81	15.95	100.66	1.24	106.62	294.33	100.19	2718.69	60.24
Mold board	Fall	Dual	14.15	91.61	15.32	96.65	1.14	98.32	283.53	96.51	4003.69	88.72
Mold board	Spring	Dual	14.99	97.07	15.43	97.36	1.18	101.78	285.00	97.01	4247.43	94.12
Mold board	Fall Postemergence	Dual * Micro rate (3x)	17.42	112.75	15.29	96.44	1.20	103.17	281.75	95.91	4921.03	109.04
Mold board	Spring Postemergence	Dual * Micro rate (3x)	18.53	119.94	15.47	97.59	1.13	97.38	286.75	97.61	5333.25	118.18
Mold board	Postemergence	* Micro rate (3x)	23.16	149.95	15.26	96.25	1.16	99.91	281.91	95.96	6486.08	143.72
Mold board		Check	5.84	37.79	16.37		1.39		299.64		1753.05	
	Mean		**15.45**		**15.85**		**1.16**		**293.77**		**4512.86**	
	C.V. %		**9.60**		**14.20**		**18.00**		**16.40**		**12.95**	
	LSD (0.05)		**2.36**		**0.79**		**0.19**		**19.00**		**565.00**	

Micro Rate
Betanex @ 8 oz/acre
Stinger @ 1.25 oz/acre
Upbeet @ 1/4 oz/acre
Methylated Seed oil 1.5% V/V

Table 2. Fall and spring Dual application and tillage influence on sugarbeet injury and stand and weed control
Location Maynard

Fall Tillage Type	App. Timing	Herbicide Treatment	Injury	Injury (%) of mean	Stand	Stand (%) of mean	Redroot Pigweed	Redroot Pigweed (%) of mean	Smart-weed	Smartweed (%) of mean	Foxtail Species	Foxtail Species (%) of mean	Lmbsqrtr	Lmbsqrtr (%) of mean
Disk Chiesel	Fall	Dual	0.00	0.00	93.50	103.39	42.50	76.15	63.75	101.69	87.00	127.08	42.50	69.62
Disk Chiesel	Spring	Dual	2.50	600.00	88.25	97.58	47.50	85.11	47.50	75.77	76.00	111.02	51.25	83.96
Disk Chiesel	Fall Postemergence	Dual * Micro rate (3x)	1.25	300.00	93.50	103.39	90.75	162.60	85.75	136.79	87.00	127.08	96.50	158.09
Disk Chiesel	Spring Postemergence	Dual * Micro rate (3x)	1.25	300.00	94.25	104.22	96.25	172.45	85.50	136.39	92.00	134.39	90.50	148.26
Disk Chiesel	Postemergence	* Micro rate (3x)	0.00	0.00	94.75	104.77	74.75	133.93	86.00	137.19	66.25	96.77	80.50	131.88
Disk Chiesel		Check	0.00	0.00	91.00	100.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mold board	Fall	Dual	0.00	0.00	86.75	95.92	25.00	44.79	47.50	75.77	79.00	115.40	45.00	73.72
Mold board	Spring	Dual	0.00	0.00	90.00	99.52	26.25	47.03	79.00	126.02	82.00	119.78	55.00	90.10
Mold board	Fall Postemergence	Dual * Micro rate (3x)	0.00	0.00	87.50	96.75	92.00	164.84	90.50	144.37	86.75	126.72	95.25	156.04
Mold board	Spring Postemergence	Dual * Micro rate (3x)	0.00	0.00	81.00	89.56	86.75	155.43	85.75	136.79	90.25	131.83	87.75	143.75
Mold board	Postemergence	* Micro rate (3x)	0.00	0.00	93.50	103.39	88.00	157.67	81.00	129.21	75.25	109.92	88.25	144.57
Mold board		Check	0.00	0.00	91.25	100.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mean		**0.42**	**100.00**	**90.44**	**100.00**	**55.81**	**100.00**	**62.69**	**100.00**	**68.46**	**100.00**	**61.04**	**100.00**
	C.V. %		**316.23**		**8.93**		**15.58**		**11.85**		**9.69**		**10.97**	
	LSD (0.05)		**1.89**		**11.58**		**12.47**		**10.65**		**9.52**		**9.60**	

Micro Rate
Betanex @ 8 oz/acre
Stinger @ 1.25 oz/acre
Upbeet @ 1/4 oz/acre
Methylated Seed oil 1.5% V/V

Table 3. Sugar beet yield and quality with fall and spring applied Dual to Magnum as influenced by fall tillage type.
Location Hector

Fall Tillage Type	App. Timing	Herbicide Treatment	Tons	Tons (%) of mean	Sugar	Sugar (%) of mean	LTM	LTM (%) of mean	RST	RST (%) of mean	RSA (%)	RSA (%) of mean
Disk Chiesel	Fall	Dual	18.64	104.78	12.93	98.73	1.44	95.66	229.85	99.38	4279.30	104.61
Disk Chiesel	Spring	Dual	18.42	103.58	12.40	94.70	1.67	110.80	216.92	93.79	4000.20	97.79
Disk Chiesel	Fall Postemergence	Dual * Micro rate (3x)	24.63	138.46	13.25	101.17	1.38	91.83	237.36	102.62	5847.00	142.94
Disk Chiesel	Spring Postemergence	Dual * Micro rate (3x)	24.91	140.04	12.91	98.54	1.48	98.16	228.56	98.82	5687.70	139.04
Disk Chiesel	Postemergence	* Micro rate (3x)	19.43	109.23	13.84	105.70	1.06	70.37	246.73	106.68	4789.00	117.07
Disk Chiesel		Check	12.08	67.92	13.49	103.03	1.35	89.51	242.96	105.05	2917.70	71.33
Mold board	Fall	Dual	15.57	87.55	12.69	96.92	1.62	107.64	221.49	95.76	3435.80	83.99
Mold board	Spring	Dual	15.64	87.92	13.18	100.60	1.50	99.65	233.47	100.94	3635.00	88.86
Mold board	Fall Postemergence	Dual * Micro rate (3x)	17.64	99.19	13.05	99.63	1.65	109.97	227.89	98.53	4020.00	98.28
Mold board	Spring Postemergence	Dual * Micro rate (3x)	22.23	124.95	12.55	95.83	1.75	116.12	216.10	93.43	4793.10	117.17
Mold board	Postemergence	* Micro rate (3x)	18.32	103.00	13.25	101.17	1.64	109.30	232.12	100.36	4243.00	103.73
Mold board		Check	5.94	33.38	13.62	103.98	1.52	100.98	242.03	104.64	1438.80	35.17
	Mean		**17.79**	**100.00**	**13.10**	**100.00**	**1.50**	**100.00**	**231.29**	**100.00**	**4090.55**	**100.00**
	C.V. %		**7.93**		**4.89**		**14.51**		**6.88**		**8.55**	
	LSD (0.05)		**2.02**		**0.92**		**0.31**		**22.84**		**501.56**	

Micro Rate
Betanex @ 8 oz/acre
Stinger @ 1.25 oz/acre
Upbeet @ 1/4 oz/acre
Methylated Seed oil 1.5% V/V

Table 4. Fall and spring Dual application and tillage influence on sugarbeet stand and weed control
Location Hector

Fall Tillage Type	App. Timing	Herbicide Treatment	Stand	Stand (%) of mean	Green Foxtail	Green Foxtail (%) of mean	Lmbsqrtr	Lmbsqrtr (%) of mean	Redroot Pigweed	Redroot Pigweed (%) of mean	Eastern Black Nightshade	Eastern Black Nightshade (%) of mean
Disk Chiesel	Fall	Dual	72.75	114.23	89.50	118.58	93.25	117.70	99.00	118.77	89.25	118.31
Disk Chiesel	Spring	Dual	65.75	103.24	72.50	96.05	75.75	95.61	99.00	118.77	63.25	83.84
Disk Chiesel	Fall Postemergence	Dual * Micro rate (3x)	67.50	105.99	95.50	126.52	97.75	123.38	99.00	118.77	99.00	131.23
Disk Chiesel	Spring Postemergence	Dual * Micro rate (3x)	66.00	103.63	93.25	123.54	99.00	124.95	97.25	116.67	99.00	131.23
Disk Chiesel	Postemergence	* Micro rate (3x)	93.75	147.20	74.50	98.70	92.50	116.75	99.00	118.77	96.50	127.92
Disk Chiesel		Check	96.75	151.91	22.50	29.81	27.25	34.39	12.50	15.00	5.00	6.63
Mold board	Fall	Dual	38.75	60.84	88.50	117.25	81.00	102.24	99.00	118.77	78.00	103.40
Mold board	Spring	Dual	41.25	64.77	90.00	119.24	99.00	124.95	99.00	118.77	86.00	114.00
Mold board	Fall Postemergence	Dual * Micro rate (3x)	47.50	74.58	95.00	125.86	96.75	122.11	99.00	118.77	95.50	126.59
Mold board	Spring Postemergence	Dual * Micro rate (3x)	15.00	23.55	98.00	129.84	99.00	124.95	99.00	118.77	99.00	131.23
Mold board	Postemergence	* Micro rate (3x)	70.00	109.91	81.50	107.98	89.50	112.96	98.50	118.17	94.75	125.60
Mold board		Check	89.25	140.14	5.00	6.62	0.00	0.00	0.00	0.00	0.00	0.00
	Mean		**63.69**	**100.00**	**75.48**	**100.00**	**79.23**	**100.00**	**83.35**	**100.00**	**75.44**	**100.00**
	C.V. %		**35.36**		**17.43**		**23.46**		**60.68**		**21.85**	
	LSD (0.05)		**2.29**		**8.86**		**6.66**		**0.98**		**3.64**	

Micro Rate
Betanex @ 8 oz/acre
Stinger @ 1.25 oz/acre
Upbeet @ 1/4 oz/acre
Methylated Seed oil 1.5% V/V

SUGARBEET TOLERANCE TO FRONTIER, WILLMAR, 1999

OBJECTIVE:

Evaluate sugarbeet tolerance to Frontier applied at various growth stages.

EXPERIMENTAL PROCEDURE:

Sugarbeets were planted April 30, 1999. Experimental design was a randomized complete block. Treatments were replicated four times. Applications were made to the center four rows of six row plots by 30 ft. long experimental units with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. Treatments consisted of BAS 656 at 17.5 oz./A and 35 oz./A and Frontier at 32 oz./A at pre-emerge, cotyledon to 2-leaf, 2 to 4 leaf, 4 to 6 leaf, and 8 leaf + sugarbeet stages. Sugarbeets were evaluated for injury at 3, 7, 14, and 28 days after each treatment.

Table 1. Frontier effect on sugarbeet injury as influenced by application timing

Treatment	Rate	Crop Stage (Timing)	Injury 3 DAY	Injury 7 DAY	Injury 14 DAY	Injury 28 DAY
CHECK	N/A	N/A	0	0	0	0
BAS 656 07	17.5 oz.	preemerge	10	33	38	40
BAS 656 07	35 oz.	preemerge	10	25	23	25
FRONTIER	32 oz.	preemerge	8	10	5	0
BAS 656 07	17.5 oz.	Cot.-2lf	0	0	0	0
BAS 656 07	35 oz.	Cot.-2lf	0	0	0	0
FRONTIER	32 oz.	Cot.-2lf	0	0	0	0
BAS 656 07	17.5 oz.	2 - 4 lf	0	0	0	0
BAS 656 07	35 oz.	2 - 4 lf	0	0	0	0
FRONTIER	32 oz.	2 - 4 lf	0	0	0	0
BAS 656 07	17.5 oz.	4 - 6 lf	0	0	0	0
BAS 656 07	35 oz.	4 - 6 lf	0	0	0	0
FRONTIER	32 oz.	4 - 6 lf	0	0	0	0
BAS 656 07	17.5 oz.	8+ lf	0	0	0	0
BAS 656 07	35 oz.	8+ lf	0	0	0	0
FRONTIER	32 oz.	8+ lf	0	0	0	0
Mean			**1.719**	**4.219**	**4.063**	**4.063**
C.V. %			**51.43**	**46.85**	**53.29**	**0.00**
LSD (0.05)			**1.874**	**4.190**	**4.590**	**0.000**

Table 2. Sugarbeet yield and quantity of sugarbeets as influenced by Frontier

Treatment	Rate	Crop Stage (Timing)	Tons	Tons (%) of mean	Sugar	Sugar (%) of Mean	LTM	LTM (%) of Mean	Recoverable Sugar/Ton (RST)	Recoverable Sugar/Ton (%) of mean	Recoverable Sugar/Acre (%)	Recoverable Sugar/Acre (%) of mean
CHECK	N/A	N/A	16	63.50	12.85	94.88	1.60	93.94	224.96	95.01	3533.40	60.38
BAS 656 07	17.5 oz.	preemerge	27	109.04	13.61	100.47	1.75	102.61	237.20	100.18	6388.50	109.17
BAS 656 07	35 oz.	preemerge	22	87.78	13.72	101.29	1.71	100.55	240.06	101.39	5201.90	88.90
FRONTIER	32 oz.	preemerge	30	120.99	13.04	96.28	1.73	101.58	226.15	95.52	6753.00	115.40
BAS 656 07	17.5 oz.	Cot.-2lf	27	107.41	13.57	100.18	1.83	107.16	234.81	99.17	6232.30	106.50
BAS 656 07	35 oz.	Cot.-2lf	21	83.71	13.41	99.00	1.87	109.80	230.75	97.46	4772.70	81.56
FRONTIER	32 oz.	Cot.-2lf	29	117.43	13.58	100.27	1.73	101.28	237.10	100.14	6878.30	117.54
BAS 656 07	17.5 oz.	2 - 4 lf	29	117.10	13.71	101.23	1.63	95.56	241.65	102.06	6963.90	119.01
BAS 656 07	35 oz.	2 - 4 lf	25	100.40	14.14	104.41	1.70	99.96	248.60	105.00	6180.00	105.61
FRONTIER	32 oz.	2 - 4 lf	22	88.92	13.56	100.12	1.67	98.06	237.80	100.44	5225.30	89.30
BAS 656 07	17.5 oz.	4 - 6 lf	26	104.44	13.28	98.02	1.62	95.27	232.96	98.39	6020.70	102.89
BAS 656 07	35 oz.	4 - 6 lf	24	98.90	13.66	100.86	1.69	99.23	239.40	101.11	5840.50	99.81
FRONTIER	32 oz.	4 - 6 lf	26	105.41	13.77	101.67	1.61	94.68	243.11	102.68	6332.80	108.22
BAS 656 07	17.5 oz.	8+ lf	25	103.12	13.29	98.11	1.85	108.62	228.70	96.59	5813.80	99.35
BAS 656 07	35 oz.	8+ lf	25	103.12	13.78	101.77	1.70	99.67	241.65	102.06	6156.60	105.21
FRONTIER	32 oz.	8+ lf	22	88.73	13.74	101.43	1.57	92.04	243.38	102.79	5332.90	91.13
Mean			**24.70**	**100.00**	**13.54**	**100.00**	**1.70**	**100.00**	**236.77**	**100.00**	**5851.66**	**100.00**
C.V. %			**11.72**		**4.22**		**9.92**		**5.27**		**13.02**	
LSD (0.05)			**4.12**		**0.81**		**0.24**		**17.75**		**1083.20**	

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FRONTIER PLUS LIBERTY TIMING

OBJECTIVE:

Evaluate the postemergence-applied, lay by residual weed control effect of Frontier in Liberty Link sugarbeet.

EXPERIMENTAL PROCEDURE:

Sugarbeet were planted April 30, 1999. Experimental design was a randomized complete block replicated four times. Applications were made to the center four rows of six row plots by 30 ft. long experimental units with a bicycle wheel sprayer delivering 8.5 gpa at 40 psi through 8001 Tee-Jet nozzles. Treatments consisted of Liberty at 28 oz./A with spray grade ammonium sulfate alone and in combination with Frontier at 17.6 oz./A at various applications, timings and alternations. Sugarbeets were evaluated for injury and weed species for control. Spray dates for cotyledon beets was May 26, 2 to 4 leaf June 3, 4 to 6 leaf June 10. Evaluations were made June 28 and August 1.

Table 1. Frontier and Liberty effect on sugarbeet injury and control of giant foxtail and lambsquarter

Treatments	Application Stage	Rate	Eval. 1 Beet Injury %	Eval. 2 Beet Injury %	Eval. 1 Green Fxtl Control %	Eval. 2 Green Fxtl Control %	Eval. 1 Lambsqrtr Control %	Eval. 2 Lambsqrtr Control %
Untreated	N/A	N/A	0	0.00	0.00	0.00	0.00	0.00
Liberty +AMSU	Coty.-2lf	28 oz + 2.5 lb	6	0.00	86.25	67.50	75.50	62.50
Liberty+BAS 656+AMSU	Coty.-2lf	28 oz + 17.60 oz +2.5 lb	0	0.00	84.50	70.00	80.00	66.25
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb	0	0.00	92.25	75.00	88.50	80.00
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb	0	0.00	88.75	77.50	87.75	80.00
Liberty +AMSU	Cot.-2lf	28 oz + 2.5 lb	0	0.00	98.50	82.00	97.50	84.50
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb						
Liberty+BAS 656+AMSU	Cot.-2lf	28 oz + 17.60 oz +2.5 lb	0	0.00	98.50	87.50	94.00	83.00
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb						
Liberty +AMSU	Cot.-2lf	28 oz + 2.5 lb	0	0.00	98.50	93.00	97.50	90.00
Liberty +AMSU	4-6 lf	28 oz + 2.5 lb						
Liberty+BAS 656+AMSU	Cot.-2lf	28 oz + 17.60 oz +2.5 lb	0	0.00	97.50	90.75	94.75	90.75
Liberty+BAS 656+AMSU	4-6 lf	28 oz + 17.60 oz +2.5 lb						
Liberty +AMSU	Cot.-2lf	28 oz + 2.5 lb	0	0.00	98.00	90.00	96.50	88.25
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb						
Liberty +AMSU	4-6 lf	28 oz + 2.5 lb						
Liberty+BAS 656+AMSU	Cot.-2lf	28 oz + 17.60 oz +2.5 lb	0	0.00	98.50	93.00	97.00	88.25
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb						
Liberty+BAS 656+AMSU	4-6 lf	28 oz + 17.60 oz +2.5 lb						
Mean			0.57	0.00	85.57	75.11	82.64	73.95
C.V. %			398.00	0.00	2.37	4.82	3.49	4.78
LSD (0.05)			3.25	0.00	2.92	5.24	4.15	5.09

Table 2. Frontier with Liberty influence on yield and quality of sugarbeets

Treatments	Application Stage	Rate	Tons	Tons (%) of mean	Sugar	Sugar (%) of mean	LTM	LTM (%) of mean	RST	RST (%) of mean	RSA (%)	RSA (%) of mean
Untreated	N/A	N/A	13.14	54.25	13.26	95.83	1.80	90.33	229.25	96.74	3003.00	52.02
Liberty +AMSU	Cotyledon-2lf	28 oz + 2.5 lb	22.61	93.37	13.40	96.80	1.86	93.22	230.83	97.41	5234.00	90.67
Liberty+BAS 656+AMSU	Cotyledon-2lf	28 oz + 17.60 oz +2.5 lb	21.90	90.42	12.73	92.00	2.31	115.83	208.55	88.01	4584.60	79.42
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb	24.62	101.63	13.56	98.00	2.36	118.34	224.10	94.57	5540.30	95.98
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb	24.60	101.57	13.97	100.94	2.39	119.97	231.60	97.74	5706.50	98.86
Liberty +AMSU	Cotyledon-2lf	28 oz + 2.5 lb	25.31	104.52	14.19	102.49	1.82	91.33	247.36	104.39	6239.30	108.08
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb										
Liberty+BAS 656+AMSU	Cotyledon-2lf	28 oz + 17.60 oz +2.5 lb	26.11	107.82	14.44	104.34	1.70	85.55	254.70	107.48	6652.20	115.24
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb										
Liberty +AMSU	Cotyledon-2lf	28 oz + 2.5 lb	28.96	119.59	14.37	103.81	1.75	87.69	252.39	106.51	7300.50	126.47
Liberty +AMSU	4-6 lf	28 oz + 2.5 lb										
Liberty+BAS 656+AMSU	Cotyledon-2lf	28 oz + 17.60 oz +2.5 lb	27.31	112.77	14.20	102.57	1.78	89.20	248.37	104.81	6781.30	117.47
Liberty+BAS 656+AMSU	4-6 lf	28 oz + 17.60 oz +2.5 lb										
Liberty +AMSU	Cotyledon-2lf	28 oz + 2.5 lb	26.42	109.08	13.98	101.00	1.80	90.45	243.52	102.77	6439.90	111.56
Liberty +AMSU	2-4 lf	28 oz + 2.5 lb										
Liberty +AMSU	4-6 lf	28 oz + 2.5 lb										
Liberty+BAS 656+AMSU	Cotyledon-2lf	28 oz + 17.60 oz +2.5 lb	25.43	104.98	14.15	102.22	2.35	118.09	235.93	99.56	6016.90	104.23
Liberty+BAS 656+AMSU	2-4 lf	28 oz + 17.60 oz +2.5 lb										
Liberty+BAS 656+AMSU	4-6 lf	28 oz + 17.60 oz +2.5 lb										
Mean			**24.22**	**100.00**	**13.84**	**100.00**	**1.99**	**100.00**	**236.96**	**100.00**	**5772.59**	**100.00**
C.V. %			**8.31**		**3.90**		**35.37**		**6.94**		**11.61**	
LSD (0.05)			**2.89**		**0.78**		**1.01**		**23.65**		**964.26**	

LIBERTY RATE EFFICACY

OBJECTIVE:

Evaluate influence of Liberty rate on weed control and sugarbeet yield and compare to conventional weed control options.

EXPERIMENTAL PROCEDURE:

Liberty Link sugarbeet were planted April 30, 1999. Experimental design was a randomized complete block replicated four times. Applications were made to the center four rows of six row plots by 30 ft. long experimental units with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 nozzles. Treatments were Liberty at 20.5 oz., 24 oz. or 27 oz./A with 3 lb./A spray grade ammonium sulfate as needed. Liberty applications were made at 3 to 4 leaf crop stage (June 3) and 14-leaf (June 28); and Betanex+Upbeet+Stinger at 8 oz.+1/8 oz.+1.25 oz. per acre + 1.5% v/v methylated seed oil at cotyledon (May 18), 2-leaf (May 26), 3 to 4-leaf (June 3), and 14-leaf (June 28). Yield was obtained by sampling ten ft. of row from each of center two rows of 6-row plots, which were weighed and analyzed for quality. Evaluation of weed control were taken on June 28 and July 29.

TABLE 1. LIBERTY AND MICRORATE INFLUENCE ON WEED CONTROL, YIELD AND QUALITY IN SUGAR BEETS, EXP. 9923, WILLMAR LOCATION

TREATMENT	TONS/A	% SUGAR	LTM	REC. SUG./ TON	REC. SUG./ ACRE	YELLOW FOXTAIL Eval 1	YELLOW FOXTAIL Eval 2	LAMBS QUARTER Eval 1	LAMBS QUARTER Eval 2	REDROOT PIGWEED Eval 1	REROOT PIGWEED Eval 2
UNTREATED	22.13	16.50	1.38	302	6694	0	0	0	0	0	0
LIBERTY+AMS .268+3 1 inch weeds	30.72	16.94	1.13	316	9715	84	76	88	84	82	79
LIBERTY+AMS .312+3 1 inch weeds	32.87	16.48	1.16	307	10085	94	91	92	93	92	92
LIBERTY+AMS .357+3 1 inch weeds	32.77	16.78	1.15	313	10251	99	99	99	99	99	99
MICRO RATE plus poast cotyledon weeds	32.01	16.51	1.10	308	9878	95	98	94	91	93	91
LIBERTY+AMS .357+3 applied @ 3 inch weeds	31.75	16.14	1.11	301	9543	95	93	97	94	96	95
MEAN	30.37	16.56	1.17	308	9361	78	76	78	77	77	76
C.V.%	6.03	4.07	7.24	4.62	8.54	3.24	3.35	3.27	2.33	4.68	5.16
LSD (0.05)	2.72	1.00	0.13	21	789	4	4	4	3	5	6

ROUND-UP WEED CONTROL EFFICACY AND INFLUENCE ON YIELD

OBJECTIVE:

Define the start time and date(s) of subsequent applications of Round up ultra to Round up ready sugarbeet.

EXPERIMENTAL PROCEDURE:

Round up ready sugarbeet were planted April 30, 1999. Experimental design was a randomized complete block replicated four times. Herbicide applications were made to the center four rows of six rows by 30 ft. long experimental units with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 nozzles. All Round up treatments were 1.5 pt./A. Round up treatments that began at the 2-leaf stage were initiated on June 3, 4-leaf Round up treatments were initiated on June 10, the pre-emerge Dual treatment was made at 2.25 pt./A on May 7, and the micro-rate treatment that started at the colyledon stage was initiated on May 18 and was re-applied every seven days through June 10. The treatment list and crop stage of application can be found in Table 1. Yield was established by sampling ten ft. of row from each of center two rows of 6-row plots, which were weighed and analyzed for quality.

Table 1

Herbicide	Crop Stage at Application
Round up	V2,V2+10d, V2+20d
Round up	V2, V2+20 d
Round up	V2, V2+30d
Round up	V2, V2+20d, V2+40d
Round up	V2, V2+40d
Round up	V4, V4+10d,V4+20d
Round up	V4, V4+20d
Round up	V4, V4+20d,V4+40d
Round up	V4, V4+30d
Untreated check	
Micro-rate	Cotyledon, cotyl+7d,cotyl+14d,cotyl+21d
Dual/Round up	Pre-emerge/V2,V2+30d
Dual+Round V2, Round up	V2+40d

Sugarbeet stage abbreviations: Cotyl, cotyledon
V2, 2nd vegetative leaf stage
V4, 4th vegetative leaf stage, etc.
d, days

Roundup influence on weed control efficacy and yield of sugar beets. Willmar location, exp. 9924.

TRT #	TONS/A	SUGAR %	LTM	RST	RSA	EVAL 1 YELLOW FOXTAIL	EVAL 2 YELLOW FOXTAIL	EVAL 1 LAMBS QUARTER	EVAL 2 LAMBS QUARTER	EVAL 1 REDROOT PIGWEED	EVAL 2 REDROOT PIGWEED
Roundup 2lf/10days/20days	26.24	15.63	1.39	285	7478	99	92	100	92	100	92
Roundup 2lf/20 days	23.56	15.72	1.36	287	6781	100	94	98	89	99	89
Roundup 2 lf/ 30 days	25.01	15.97	1.27	294	7326	99	92	99	92	99	91
Roundup 2 lf/ 20 days/ 40 days	24.77	15.61	1.26	287	7080	100	92	100	94	100	92
Roundup 2 lf/ 40 days	22.90	15.66	1.20	289	6627	97	89	98	90	98	89
Roundup 4lf/10days/20days	23.61	15.81	1.20	292	6906	99	92	99	94	100	92
Roundup 4lf/20 days	21.94	15.31	1.12	284	6230	99	89	99	90	98	87
Roundup 4 lf/ 30 days	23.54	15.16	1.37	276	6495	100	88	99	89	99	88
Roundup 4 lf/ 20 days/ 40 days	23.67	15.81	1.28	290	6863	99	89	98	91	98	88
untreated	13.11	15.05	1.31	275	3616	0	0	0	0	0	0
micro-rate Select	24.29	15.31	1.42	278	6747	99	88	95	86	99	89
Dual preemergence 2lf/30 days	26.41	15.87	1.40	289	7639	100	92	99	92	99	91
Dual+Roundup 2lf Roundup 40 days	26.41	14.96	1.26	274	7229	100	95	99	94	99	93
Mean	23.50	15.53	1.30	285	6694	91.48	83.96	90.88	83.98	91.15	83.13
C.V. %	6.8	11.4	16.8	12.3	9.6	17.2	16.3	20.1	16.5	15.1	18.4
LSD	1.91	0.71	0.11	21	686	3	5	5	4	4	6

WEED CONTROL OPTIONS FOR TALL WATERHEMP

OBJECTIVE:

Evaulate products both currently labeled and those with potential to receive a label for use in sugarbeet for control of tall waterhemp among other weeds.

EXPERIMENTAL PROCEDURE:

The experiment was initiated in a previously planted commercial beet field near Comfrey with anticipated infestation of tall waterhemp. Treatments were replicated four times in a randomized complete block design. Applications were made to the center four rows of six row by 30 ft. plots with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. The treatment list can be found in Table 1 with application date information.

Table 1. Treatment, rates, and application dates for weed control options for tall waterhemp experiment.

Treatment	Rate	1st App.	2nd App.	3rd App.
Betanex (3X)	16 oz./16 oz./20 oz.	May 21	June 2	June 17
Betamix (3X)	16 oz./16 oz./20 oz.	May 21	June 2	June 17
Betanex+Stinger (3X)	16 oz.+2.5 oz. (3X)	May 21	June 2	June 17
Betanex+Upbeet(3X)	16 oz.+1/4 oz. (3X)	May 21	June 2	June 17
Betanex+Upbeet+Stinger+MSO (3X)	8 oz+1/8 oz.+1.25 oz.+1.5% (3X)	May 21	June 2	June 17
Betanex+Upbeet+Stinger+MSO (3X)	12 oz.+1/8 oz.+1.25 oz.+1.5% (3X)	May 21	June 2	June 17
Betanex+Upbeet+Stinger+MSO (3X)	16 oz.+1/8 oz.+1.25 oz.+1.5% (3X)	May 21	June 2	June 17
Betanex+Frontier/Betanex (2X)	16 oz.+32 oz.\16 oz. (2X)	May 21	June 2	June 17
Betanex+Dual II Mag/Betanex (2X)	16 oz.+2 pt.\16 oz. (2X)	May 21	June 2	June 17
Liberty/Liberty	27 oz./27 oz.	June 2	June 30	
Roundup/Roundup	1.5 pt.\1.5 pt.	June 2	June 3	
Betanex+Upbeet+Stinger+MSO (3X)	8 oz.+1/8 oz.+1.25 oz.+1.5%	May 21	June 2	June 17
Betanex+Upbeet+Stinger+MSO (3X)	8 oz.+1/8 oz.+1.25 oz.+1.5%	June 2	June 17	June 30
Untreated	N/A	N/A	N/A	N/A

Table 2. Efficacy and stand percent as influenced by postemergence herbicides in sugarbeets, location Sleepy Eye.

Treatment	Rate	Tall Waterhemp	Giant Foxtail	Eastern Black Nightshade	Percent Stand
Betanex (3X)	16 oz./16 oz./20 oz.	77	69	86	91
Betamix (3X)	16 oz./16 oz./20 oz.	70	72	79	95
Betanex+Stinger (3X)	16 oz.+2.5 oz. (3X)	76	67	89	93
Betanex+Upbeet(3X)	16 oz.+1/4 oz. (3X)	80	62	84	91
Betanex+Upbeet+Stinger+MSO (3X)	8 oz+1/8 oz.+1.25 oz.+1.5% (3X)	83	69	96	94
Betanex+Upbeet+Stinger+MSO (3X)	12 oz.+1/8 oz.+1.25 oz.+1.5% (3X)	88	63	99	92
Betanex+Upbeet+Stinger+MSO (3X)	16 oz.+1/8 oz.+1.25 oz.+1.5% (3X)	99	61	99	97
Betanex+Frontier/Betanex (2X)	16 oz.+32 oz.\16 oz. (2X)	99	78	99	87
Betanex+Dual II Mag/Betanex (2X)	16 oz.+2 pt.\16 oz. (2X)	99	77	99	84
Liberty/Liberty	27 oz./27 oz.	99	79	99	0
Roundup/Roundup	1.5 pt.\1.5 pt.	99	79	99	0
Betanex+Upbeet+Stinger+MSO (3X)	8 oz.+1/8 oz.+1.25 oz.+1.5%	78	56	96	99
Betanex+Upbeet+Stinger+MSO (3X)	8 oz.+1/8 oz.+1.25 oz.+1.5%	76	64	98	99
Untreated	N/A	0	0	0	99
	Mean	**80**	**64**	**87**	**80**
	C.V. %	**4.71**	**13.17**	**4.63**	**7.26**
	LSD (0.05)	**5**	**12**	**6**	**8**

COMPARISON OF VARIABLE RATES OF BETANEX OR MSO IN THE MICRO-RATE TO ROUND-UP, LIBERTY OR BETANEX ALONE

OBJECTIVE:

Determine the influence of variable methylated seed oil concentrations and Betanex rates in the spray solution on weed control when compared to Round up, Liberty, or Betanex alone.

EXPERIMENTAL PROCEDURE:

Sugarbeet were planted at Belgrade on May 3, 1999. Treatments that included Round up or Liberty herbicide had tolerant varieties seeded, respectively. Micro-rate and Betanex treatments were seeded to Beta 6863. Applications were made to the center four rows of six row by 30 ft. plots with a bicycle wheel sprayer delivering 8.5 gpa at 40 p.s.i. through 8001 Tee-Jet nozzles. The treatment list and evaluation dates are contained in Table 1 with weed control data. The Betanex and micro-rate treatments were each applied four times and included a grass control product in the fourth treatment; on May 19 at the colyledon beet stage, May 27 at the 2-leaf stage, June 3 at the 3-leaf, and June 10 at the 4 to 5-leaf. The Round up and Liberty treatments were initiated at 2" weed height and were applied twice; on May 27 at the 2-leaf stage, and on June 8 at the 4-leaf stage. Sugarbeet were not harvested nor yield determined due to poor beet emergence throughout plot.

Table 1. Weed control comparisons of Micro-rate, Roundup, Liberty, and Betanex with MSO volumes, Belgrade location, 1999

Product	Treatment	June 10 Green Foxtail	June 10 Lambs Quarter	June 21 Lambs Quarter	June 10 Redroot Pigweed	June 21 Redroot Pigweed	June 10 Alfalfa	June 21 Alfalfa	June 10 Quack	June 21 Quack	June 10 WIMW
Betanex+Upbeet+Stinger+MSO	12 oz.+1/8 oz.+1.3 oz.+1.5% (4X)	68	80	76	90	93	78	85	34	58	100
Roundup/Roundup	1.5 pt./1.t pt.	98	97	85	99	92	87	93	97	98	100
Liberty+AMSU/Liberty+AMSU	21.5 oz.+2.5 lb./21.5 oz.+2.5 lb.	93	99	85	99	94	99	99	76	86	100
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+0.5% (4X)	51	63	72	74	88	71	82	25	45	100
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1% (4X)	48	69	72	84	81	73	86	30	51	96
Betanex+Upbeet+Stinger+MSO+Quad 7	8 oz.+1/8 oz.+1.3 oz.+1%+1% (4X)	75	83	74	93	85	83	88	53	60	100
Betanex+Upbeet+Stinger+MSO	8 oz.+1/8 oz.+1.3 oz.+1.5% (4X)	75	85	77	93	94	83	89	46	61	100
Betanex/Betanex/Betanex/Betanex	16 oz./16 oz./20 oz./20 oz.	24	63	62	71	74	51	66	11	33	100
Mean		**66**	**80**	**75**	**88**	**87**	**78**	**86**	**47**	**61**	**100**
C.V.%		**18.3822**	**23.418**	**16.138**	**16.79**	**17.2592**	**11.391**	**12.055**	**21.547**	**21.0922**	**2.664**
LSD (0.05)		**17.815**	**27.223**	**17.723**	**21.495**	**21.984**	**13.011**	**15.125**	**14.633**	**18.921**	**3.8698**

SMSC LIME AND PHOSPHOROUS INFLUENCES ON SUGAR BEET, CORN, AND SOYBEAN PRODUCTION, HECTOR, 1999

OBJECTIVE:

Evaluate sugar beet, corn, and soybean production in soils amended with SMSC lime (precipitated calcium carbonate or PCC) and phosphorous and the influence on soil structure.

EXPERIMENTAL PROCEDURE:

Soil samples were obtained November 10, 1998 to determine soil characteristics prior to application of treatments. There was no significant difference among plots for pH and phosphorous levels. Treatments including 0,4,8,12, and 16 ton of PCC and 40,80,120 and 160 lb. P/acre were applied on November 12,1998. Experimental Units were 33 ft wide by 30 ft long to allow for each crop to be planted 6 rows wide in 22 inch rows. Crops were planted on April 27, 1999. Yield data was obtained by sampling 10 ft. from the middle 2 rows of sugar beets, 20 ft, from the middle two rows of the corn, and the entire soybean plot. Samples were weighed and analyzed for quality. This experiment will be conducted for a time span of at least 3 years. Soil will be tested annually for phosphorus levels and pH changes. Phosphorus and pH data for 1999 fall testing was not available at the time of this report.

Table 1. Sugarbeet quantity and quality as influenced by lime rate

Treatments	Tons	Tons (%) of mean	Sugar	Sugar (%) of mean	LTM	LTM (%) of mean	RST	RST (%) of mean	RSA	RSA (%) of mean
40 lb. p	23.04	97.56	14.83	100.28	1.62	101.93	264.17	99.25	6097.50	97.34
4 ton lime	23.29	98.65	14.90	100.77	1.57	98.87	266.71	100.21	6216.90	99.24
80 lb. p	27.06	114.61	14.59	98.65	1.64	103.35	258.91	97.28	7006.40	111.84
8 ton lime	24.51	103.80	15.01	101.49	1.47	92.63	272.66	102.44	6699.30	106.94
120 lb. p	27.50	116.47	14.73	99.65	1.67	105.39	261.21	98.14	7184.90	114.69
12 ton lime	26.80	113.50	14.26	96.42	1.53	96.57	254.43	95.59	6764.50	107.98
160 lb. p	24.65	104.38	14.33	96.93	1.61	101.46	254.41	95.59	6262.30	99.97
16 ton lime	20.82	88.19	15.13	102.34	1.56	98.15	271.49	102.00	5673.00	90.56
check	18.07	76.53	14.96	101.19	1.63	102.40	266.68	100.19	4819.40	76.93
check	20.38	86.31	15.12	102.27	1.58	99.25	290.94	109.31	5920.00	94.50
Mean	23.61	100.00	14.78	100.00	1.59	100.00	266.16	100.00	6264.42	100.00
C.V. %	9.760		5.412		7.923		6.330		11.346	
LSD (0.05)	3.328		1.163		0.182		24.329		1026.400	

Table 2. Soybean and corn yield as influenced by lime rate

Varieties	Soybean Moisture	Soybean Moisture (%) of mean	Soybean Yield	Soybean Yield (%) of mean	Corn Moisture	Corn Moisture (%) of mean	Corn Yield	Corn Yield (%) of mean
40 lb. p	0.07	98.54	43.92	95.89	0.42	272.73	165.82	96.87
4 ton lime	0.07	102.19	46.90	102.38	0.13	86.04	158.56	92.63
80 lb. p	0.07	102.19	48.10	105.01	0.10	63.31	170.83	99.79
8 ton lime	0.07	94.89	46.04	100.51	0.13	84.42	173.43	101.31
120 lb. p	0.08	113.14	47.35	103.37	0.10	63.31	176.97	103.38
12 ton lime	0.08	109.49	49.76	108.63	0.14	90.91	175.48	102.51
160 lb. p	0.07	105.84	46.94	102.48	0.14	87.66	174.24	101.78
16 ton lime	0.06	87.59	42.61	93.03	0.14	87.66	186.21	108.77
check	0.06	91.24	42.85	93.55	0.13	81.17	171.53	100.20
check	0.07	94.89	43.57	95.13	0.13	82.79	158.78	92.76
Mean	0.07	100.00	45.80	100.00	0.15	100.00	171.18	100.00
C.V. %	19.220		11.994		120.413		7.548	
LSD (0.05)	0.019		7.934		0.268		18.658	

CERCOSPORA LEAF SPOT CONTROL IN EASTERN NORTH DAKOTA AND MINNESOTA IN 1999

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Cercospora leaf spot, caused by the fungus *Cercospora beticola* Sacc. is the most serious leaf disease of sugarbeet (*Beta vulgaris* L.) in the production areas of North Dakota and Minnesota. This disease may cause reductions in tonnage and sucrose, and increase impurities. Losses as high as 30 percent in recoverable sucrose are fairly common under moderate disease conditions. Roots of diseased plants do not store in piles as well as roots of healthy plants. Limited tolerance to the triphenyl tin hydroxide (TPTH) fungicides was identified in the southern Red River Valley and southern Minnesota in 1994. This tolerance has increased in incidence and severity in the Red River Valley and southern Minnesota. Benzimidazole resistance is present in all production areas of North Dakota and Minnesota.

OBJECTIVES:

The research objectives of these trials were to evaluate the efficacy of labeled and experimental fungicides at controlling Cercospora leaf spot. These fungicides were applied alone, in tank mixes, or alternated at various application intervals not only to evaluate control, but also to evaluate management strategies to prevent or slowdown the buildup of tolerance or resistance to the fungicides. All 1999 test sites had known TPTH tolerance and benzimidazole resistance.

PROCEDURES:

Research was conducted at Crookston, Foxhome, Willmar, and Gluek, Minnesota. The cultural practices and application dates for each location are in **Table 1**. At all locations, plots were 11 feet wide (6-22 inches rows) and 35 feet long. The middle four rows received the fungicide applications. The middle two rows of each plot were harvested for yield and quality determinations. The Foxhome and Crookston analysis were completed at the American Crystal Sugar Company Quality Tare Laboratory, East Grand Forks, MN. Southern Minnesota samples were analyzed at the Southern Minnesota Beet Sugar Cooperative Laboratory, Renville, MN. The experiments were all arranged in a randomized complete block design with four replications. Cercospora leaf spot severity was rated on the KWS scale of 1 to 9. One indicates there is no disease, a rating of 3 indicates the early stages of economic loss level, and a rating of 9 indicates that the plants assessed have only new leaf growth, all earlier leaves being dead, and severe economic loss.

All sites were planted in April. All sites were affected by Cercospora leaf spot, with initial symptoms occurring around mid July.

There were 40 identical fungicide treatments at Willmar and Gluek in southern Minnesota, and 36 identical fungicide treatments at Foxhome and Crookston. The fungicides tested in 1999 are listed in **Table 2**. The application interval for each treatment at each site is indicated in the tables for the respective sites.

RESULTS AND DISCUSSION:

The effect of the treatments for Cercospora leaf spot control for the test sites are shown in Tables 2, 3, 4, and 5. **Please note** that some treatments having TPTH exceeded the labeled amounts to be applied for a given season. Only 15 oz/A of TPTH is allowed per season. A Section 18 label was granted for Eminent 125 SL on sugarbeet for the 1999 cropping season. **Another Section 18 label for Eminent 125 SL on sugarbeet in North Dakota and Minnesota was also granted for the 2000 cropping season.** Registration status of all other experimental fungicides for the 2000 cropping season is not known at this time.

Crookston:

Cercospora leaf spot damage was fairly high at Crookston as is indicated in the check plots (**Table 3**), but was not as severe as in 1998. All the fungicide treatments resulted in significantly higher recoverable sucrose per acre than the check plots. The best fungicide treatment of the registered compounds, Topsin M + Penncozeb (App 1) / Penncozeb (App 2,4) / TPTH (App 3,5), increased recoverable sucrose (lb/A and lb/T), root yield, and sucrose content by 2628 lb/A, 34 lb/T, 5.7 T/A, and 1.3 % respectively, when compared to the untreated check.

Eminent, with a Section 18 label for 1999, when used with Topsin M, Penncozeb, and TPTH as a resistance management strategy, provided excellent Cercospora leaf spot control and was one of the best treatments.

The most effective treatments were with the experimental fungicides: BAS 500 + Agri-dex COC, BAS 500 + X-77, and BAS applied alone. There were some spotty damage to leaves on plots treated with BAS 500 + Methoil.

Foxhome:

Cercospora leaf spot progressed rapidly at Foxhome after it was first detected on 13 July. Disease pressure was very high during the season and the untreated check plots had only re-growth canopy and a KWS Cercospora leaf spot rating of 8.9 at harvest (**Table 4**).

All treatments, except Quadris applied alone, Benlate applied alone, Benlate applied in alternation with Manzate, and TPTH applied in alternation with TRA0019, resulted in significantly higher recoverable sucrose per acre than the check plots. The most effective treatments were BAS 500 + Methoil, BAS 500 (at the higher rate) + Agri-dex COC, Eminent alternating with BAS 500, Eminent applied at a 14 day interval, and BAS 500 + Silwet L-77. The registered fungicides were not very effective at controlling Cercospora leaf spot at this site.

Southern Minnesota:

Willmar:

Cercospora leaf spot damage was severe resulting in untreated check plots having a 9.0 Cercospora leaf spot rating on the KWS scale at harvest (**Table 5**). All fungicide treatments yielded significantly higher recoverable sucrose than the checks. The best treatment of the registered compounds was Topsin M (at the lower rate) + Penncozeb (App 1) / Penncozeb (App 2, 4 6, 8) / TPTH (App 3, 5, 7) which increased recoverable sucrose (lb/A and lb/T), root yield, and sucrose content by 3480 lb/A, 31 lb/T, 11.9 T/A, and 1.5 % respectively, when compared to the untreated check. One of the treatments recommended to farmers, Eminent alternating with TPTH, produced 4,259 lb/A of recoverable sucrose more than the untreated check. The best treatment was the experimental fungicide BAS 500 + Methoil. The application of an additional 40 lb of N_2 at cultivation on plots of one treatment and one check did not improve Cercospora leaf spot control.

Gluek:

Cercospora leaf spot damage was high resulting in untreated check plots having a 8.4 Cercospora leaf spot rating on the KWS scale at harvest (**Table 6**). All fungicide treatments yielded significantly higher recoverable sucrose than the checks. As at Willmar, the best treatment of the registered compounds was Topsin M (at the lower rate) + Penncozeb (App 1) / Penncozeb (App 2, 4 6, 8) / TPTH (App 3, 5, 7) which increased recoverable sucrose (lb/A and lb/T), root yield, and sucrose content by 2965 lb/A, 4 lb/T, 7.4 T/A, and 2.8 % respectively, when compared to the untreated check. Eminent alternating with TPTH, produced 4,416 lb/A of recoverable sucrose more than the untreated check. The non-registered experimental compounds provided the best Cercospora leaf spot control. The best treatments were BAS 500 / Eminent, BAS 500 + Methoil, and BAS 500 + X-77. The application of an additional 40 lb of N_2 at cultivation on plots of one treatment and one check did not improve Cercospora leaf spot control.

SUMMARY AND CONCLUSIONS

A. Registered Fungicides

1. The 3.75 oz/A TPTH rate should only be used in the northern end of the sugarbeet growing area of North Dakota and Minnesota. For the most effective Cercospora leaf spot control, a 10-day application interval is recommended.

2. The 5.0 oz/A TPTH rate should be used in areas of high TPTH tolerance (Moorhead factory district, Minn-Dak, and Southern Minnesota) with an application interval of 10 days.

3. Using a single benzimidazole (Topsin M) fungicide application in combination with or alternating with a protectant fungicide provided the best Cercospora leaf spot control at Crookston. This treatment was also fairly effective at Gluek and Willmar, and least effective at Foxhome. Only one application of a benzimidazole fungicide in combination with a protectant fungicide should be used at the northern end of the sugarbeet growing region in North Dakota and Minnesota.

B. Experimental Fungicides

1. Some experimental fungicides consistently provided better Cercospora leaf spot control than the best currently registered fungicides. The experimental fungicides that were most effective, alone or in combinations with other experimental or registered fungicides, include BAS 500 (with the addition of an adjuvant), Eminent, and Stratego. Quadris and RH-7592 also showed some promise at some sites.

C. Fungicide with Section 18 Label

1. The availability of Eminent (since a Section 18 has been granted for 2000) will enhance the ability of growers to control Cercospora leaf spot and better manage fungicide resistance. Alternating Eminent with other classes of fungicides provides better disease control and delays the development of fungicide resistance.

D. Other Comments

1. The addition of an extra 40 lb/A of N_2 above the recommended level at cultivation did not improve Cercospora leaf spot control.

2. The first fungicide application should be made when conditions first favor the disease or at disease onset. If the first application is late, control will be difficult all season.

3. Use the recommended rates of fungicides to control Cercospora leaf spot.

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Table 1. Cultural Practices And Application Date Information For Cercospora Leaf Spot Trial At Foxhome, MN

	Crookston	Foxhome	Willmar	Gluek
Planting Date	April 26	April 26	April 25	April 23
Previous Crop	Wheat	Small grains	Corn	Corn
Variety	HM Valley	HM Valley	VDH 66140	VDH 66140
Weed Control	Betamix –micro-rate	Betamix –micro-rate	Betamix –micro-rate	Betamix –micro-rate
	Betanex – m/rate	Betanex – m/rate	Betanex – m/rate	Betanex – m/rate
	Upbeet – m/rate	Upbeet – m/rate	Upbeet – m/rate	Upbeet – m/rate
	Stinger – m/rate	Stinger – m/rate	Stinger – m/rate	Stinger – m/rate
	Poast – m/rate	Poast – m/rate	Poast – m/rate	Poast – m/rate
	Oil – micro-rate	Oil – micro-rate	Oil – micro-rate	Oil – micro-rate
			Ammonia	Ammonia
	Hand labor	Hand labor	Hand labor	Hand labor
	Cultivation	Cultivation	Cultivation	Cultivation
Insecticide	Counter	Counter	None	None
Plant Population at Thinning	35,000 plant/A	35,000 plant/A	35,000 plant/A	35,000 plant/A
Spray Application	**Crookston**	**Foxhome**	**Willmar**	**Gluek**
1st	July 16	July 19	July 6	July 7
2nd	July 23	July 27	July 13	July 14
3rd	July 30	August 2	July 16	July 16
4th	August 6	August 9	July 19	July 20
5th	August 9	August 12	July 23	July 23
6th	August 19	August 17	July 27	July 28
7th	August 20	August 23	July 30	July 30
8th	August 26	August 26	August 2	August 2
9th	August 27	August 30	August 4	August 3
10th	September 8	September 7	August 6	August 6
11th	September 10	September 10	August 9	August 9
12th	September 17		August 10	August 11
13th	September 18		August 13	August 13
			August 17	August 18
			August 19	August 19
			August 20	August 20
			August 23	August 23
			August 26	August 26
			August 27	August 27
Spray Volume (gpa)	20.0	20.5	20	20
Spray Pressure (psi)	100	110	120	120
Rain and/or wet conditions may have occasionally kept application intervals from being exactly correct.				
Harvest Date	September 30	September 21	October 17	October 16

Table 2. Fungicides tested in 1999.

Fungicides	Status
Manzate	Registered
Benlate	Registered
Penncozeb	Registered
Topsin M	Registered
Super Tin (TPTH)	Registered
Agritin	Registered
Dithane	Registered
Eminent	Section 18 granted for 1999 and 2000
Quadris	Experimental
Stratego	Experimental
Bas 500	Experimental
RH-7592	Experimental
TRA0019	Experimental
Bravo Weather Stik	Experimental

Table 3. Cercospora leaf spot control at Crookston in 1999 with registered and experimental fungicides.

Treatment and rate/A	App. Interval	CLS*	Recoverable Sucrose		Root Yield	Sucrose Content	LTM**
	(d)	16-Oct	(lb/A)	(lb/T)	(T/A)	(%)	(%)
BAS 500 2.09 EC 0.15 lb a.i + Agri-dex COC 1% v/v	14	2.8	9754	336	29.1	17.9	1.1
BAS 500 2.09 EC 0.15 lb a.i + X-77 0.25% v/v	14	2.5	9688	331	29.3	17.7	1.1
BAS 500 2.09 EC 0.15 lb a.i	14	2.8	9621	335	28.8	17.9	1.2
Eminent 125 SL 13 fl oz / BAS 500 2.09 EC 0.15 lb a.i	14/14	2.6	9593	325	29.5	17.4	1.2
Eminent 125 SL 13 fl oz (App 1,4) / Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 2) / TPTH 80 WP 5 oz (App 3, 5)	14/14/14	3.5	9572	329	29.1	17.6	1.2
TPTH 80 WP 3.75 oz + Eminent 125 SL 6.5 fl oz	14	2.5	9486	323	29.4	17.3	1.2
RH-7592 75 WP 0.167 lb + Agri Tin 80 WP 5 oz	14	3.5	9402	335	28.1	17.9	1.2
Super Tin 80 WP 5 oz (App 1-5)	14	4.4	9310	331	28.2	17.7	1.1
Quadris 2.08 SC 0.1 lb a.i / TPTH 80 WP 5 oz	14/14	3.8	9305	328	28.4	17.6	1.2
TPTH 80 WP 5 oz / Stratego 2.1 EC 8 fl oz	14/14	5.0	9281	338	27.5	18.0	1.1
BAS 500 2.09 EC 0.15 lb a.i + Silwet L-77 0.09% v/v	14	2.8	9262	321	28.9	17.3	1.2
Topsin M 70 WSB 0.5 lb + Penncozeb 75DF 2.0 lb (App 1) / Penncozeb 75DF 2.0 lb (App 2,4) / TPTH 80 WP 5 oz (App 3, 5)	14/7/14	3.4	9251	330	28.1	17.6	1.2
Eminent 125 SL 13 fl oz	14	3.0	9226	325	28.4	17.5	1.2
Topsin M 70 WSB 0.5 lb / TPTH 80 WP 5 oz	14/14	4.3	9204	325	28.4	17.4	1.2
Eminent 125 SL 13 fl oz	21	3.5	9202	328	28.1	17.5	1.1
BAS 500 2.09 EC 0.15 lb a.i + Methoil 1 % v/v	14	3.1	9146	328	27.9	17.5	1.2
Super Tin 80 WP 5 oz / Eminent 125 SL 13 fl oz	14/14	3.6	9073	326	27.8	17.5	1.2
Stratego 2.1 EC 10 fl oz / TPTH 80 WP 5 oz	14/14	3.1	9069	326	27.9	17.5	1.2
Super Tin 80 WP 5 oz (App 1-3) / Manzate 75 DF 2.0 lb (App 4, 5)	14/10	5.1	9038	337	26.9	18.0	1.2
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/10	4.4	9024	317	28.5	17.2	1.3
Quadris 2.08 SC 0.10 lb a.i / TPTH 80 WP 5 oz	14/14	3.9	8997	329	27.3	17.6	1.1
RH-7592 75 WP 0.167 lb + Dithane DF 2.0 lb	14	4.0	8965	327	27.5	17.5	1.2
BAS 500 2.09 EC 0.10 lb a.i + Agri-dex COC 1% v/v	14	3.0	8932	322	27.8	17.4	1.3
Stratego 2.1 EC 8 fl oz / TPTH 80 WP 5 oz	14/14	3.9	8888	329	27.0	17.6	1.1
RH-7592 75 WP 0.167 lb + Latron CS-7 0.12 %v/v	14	3.9	8862	328	27.0	17.6	1.2
Agri Tin 80 WP 5 oz (App 1-3) / Manzate 75 DF 2.0 lb (App 4, 5)	14/10	4.0	8766	328	26.8	17.5	1.1
Penncozeb 75DF 2.0 lb / TPTH 80 WP 5 oz	7/14	4.0	8742	316	27.7	17.1	1.3
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/14	3.5	8687	315	27.6	17.0	1.3
Quadris 2.08 SC 0.15 lb a.i	14	3.6	8679	321	27.1	17.3	1.3
TPTH 80 WP 5 oz / TRA0019 2.0 pt	14/10	4.0	8478	320	26.5	17.2	1.3
Quadris 2.08 SC 0.15 lb a.i / Bravo Weather Stik SC 2.0 pt	14/10	4.1	8457	321	26.3	17.4	1.3
Benlate WP 0.5 lb / Manzate 75DF 2.0 lb	14/10	5.5	8187	314	26.1	16.9	1.2
[40 lb $N_2(NH_4)_2SO_4$)]Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/14	4.8	8172	308	26.6	16.8	1.4
Benlate WP 0.5 lb	14	5.6	7689	310	24.8	16.8	1.3
Check		7.5	6623	296	22.4	16.3	1.5
[40 lb $N_2(NH_4)_2SO_4$)] Check		7.4	6609	297	22.4	16.2	1.4
LSD (P=0.05)		0.7	571	15.5	1.4	0.7	0.2
CV %		12.9	4.6	3.4	3.8	2.7	9.3

*Cercospora leaf spot measured on KWS scale 1-9 (least-most)
**LTM: Sugar loss to molasses

Table 4. Cercospora leaf spot control at Foxhome in 1999 with registered and experimental fungicides.

Treatment and rate/A	App. Interval (d)	CLS* 21-Sep	Recoverable Sucrose (lb/A)	(lb/T)	Root Yield (T/A)	Sucrose Content (%)	LTM** (%)
BAS 500 2.09 EC 0.15 lb a.i + Methoil 1 % v/v	14	3.1	7979	281	30.1	15.6	1.6
BAS 500 2.09 EC 0.15 lb a.i + Agri-dex COC 1% v/v	14	3.0	7884	275	29.8	15.5	1.8
Eminent 125 SL 13 fl oz / BAS 500 00F 0.15 lb a.i	14/14	3.2	7606	270	30.7	15.5	2.0
Eminent 125 SL 13 fl oz	14	3.5	7382	270	28.5	15.2	1.8
BAS 500 2.09 EC 0.15 lb a.i + Silwet L-77 0.09% v/v	14	4.6	7313	281	26.9	15.7	1.6
Stratego 2.1 EC 10 fl oz / TPTH 80 WP 5 oz	14/14	4.3	7130	272	26.3	15.4	1.8
BAS 500 2.09 EC 0.15 lb a.i + X-77 0.25% v/v	14	4.5	6879	254	29.9	14.7	2.0
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/14	3.9	6756	258	25.6	14.8	2.0
BAS 500 2.09 EC 0.15 lb a.i	14	3.8	6715	259	27.1	14.8	1.8
TPTH 80 WP 3.75 oz + Eminent 125 SL 6.5 fl oz	14	5.3	6659	265	26.0	15.0	1.7
Stratego 2.1 EC 8 fl oz / TPTH 80 WP 5 oz	14/14	5.6	6416	265	24.8	15.0	1.7
Eminent 125 SL 13 fl oz (App 1,4) / Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 2) / TPTH 80 WP 5 oz (App 3, 5)	14/14/14	6.0	6359	243	27.4	14.3	2.1
Quadris 2.08 SC 0.15 lb a.i / TPTH 80 WP 5 oz	14/14	5.9	6319	266	25.7	14.9	1.6
BAS 500 2.09 EC 0.10 lb a.i + Agri-dex COC 1% v/v	14	4.5	6238	222	29.3	13.5	2.4
Quadris 2.08 SC 0.10 lb a.i / TPTH 80 WP 5 oz	14/14	5.5	6227	226	28.7	14.0	2.1
Super Tin 80 WP 5 oz / Eminent 125 SL 13 fl oz	14/14	5.0	6185	259	24.0	14.7	1.7
Eminent 125 SL 13 fl oz	21	5.6	5977	236	26.8	14.1	2.3
RH-7592 75 WP 0.167 lb + Dithane DF 2.0 lb	14	7.4	5953	251	24.6	14.4	1.8
RH-7592 75 WP 0.167 lb + Latron CS-7 0.12 %v/v	14	5.9	5928	249	23.5	14.6	1.8
TPTH 80 WP 5 oz / Stratego 2.1 EC 8 fl oz	14/14	5.5	5911	250	25.7	14.3	1.9
[40 lb $N_2(NH_4)_2SO_4$] Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb.	14/14	6.3	5873	264	22.7	14.7	1.6
RH-7592 75 WP 0.167 lb + Agri Tin 80 WP 5 oz	14	7.0	5857	254	23.6	14.5	1.8
Super Tin 80 WP 5 oz (App 1-3) / Manzate 75 DF 2.0 lb (App 4,5).	14/10	7.1	5732	249	24.2	14.4	1.9
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/10	7.4	5678	232	25.6	13.7	2.1
Agri Tin 80 WP 5 oz (App 1-3) / Manzate 75 DF 2.0 lb (App 4, 5).	14/10	7.1	5580	235	24.8	13.6	1.9
Super Tin 80 WP 5 oz (App 1-5)	14	7.0	5509	257	22.7	14.6	1.8
Topsin M 70 WSB 0.5 lb / TPTH 80 WP 5 oz	14/14	7.6	5411	236	23.8	13.7	1.9
Topsin M 70 WSB 0.5 lb + Penncozeb 75DF 2.0 lb (App 1) / Penncozeb 75DF 2.0 lb (App 2,4) / TPTH 80 WP 5 oz (App 3, 5)	14/7/14	8.0	5273	241	23.0	13.7	1.7
Quadris 2.08 SC 0.15 lb a.i / Bravo Weather Stik SC 2.0 pt	14/10	6.8	5455	260	24.0	14.6	1.6
Penncozeb 75DF 2.0 lb / TPTH 80 WP 5 oz	7/14	8.0	5269	246	22.8	14.2	1.9
TPTH 80 WP 5 oz / TRA0019 2.0 pt	14/10	7.6	5176	214	25.3	13.0	2.2
Benlate WP 0.5 lb / Manzate 75DF 2.0 lb	14/10	7.3	4949	268	19.2	14.9	1.3
Quadris 2.08 SC 0.15 lb a.i	14	5.0	4804	271	18.2	15.0	1.5
Benlate WP 0.5 lb	14	7.3	4554	202	23.4	13.7	1.9
[40 lb $N_2(NH_4)_2SO_4$] Check		8.6	4207	213	22.3	13.0	2.3
Check		8.9	3984	224	18.1	13.1	1.9
LSD (P=0.05)		1.3	1039	39	5.5	1.4	NS
CV%		15.4	12.3	11.0	15.4	7.0	24.4

*Cercospora leaf spot measured on KWS scale 1-9 (least-most)

**LTM: Sugar loss to molasses

Table 5. Cercospora leaf spot control at Willmar in 1999 with registered and experimental fungicides.

Treatment and rate/A	App. Interval	CLS*	Recoverable Sucrose		Root Yield	Sucrose Content	LTM**
	(d)	16-Oct	(lb/A)	(lb/T)	(T/A)	(%)	(%)
BAS 500 2.09 EC 0.15 lb a.i + Methoil 1 % v/v	14	4.0	7978	266	30.0	15.0	1.7
Eminent 125 SL 13 fl oz	14	3.5	7523	252	29.9	14.5	1.9
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/10	3.7	7324	261	28.0	14.9	1.8
Stratego 2.1 EC 8 fl oz / Eminent 125 SL 13 fl oz	14/14	4.8	7252	260	27.9	14.7	1.7
BAS 500 2.09 EC 0.15 lb a.i / Eminent 125 SL 13 fl oz	14/14	3.7	7170	273	26.3	15.3	1.7
Eminent 125 SL 13 fl oz / Agri Tin 80 WP 5 oz	14/10	5.3	7131	257	27.8	14.7	1.8
Eminent 125 SL 13 fl oz	21	5.0	6829	267	25.6	15.1	1.7
BAS 500 2.09 EC 0.15 lb a.i	14	4.8	6763	257	26.3	14.6	1.7
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	21/14	5.7	6762	257	26.3	14.7	1.8
BAS 500 2.09 EC 0.15 lb a.i + X-77 0.25% v/v	14	4.7	6758	252	26.7	14.4	1.8
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/14	5.3	6718	266	25.2	15.0	1.7
Eminent 125 SL 13 fl oz / Quadris 2.08 SC 9.37 oz / Super Tin 80 WP 5 oz	14/14/14	5.3	6672	256	26.0	14.7	1.9
BAS 500 2.09 EC 0.10 lb a.i + Agri-dex COC 1% v/v	14	5.0	6663	272	24.4	15.3	1.6
Stratego 2.1 EC 8 fl oz / TPTH 80 WP 5 oz	14/10	4.8	6626	260	25.5	14.8	1.7
Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 1) / Eminent 125 SL 13 fl oz (App 2,4,6) / Super Tin 80 WP 5 oz (App 3, 5,7)	14/14/10	4.3	6564	266	24.7	15.0	1.7
Topsin M 70 WSB 0.38 lb + Penncozeb 2.0 lb (App 1) / Penncozeb 2.0 lb (App 2,4,6,8) / Super Tin 80 WP 5 oz (App 3, 5,7)	10/7/10	6.2	6545	255	25.7	14.5	1.7
Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 1) / Stratego 2.1 EC 8 fl oz (App 2,4,6) / Penncozeb 2.0 lb (App 3,5,7)	10/14/7	6.2	6520	257	25.3	14.6	1.7
Stratego 2.1 EC 8 fl oz / Super Tin 80 WP 5 oz	14/10	4.7	6453	261	24.8	14.8	1.8
BAS 500 2.09 EC 0.15 lb a.i + Agri-dex COC 1% v/v	14	4.3	6400	273	23.4	15.4	1.7
[40 lb $N_2(NH_4)_2SO_4$)] Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/10	6.5	6389	252	25.4	14.4	1.8
Quadris 2.08 SC 9.37 oz / Eminent 125 SL 13 fl oz	14/14	5.0	6369	265	24.1	14.9	1.6
RH-7592 75 WP 0.167 lb + Latron CS-7 0.12 %v/v	14	6.8	6331	259	24.5	14.7	1.7
Super Tin 80 WP 5 oz / Eminent 125 SL 13 fl oz	10/14	5.5	6249	264	23.7	14.9	1.7
RH-7592 75 WP 0.167 lb + Dithane DF 2.0 lb	14	6.5	6232	252	24.7	14.4	1.7
BAS 500 2.09 EC 0.15 lb a.i / Agri Tin 80 WP 5	14/10	4.5	6229	255	24.5	14.5	1.7
Super Tin 80 WP 3.75 oz + Eminent 125 SL 6.5 fl oz	14	5.0	6205	261	23.8	14.8	1.7
Manzate 75 DF 2.0 lb / Agri Tin 80 WP 5 oz	7/10	6.7	6082	244	25.0	14.0	1.7
Topsin M 70 WSB 0.5 lb + Penncozeb 75DF 2.0 lb (App 1) / Penncozeb 75DF 2.0 lb (App 2,4,6,8) / Super Tin 80 WP 5 oz (App 3,5,7)	10/7/10	6.5	5894	262	22.5	14.8	1.7
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	10/7	6.0	5762	252	22.9	14.4	1.8
Penncozeb 75DF 2.0 lb / Super Tin 80 WP 5 oz	7/10	6.8	5734	252	22.7	14.1	1.8
Quadris 2.08 SC 9.37 oz	14	6.7	5733	250	23.0	14.4	1.8
RH-7592 75 WP 0.167 lb + Agri Tin 80 WP 5 oz	14	7.3	5466	242	22.7	13.9	1.8
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/7	6.3	5418	248	21.9	14.3	1.9
Benlate WP 0.5 lb / Super Tin 80 WP 5 oz	14/10	7.2	5166	237	21.6	13.8	1.9
Quadris 2.08 SC 9.37 oz / Bravo Weather Stik SC 2.0 pt	14/14	7.3	5097	242	21.1	14.0	1.9
Benlate WP 0.5 lb / Manzate 75 DF 2.0 lb	14/10	7.3	4955	246	20.2	14.0	1.7
Quadris 2.08 SC 9.37 oz / Super Tin 80 WP 5 oz	14/10	6.5	4928	244	20.2	14.0	1.8
Benlate WP 0.5 lb	14	7.8	4876	232	20.1	13.4	1.8
[40 lb $N_2(NH_4)_2SO_4$)] Check		8.7	3230	227	14.3	13.2	1.9
Check		9.0	3065	224	13.8	13.0	1.8
LSD (P=0.05)		0.9	651	17	2.2	0.8	0.2
CV %		13.3	9.3	6.0	7.9	4.6	8.4

*Cercospora leaf spot measured on KWS scale 1-9 (least-most)

**LTM: Sugar loss to molasses

Table 6. Cercospora leaf spot control at Gluek in 1999 with registered and experimental fungicides.

Treatment and rate/A	App. Interval	CLS*	Recoverable Sucrose		Root Yield	Sucrose Content	LTM**
	(d)	16-Oct	(lb/A)	(lb/T)	(T/A)	(%)	(%)
BAS 500 2.09 EC 0.15 lb a.i / Eminent 125 SL 13 fl oz	14/14	2.2	10101	311	32.4	16.6	1.1
BAS 500 2.09 EC 0.15 lb a.i + Methoil 1 % v/v	14	2.0	9731	305	31.9	16.3	1.0
BAS 500 2.09 EC 0.15 lb a.i + X-77 0.25% v/v	14	2.0	9537	319	29.8	17.0	1.0
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/10	2.2	9467	301	31.4	16.2	1.1
Eminent 125 SL 13 fl oz / Quadris 2.08 SC 9.37 oz / Super Tin 80 WP 5 oz	14/14/14	5.2	9445	297	31.9	15.9	1.0
BAS 500 2.09 EC 0.15 lb a.i	14	1.8	9440	314	30.1	16.7	1.0
BAS 500 2.09 EC 0.15 lb a.i / Agri Tin 80 WP 5	14/10	3.4	9366	299	31.4	16.1	1.2
BAS 500 2.09 EC 0.15 lb a.i + Agri-dex COC 1% v/v	14	2.0	9343	303	30.9	16.4	1.2
Quadris 2.08 SC 9.37 oz / Eminent 125 SL 13 fl oz	14/14	4.8	9329	303	30.8	16.2	1.0
Eminent 125 SL 13 fl oz / Agri Tin 80 WP 5 oz	14/10	3.8	9227	308	30.0	16.6	1.2
Stratego 2.1 EC 8 fl oz / Eminent 125 SL 13 fl oz	14/14	4.0	9221	310	29.8	16.6	1.1
Super Tin 80 WP 3.75 oz + Eminent 125 SL 6.5 fl oz	14	3.8	9183	301	30.5	16.2	1.2
Eminent 125 SL 13 fl oz	14	2.4	9044	298	30.3	16.0	1.1
BAS 500 2.09 EC 0.10 lb a.i + Agri-dex COC 1% v/v	14	1.8	8966	297	30.2	15.9	1.0
Eminent 125 SL 13 fl oz	21	4.8	8933	297	30.1	15.9	1.1
Stratego 2.1 EC 8 fl oz / TPTH 80 WP 5 oz	14/10	5.2	8871	291	30.6	15.7	1.2
Stratego 2.1 EC 10 fl oz / TPTH 80 WP 5 oz	14/10	5.4	8740	294	29.8	15.8	1.1
Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 1) / Eminent 125 SL 13 fl oz (App 2,4,6) / Super Tin 80 WP 5 oz (App 3, 5,7)	14/14/10	4.4	8733	301	29.0	16.2	1.1
Quadris 2.08 SC 9.37 oz	14	6.0	8673	294	29.6	15.8	1.1
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	14/14	4.4	8543	289	29.5	15.6	1.2
RH-7592 75 WP 0.167 lb + Latron CS-7 0.12 %v/v	14	5.0	8518	292	29.2	15.7	1.1
RH-7592 75 WP 0.167 lb + Agri Tin 80 WP 5 oz	14	5.4	8441	296	28.5	15.8	1.0
RH-7592 75 WP 0.167 lb + Dithane DF 2.0 lb	14	6.2	8398	287	29.2	15.4	1.1
Super Tin 80 WP 5 oz / Eminent 125 SL 13 fl oz	10/14	4.8	8355	299	28.0	16.0	1.1
Quadris 2.08 SC 9.37 oz / Bravo Weather Stik SC 2.0 pt	14/14	6.0	8328	284	29.4	15.3	1.1
Topsin M 70 WSB 0.5 lb + Penncozeb 2.0 lb (App 1) / Stratego 2.1 EC 8 fl oz (App 2,4,6) / Penncozeb 2.0 lb (App 3,5,7)	10/14/7	5.4	8258	289	28.5	15.5	1.0
Quadris 2.08 SC 9.37 oz / Super Tin 80 WP 5 oz	14/10	5.6	8046	287	28.0	15.6	1.3
Topsin M 70 WSB 0.38 lb + Penncozeb 2.0 lb (App 1) / Penncozeb 2.0 lb (App 2,4,6,8) / Super Tin 80 WP 5 oz (App 3, 5,7)	10/7/10	5.8	8016	288	28.0	15.6	1.2
[40 lb $N_2(NH_4)_2SO_4$)] Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/10	6.8	7858	272	28.9	14.9	1.2
Eminent 125 SL 13 fl oz / Super Tin 80 WP 5 oz	21/14	6.0	7831	290	27.0	15.7	1.2
Benlate WP 0.5 lb / Manzate 75 DF 2.0 lb	14/10	7.2	7752	287	27.0	15.4	1.1
Benlate WP 0.5 lb	14	6.8	7682	288	26.7	15.4	1.1
Penncozeb 75DF 2.0 lb / Super Tin 80 WP 5 oz	7/10	6.8	7564	270	28.0	14.5	1.0
Benlate WP 0.5 lb / Super Tin 80 WP 5 oz	14/10	6.2	7561	278	27.2	15.0	1.1
Topsin M 70 WSB 0.5 lb + Penncozeb 75DF 2.0 lb (App 1) / Penncozeb 75DF 2.0 lb (App 2,4,6,8) / Super Tin 80 WP 5 oz (App 3,5,7)	10/7/10	5.6	7553	281	26.9	15.2	1.1
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	14/7	6.8	7542	276	27.3	14.9	1.1
Manzate 75 DF 2.0 lb / Agri Tin 80 WP 5 oz	7/10	6.4	7469	281	26.6	15.2	1.2
Super Tin 80 WP 5 oz / Manzate 75 DF 2.0 lb	10/7	6.0	7447	291	25.5	15.6	1.0
Check		8.4	5051	224	20.6	12.8	1.2
[40 lb $N_2(NH_4)_2SO_4$)] Check		7.8	4841	234	22.5	12.4	1.1
LSD (P=0.05)		1.2	765	21.0	2.1	1.0	0.2
C.V%		18.9	7.6	5.8	5.7	5.3	15.7

*Cercospora leaf spot measured on KWS scale 1-9 (least-most)
**LTM: Sugar loss to molasses

NITRATE SOIL TEST ADJUSTMENT FOR SUGAR BEET GROWN IN HUMID AREAS OF MINNESOTA

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Concerns have been raised about the accuracy of the nitrate-N soil test in prediction of N needs in the Southern Beet Sugar Cooperative growing area. This sugar beet production area is located in a more humid area of Minnesota than the Red River Valley production areas. The extra precipitation changes the soil moisture dynamics and thus increases the chances of N losses to denitrification and also possibly an increase in the contribution of N from soil organic matter. Other logistical problems exist because of the more humid situation. Soil samples from the 2 to 4 foot depths are difficult to collect. Soil can be too wet to stay in the sampling tube when brought to the soil surface or too wet to get a recognizable and representative sample. This work is investigating the importance of deep nitrate soil sampling at different times in the production year in the prediction of the optimum N fertilizer rate for optimum root yield and quality.

Nitrogen management is paramount for optimum sugar production. Nitrogen sources for sugar beet include fertilizer N and organic matter. Factors that influence nitrogen availability are temperature, precipitation, and soil drainage. Of the factors mentioned, the rate of nitrogen fertilizer applied is the easiest input to management. This has been done through the use of a nitrate soil test.

The effect of previous crop on sugar beet yield and quality can be seen in cooperative statistics. There are many different crops in the Southern Minnesota Beet Sugar Cooperative growing area that have been used as previous crop. Little is known about the effect of previous crop on nitrogen fertilizer recommendations for sugar beet grown in this area. One observation has been that a fall nitrate-N soil test when the previous crop is soybean is not very useful because the soybean plant utilizes all the nitrate-N in the soil. The nitrogen in soybean residue mineralizes much quicker than other crops such as corn. This would make a case for the use of a spring or in-season soil test for prediction of N fertilizer needs. Environmental demands may require that no fall N fertilizer application may be made. This leads to the need to know the effect of spring applications of N verses fall application on sugar beet yield and quality.

Objectives:

1. Improve the ability to predict more accurately the nitrogen fertilizer needs for optimum sugar beet yield and quality in humid areas of Minnesota following several different crops.

1. Determine the effect of fall verses spring nitrogen fertilizer applications on sugar beet yield and quality.

Materials and Methods:

This was the second year of a multi-year/multi-site study. In the fall of 1998, and spring 1999, a total of 5 sites were established in the Southern Minnesota Beet Sugar Cooperative production area. In 1999, two of the sites were in the eastern area(near Bird Island, MN), two in the western end (near DeGraff, MN), and one site was located on a sandy loam soil near Hancock, MN. The preceding crops were corn and sweet corn at the Bird Island sites, corn and soybean at the DeGraff sites, and corn at the irrigated Hancock site. Three of the five site were abandoned in 1999. The two sites near DeGraff were abandoned; one because of variability in soil nitrate-N and the other because of poor stands. The Bird Island site which was following sweet corn was also abandoned because of disease.

The Bird Island site had a factorial set of treatments replicated four times. The treatments included five

nitrogen rates (0, 40, 80, 120, and 160 pounds nitrogen per acre) applied as ammonium nitrate and two applications times (fall and preplant). Sugar beet top samples were taken one or two days before root harvest. These were weighed, subsampled, dried, and analyzed for total nitrogen content. The harvest was done by a plot- sized lifter. Root samples for quality analyses were obtained at harvest and analyzed by the Southern Minnesota Beet Sugar Cooperative Quality Lab. Soil samples to a depth of four feet in increments of 0-6 inches, 6-12 inches, 1-2 foot, 2-3 foot, and 3-4 foot were taken from the 0 nitrogen rate plots in fall 1998 preceding sugar beet production, in the spring at preplanting, and the first week of June during the production year.

At the sandy site, soil samples to a depth of four feet were taken before planting for nitrate-N. Because of the sandy nature of the soil, the treatments were different at this site (Table 1). Nitrogen fertilizer was applied in different applications to achieve N rates of 0, 40, 80, 120, 160, and 200 pounds N per acre. The first 40 pounds of each treatment was applied preplant and the additional amount to equal the 80, 120, 160, and 200 pounds N per acre rates was applied June 1. Three additional treatments included a timing factor.

Table 1. Treatments for the sandy site near Hancock, Minnesota in 1999.

Preplant	June 1	July 1	August 1	Total
		lb N/A		
0	0	0	0	0
40	0	0	0	40
40	40	0	0	80
40	80	0	0	120
40	120	0	0	160
40	160	0	0	200
40	40	40	0	120
40	40	40	40	160
40	80	40	0	160

Results and Discussion:

The soil nitrate-N content in the 0 to 4 foot depth increased 26 pounds per acre from Fall 1998 to Spring 1999 at the Bird Island site (Table 2). The majority of that increase occurred in the 2 to 4 foot depth. Nitrogen fertilizer recommendation did not change much between the two dates (121 vs 114 pounds N per acre). At the Hancock site, the soil sample was only taken in the spring before planting. The fertilizer N recommendation from this sampling was 97 pounds N per acre. The recommendation for each site was large but not unusual for a sugar beet crop following field corn.

Table 2. Soil Nitrate-N for each site in 1999.

Site	Previous Crop	Sample	Nitrate-N 0-2 ft.	2-4 ft.	0-4 ft.	Soil Test Recommendation So.MN	RRV
			lb NO_3-N/A			lb N/A	
Bird Island	field corn	fall 98	29	12	41	121	91
Bird Island	field corn	spring 99	34	33	67	114	84
Hancock	field corn	spring 99	53	24	77	97	77

Root yields were significantly increased with the application of N fertilizer at the Bird Island site (Table 3). In 1999 the root yields for the fall applied treatments were greater than for the spring applied treatments. Recoverable sucrose per acre was also better for the fall application than the spring applications. The regression analysis indicated maximum root yield occurred at the 120 pounds N per acre application with fall application while the maximum root yield for spring application was 100 pounds N per acre. Sucrose concentrations were not affected by the application time of the N fertilizer. The decrease of sucrose and recoverable sucrose per ton occurred for sugar beets receiving 160 pounds N per acre. The loss to molasses increased with increasing N fertilizer application. Regression analysis found recoverable sucrose per acre increased with fall applications of 100 pounds N per acre. For the spring applied N fertilizer, 95 pounds of fertilizer N per acre was maximum N rate needed. These results suggested that a N fertilizer recommendation based on a total of 150 pounds soil plus fertilizer N was more than optimum.

Table 3. Root yield, sucrose, recoverable sucrose per acre, recoverable sucrose per ton, and loss to molasses for Bird Island site in 1999.

N Rate	Root Yield		Sucrose		Recoverable Sucrose				Loss to Molasses	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
lb/A	--- ton/A ---		---- % -----		--- lb/ton ---		---- lb/A ----		----- % -----	
0	12.9	11.8	16.4	16.9	309	319	3983	3773	1.00	0.95
40	20.2	17.1	16.6	15.9	312	296	6280	5038	0.99	1.14
80	20.1	20.3	16.5	16.6	310	311	6235	6322	1.06	1.01
120	21.0	21.5	16.9	16.8	316	316	6622	6782	1.09	1.05
160	21.8	19.8	15.8	16.8	293	296	6364	5857	1.15	1.15
200	19.4	18.1	16.4	16.4	307	308	5967	5555	1.07	1.06
Statistics:										
Time	0.06		NS		NS		0.06		NS	
N rate	0.001		0.03		0.02		0.0001		0.03	
T x N	NS		NS		NS		NS		NS	
C.V.	8.7		3.8		9.4		4.3		9.2	

Maximum root yield and recoverable sucrose per acre occurred with the application of 40 pounds of N fertilizer per acre (Table 4). Increasing N fertilizer application reduced sucrose concentration and recoverable sucrose per ton. Loss to molasses was not significantly affected by the N treatments. The optimum N rate for this study was 40 pounds of N. This was considerably less than the 97 or 77 pounds recommended from the spring soil test.

The second set of treatments in this study evaluated the effect of applying N fertilizer later in the season. The split treatment at the 120 pounds N per acre treatment did not result any significant differences in parameters measured (Table 5). At the 160 pound N per acre treatments, the split of 40 pounds of N over four application times resulted in a significantly greater root yield and recoverable sucrose per acre than the two treatments that applied 80 and 120 pounds on June 1. The quality was not affected by the treatments at the 160 pounds per acre total N treatments. This was only one site in one year and it would be too early to recommend several split applications of N in sandy soils for increased yield. The split applications do show potential as a management tool to prevent water quality problems while not being detrimental to root quality on irrigated sandy soils. On heavier textured non-irrigated soils split application are still discouraged because of the great potential to reduce root quality.

Table 4. Root yield, sucrose, recoverable sucrose per ton, recoverable sucrose per acre, and loss to molasses for N-rate study at the sandy site near Hancock, Minnesota in 1999.

Preplant	June 1	July 1	Aug. 1	Total	Root Yield	Sucrose	Recoverable Sucrose		Loss to Molasses
---------- Lb. N/A ----------					ton/A	%	lb./ton	lb./A	%
0	0	0	0	0	21.0	17.4	332	6975	0.86
40	0	0	0	40	28.0	17.2	326	9075	0.91
40	40	0	0	80	27.4	16.8	318	8695	0.90
40	80	0	0	120	27.9	17.2	327	9123	0.87
40	120	0	0	160	27.2	16.5	311	8388	1.07
40	160	0	0	200	27.4	16.3	308	8444	0.91
Statistics:									
LSD 0.05					1.6	0.5	9	516	0.12
TRT					0.0001	0.0001	0.0001	0.0001	0.15
C.V. %					4.0	7.9	2.2	4.1	8.7

Table 5. Root yield, sucrose, recoverable sucrose per ton, recoverable sucrose per acre, and loss to molasses for application study at the sandy site near Hancock, Minnesota in 1999.

Preplant	June 1	July 1	Aug. 1	Total	Root Yield	Sucrose	Recoverable Sucrose		Loss to Molasses
---------- Lb. N/A ----------					ton/A	%	lb./ton	lb./A	%
0	0	0	0	0	21.0	17.4	332	6975	0.86
40	80	0	0	120	27.9	17.2	327	9123	0.87
40	40	40	0	120	28.7	17.3	327	9383	0.96
40	120	0	0	160	27.2	16.5	309	8388	1.07
40	40	40	40	160	29.1	16.5	312	9098	0.94
40	80	40	0	160	27.6	16.1	303	8387	0.97
Statistics:									
LSD 0.05					1.6	0.5	9	516	0.12

Management of Turkey and Swine Manure Derived Nitrogen in a Sugar Beet Cropping System

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Justification of Research:

Livestock operations, mainly poultry and swine, are increasing in size and impact in the Southern Minnesota sugar beet growing area. Many sugar beet producers own or have interest in these operations; thus have manure available to use on their fields. Manure research data concludes that manure has a positive effect on crop production from its effects on soil nutrient availability and soil physical properties. A concern has been raised about the effect of late season nitrogen mineralized from the manure on sugar beet quality. Grower observations indicate better growth in manured fields. With the large amount of manure available the question has changed from whether to use manure but when in the sugar beet crop rotation should manure be applied to minimize quality concerns and realize benefits. The answer to this question maybe different depending on the type of manure. Poultry manure has a considerable amount of litter in it compared to swine manure, thus slowing initial release of poultry manure-N.

Little recent information is available on the effect of manure on sugar beet root yield and quality. Halvorson and Hartman (1974) reported that sucrose concentration and recoverable sugar per acre were reduced with the addition of beef manure while root yield was increased. Schmitt et al. (1996) reported that swine manure mineralization occurs several years after application in a legume-corn rotation. Malzer and Graff (1995) reported that leached nitrate-N during second year after an application of turkey manure was greater than in the first year after application. This data suggests that poultry manure has a latter or more extended release of N when compared to liquid swine manure.

The implications of the manure-N release are critical, especially to sugar beet growers. Therefore, recommendations need to be evaluated with sugar beets. This research project has been designed to: 1) measure the effect of manure application effects on sugar beet root yield and quality compared to fertilizer N applications; 2) determine the effect of turkey and swine manure mineralization differences on sugar beet root yield and quality; and 3) develop management strategies for manure application in a sugar beet rotation.

Materials and Methods:

To address the objectives, two experiments were conducted in 1999 at a location near Renville, Minnesota. Experiment 1 was established after soybean was grown in a soybean-corn-sugar beet rotation. The treatments listed in Table 1 were designed to evaluate the effect of manure applied one cropping year before sugar beet is grown and compare its nitrogen contribution to fertilizer applied the year of sugar beet production. In the corn year (1999) the plots used for the N rate evaluation in the sugar beet year were fertilized with a recommended rate of fertilizer for optimum corn production. Deep nitrate-N soil samples were taken from the check plots Fall 1998 before manure and fertilizer application, April 1999 before planting, May 28, 1999. Nitrate-N and ammonium-N soil samples were taken monthly to a depth of one foot to characterize the N dynamics during the growing season. Basal stalk samples for nitrate concentration were taken at physiological maturity (black layer). Corn grain was hand harvested from each plot. After corn harvest, soil samples to a 4 foot depth were taken and analyzed for residual nitrate-N from every plot.

Table 1. Treatments for Experiment 1.

Treatment number	Treatment	
	Year 1 (corn 1999)	Year 2 (sugar beet 2000)
1	120 lb N/A	0 lb N/A (check)
2	120 lb N/A	40 lb N/A
3	120 lb N/A	80 lb N/A
4	120 lb N/A	120 lb N/A
5	120 lb N/A	160 lb N/A
6	120 lb N/A	200 lb N/A
7	Swine manure 2500 gal/A (228 lb total N/A)	Residual
8	Swine manure 5000 gal/A (455 lb total N/A)	Residual
9	Turkey manure 5 tons/A (90 lb total N/A)	Residual
10	Turkey manure 10 tons/A (180 lb total N/A)	Residual
11	Check (no fertilizer or manure)	Check (no fertilizer or manure)

The second experiment was established at the same location near Renville, Minnesota. The objective of this experiment was to measure the effects of manure application directly before sugar beet production. The treatments include fertilizer nitrogen, turkey manure, and swine manure (Table 2). The treatments were applied early November 1998. Fertilizer nitrogen was applied in a series of rates to determine the equivalent of the N supplied by manure. Soil samples were taken to a depth of four feet for nitrate-N from the check plot Fall 1998, April 1999, and May 28, 1999. This is similar to Experiment 1. Soil samples to one foot for nitrate-N and ammonium-N were taken monthly to estimate the mineralization of N from manure during the growing season.

Table 2. Treatments for Experiment 2.

Treatment number	Treatment
1	0 lb N/A (check)
2	40 lb N/A
3	80 lb N/A
4	120 lb N/A
5	160 lb N/A
6	200 lb N/A
7	Swine manure 2500 gal/A (228 lb total N/A)
8	Swine manure 5000 gal/A (455 lb total N/A)
9	Turkey manure 2.5 tons/A (45 lb total N/A)
10	Turkey manure 5.0 tons/A (90 lb total N/A)

Sugar beet top growth and N content, root yield, and root quality were measured at harvest Mid October 1999. Quality samples were taken at harvest and analyzed by the Southern Minnesota Beet Sugar Cooperative Quality Laboratory. Soil samples to a four foot depth were taken from all plots early November 1999.

Results and Discussion:

Experiment 1 - The initial soil nitrate-N measured Fall 1998 was 30 pounds per acre for the 0 to 2 foot depth and 11 pounds per acre for the 2 to 4 foot depth. The only data available at the time of this report was the corn grain yield (Table 3). There was a significant increase in grain yield when compared to the check with the application of fertilizer and manure. There were no significant differences in grain yield between the fertilizer treatment and the manure treatments. The only significant difference was between the grain yields for the two rates of swine manure (155 vs 169 bushels per acre). The first year of this experiment was the set up year to investigate the effects of manure on sugar beet production two years after application. Sugar beet will be grown at this site next year.

Table 3. Corn grain yields at 15.5% moisture or Experiment 1 at Renville in 1999.

Treatment	Corn grain yield - - - - bu/A - - - -
Check	126
Fertilizer - 120 lb. N/A	158
Swine Manure 2500 gallon/A	155
Swine Manure 5000 gallon/A	169
Turkey Manure 5 tons/A	166
Turkey Manure 10 tons/A	167
LSD 0.05	12

Experiment 2 - Fall 1998 soil nitrate-N was 27 pounds per acre in the 0 to 2 foot depth and 18 pounds per acre in the 2 to 4 foot depth. Root yield was not significantly affected by the nitrogen fertilizer applications (Table 4). Only the root yields of the 5 ton per acre turkey manure and 5000 gallons per acre swine manure applications were significantly greater than the root yield of the check. The loss to molasses for the 5 ton per acre turkey manure application was significantly greater than the check. No significant differences occurred for sucrose concentration, recoverable sucrose per ton, and recoverable sucrose per acre.

Table 4. Root yield, sucrose concentration, loss to molasses, recoverable sucrose per ton, and recoverable sucrose per acre for Experiment 2 at Renville in 1999.

Treatment	Root Yield	Sucrose Concentration	Loss to Molasses	Recoverable Sucrose	
	ton/A	%	%	lb/ton	lb/A
Check	23.9	18.3	0.93	348	8301
Fertilizer 40 lb N/A	24.9	18.2	1.01	345	8570
Fertilizer 80 lb N/A	25.3	18.1	0.94	342	8634
Fertilizer 120 lb N/A	25.7	17.5	0.86	332	8546
Fertilizer 160 lb N/A	26.1	17.4	0.98	329	8492
Fertilizer 200 lb N/A	24.2	17.6	1.03	331	8033
Swine Manure 2500 gal/A	25.3	17.5	1.00	329	8353
Swine Manure 5000 gal/A	28.0	17.5	0.94	330	9371
Turkey Manure 2.5 ton/A	26.2	17.8	0.93	337	8849
Turkey Manure 5.0 ton/A	27.3	17.3	1.10	323	8819
LSD 0.05	2.6	NS	0.10	NS	NS

These results were not expected and because the soil data is not available for this report. Several factors were involved during the 1999 growing season. The root yields for all treatments were very good. The check root yield of nearly 24 tons per acre on a soil with 27 pounds per acre of nitrate-N and no substantial deep nitrate was unusual. Mineralization of soil organic N during the growing season must have been greater than normal. Another factor affecting the results involved the fall application of the treatments. The treatments were application the first week of November in 1998. The observation for other studies was a loss of fall applied N occurred. These results

are only from the first year of work in a three year study. Follow up data will be important in the interpretation of this study.

Literature Cited:

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Schmitt, M.A., C.C. Sheaffer, and G.W. Randall. 1996. Preplant manure on alfalfa: Residual effects on corn yield and soil nitrate. J. Prod. Agric. 9:395-398.

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson Temperature			Willmar Temperature			Olivia Temperature			Redwood Falls Temperature			Morris Temperature			Montivideo Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
Jan 1	10.00	-5.00	2.50	11.00	-4.00	3.50	11.00	-4.00	3.50	12.00	-1.00	5.50	9.00	-7.00	1.00	6.00	-5.00	0.50
Jan 2	10.00	-1.00	4.50	8.00	-2.00	3.00	12.00	1.00	6.50	15.00	7.00	11.00	8.00	-2.00	3.00	13.00	-5.00	4.00
Jan 3	15.00	1.00	8.00	15.00	-4.00	5.50	14.00	-5.00	4.50	9.00	-12.00	-1.50	14.00	-6.00	4.00	-4.00	-7.00	-5.50
Jan 4	5.00	-17.00	-6.00	-2.00	-19.00	-10.50	-3.00	-18.00	-10.50	-9.00	-18.00	-13.50	-5.00	-19.00	-12.00	-5.00	-20.00	-12.50
Jan 5	-5.00	-19.00	-12.00	-4.00	-19.00	-11.50	-4.00	-18.00	-11.00	14.00	-12.00	1.00	-2.00	-20.00	-11.00	11.00	-5.00	3.00
Jan 6	10.00	0.00	5.00	11.00	-4.00	3.50	12.00	-5.00	3.50	14.00	-15.00	-0.50	11.00	-6.00	2.50	12.00	-10.00	1.00
Jan 7	5.00	-17.00	-6.00	-1.00	-17.00	-9.00	-3.00	-18.00	-10.50	7.00	5.00	6.00	-6.00	-20.00	-13.00	5.00	-15.00	-5.00
Jan 8	5.00	-16.00	-5.50	6.00	-17.00	-5.50	6.00	-16.00	-5.00	7.00	-16.00	-4.50	7.00	-21.00	-7.00	5.00	-13.00	-4.00
Jan 9	10.00	-22.00	-6.00	8.00	-24.00	-8.00	9.00	-20.00	-5.50	12.00	-20.00	-4.00	7.00	-18.00	-5.50	8.00	-23.00	-7.50
Jan 10	5.00	-22.00	-8.50	6.00	-24.00	-9.00	10.00	-18.00	-4.00	12.00	-9.00	1.50	7.00	-21.00	-7.00	8.00	-9.00	-0.50
Jan 11	-2.00	-13.00	-7.50	0.00	-21.00	-10.50	3.00	-11.00	-4.00	16.00	-3.00	6.50	1.00	-13.00	-6.00	15.00	-11.00	2.00
Jan 12	6.00	-2.00	2.00	6.00	0.00	3.00	12.00	3.00	7.50	5.00	-11.00	-3.00	7.00	1.00	4.00	3.00	-14.00	-5.50
Jan 13	1.00	-14.00	-6.50	1.00	-12.00	-5.50	3.00	-17.00	-7.00	12.00	-16.00	-2.00	1.00	-21.00	-10.00	2.00	-20.00	-9.00
Jan 14	9.00	-9.00	0.00	10.00	-8.00	1.00	11.00	-9.00	1.00	12.00	-2.00	5.00	12.00	-8.00	2.00	12.00	2.00	7.00
Jan 15	11.00	0.00	5.50	11.00	0.00	5.50	13.00	1.00	7.00	39.00	4.00	21.50	10.00	1.00	5.50	38.00	-7.00	15.50
Jan 16	37.00	8.00	22.50	35.00	9.00	22.50	37.00	11.00	24.00	40.00	27.00	33.50	38.00	10.00	24.00	41.00	26.00	33.50
Jan 17	36.00	27.00	31.50	37.00	23.00	30.00	38.00	24.00	31.00	35.00	25.00	30.00	36.00	19.00	27.50	36.00	25.00	30.50
Jan 18	36.00	22.00	29.00	33.00	16.00	24.50	33.00	13.00	23.00	25.00	7.00	16.00	35.00	14.00	24.50	25.00	13.00	19.00
Jan 19	22.00	-1.00	10.50	18.00	1.00	9.50	17.00	-3.00	7.00	24.00	6.00	15.00	16.00	6.00	11.00	26.00	4.00	15.00
Jan 20	20.00	1.00	10.50	18.00	5.00	11.50	20.00	-3.00	8.50	23.00	11.00	17.00	21.00	6.00	13.50	26.00	10.00	18.00
Jan 21	24.00	13.00	18.50	22.00	15.00	18.50	23.00	14.00	18.50	31.00	18.00	24.50	21.00	8.00	14.50	31.00	21.00	26.00
Jan 22	32.00	20.00	26.00	31.00	21.00	26.00	31.00	20.00	25.50	32.00	24.00	28.00	30.00	14.00	22.00	28.00	23.00	25.50
Jan 23	33.00	25.00	29.00	33.00	25.00	29.00	33.00	24.00	28.50	30.00	21.00	25.50	32.00	14.00	23.00	23.00	20.00	21.50
Jan 24	33.00	20.00	26.50	30.00	17.00	23.50	27.00	18.00	22.50	21.00	8.00	14.50	29.00	2.00	15.50	18.00	14.00	16.00
Jan 25	22.00	-3.00	9.50	19.00	-2.00	8.50	18.00	-7.00	5.50	15.00	-2.00	6.50	20.00	-4.00	8.00	17.00	-6.00	5.50
Jan 26	12.00	-2.00	5.00	19.00	-2.00	8.50	22.00	-3.00	9.50	28.00	11.00	19.50	17.00	-6.00	5.50	27.00	7.00	17.00
Jan 27	28.00	21.00	24.50	26.00	18.00	22.00	27.00	21.00	24.00	29.00	20.00	24.50	27.00	15.00	21.00	26.00	23.00	24.50
Jan 28	31.00	18.00	24.50	29.00	13.00	21.00	29.00	11.00	20.00	21.00	14.00	17.50	28.00	11.00	19.50	23.00	11.00	17.00
Jan 29	24.00	14.00	19.00	21.00	10.00	15.50	22.00	9.00	15.50	32.00	9.00	20.50	22.00	8.00	15.00	35.00	12.00	23.50
Jan 30	30.00	15.00	22.50	33.00	9.00	21.00	32.00	9.00	20.50	24.00	12.00	18.00	38.00	5.00	21.50	28.00	10.00	19.00
Jan 31	23.00	5.00	14.00	24.00	8.00	16.00	23.00	10.00	16.50	31.00	12.00	21.50	28.00	9.00	18.50	28.00	12.00	20.00
Feb 1	34.00	17.00	25.50	32.00	26.00	29.00	32.00	10.00	21.00	34.00	28.00	31.00	35.00	13.00	24.00	28.00	25.00	26.50
Feb 2	34.00	16.00	25.00	35.00	13.00	24.00	33.00	15.00	24.00	38.00	21.00	29.50	34.00	9.00	21.50	36.00	14.00	25.00
Feb 3	37.00	18.00	27.50	40.00	24.00	32.00	37.00	16.00	26.50	39.00	17.00	28.00	36.00	21.00	28.50	39.00	17.00	28.00
Feb 4	39.00	0.00	19.50	32.00	-3.00	14.50	37.00	-1.00	18.00	18.00	0.00	9.00	38.00	-3.00	17.50	17.00	-2.00	7.50
Feb 5	34.00	1.00	17.50	40.00	6.00	23.00	33.00	2.00	17.50	40.00	16.00	28.00	29.00	-4.00	12.50	38.00	13.00	25.50
Feb 6	40.00	9.00	24.50	35.00	6.00	20.50	38.00	12.00	25.00	29.00	15.00	22.00	37.00	4.00	20.50	39.00	7.00	23.00
Feb 7	37.00	9.00	23.00	38.00	17.00	27.50	33.00	11.00	22.00	40.00	26.00	33.00	27.00	4.00	15.50	40.00	23.00	31.50
Feb 8	38.00	22.00	30.00	44.00	33.00	38.50	39.00	24.00	31.50	46.00	33.00	39.50	39.00	26.00	32.50	44.00	34.00	39.00
Feb 9	44.00	28.00	36.00	40.00	25.00	32.50	42.00	28.00	35.00	44.00	31.00	37.50	41.00	26.00	33.50	49.00	29.00	39.00
Feb 10	42.00	30.00	36.00	40.00	33.00	36.50	40.00	30.00	35.00	46.00	31.00	38.50	38.00	27.00	32.50	44.00	32.00	38.00
Feb 11	41.00	23.00	32.00	38.00	17.00	27.50	42.00	22.00	32.00	32.00	19.00	25.50	42.00	21.00	31.50	32.00	18.00	25.00
Feb 12	23.00	11.00	17.00	18.00	8.00	13.00	22.00	11.00	16.50	21.00	12.00	16.50	21.00	10.00	15.50	23.00	11.00	17.00
Feb 13	18.00	3.00	10.50	32.00	3.00	17.50	21.00	10.00	15.50	38.00	11.00	24.50	20.00	9.00	14.50	37.00	9.00	23.00
Feb 14	31.00	10.00	20.50	45.00	26.00	35.50	41.00	15.00	28.00	51.00	25.00	38.00	37.00	9.00	23.00	50.00	24.00	37.00
Feb 15	44.00	28.00	36.00	42.00	29.00	35.50	47.00	33.00	40.00	43.00	32.00	37.50	50.00	24.00	37.00	38.00	31.00	34.50
Feb 16	42.00	25.00	33.50	34.00	20.00	27.00	42.00	27.00	34.50	32.00	19.00	25.50	36.00	19.00	27.50	36.00	18.00	27.00
Feb 17	26.00	18.00	22.00	21.00	15.00	18.00	27.00	15.00	21.00	20.00	16.00	18.00	21.00	7.00	14.00	31.00	7.00	19.00
Feb 18	21.00	18.00	19.50	23.00	16.00	19.50	21.00	15.00	18.00	28.00	17.00	22.50	23.00	7.00	15.00	24.00	19.00	21.50
Feb 19	26.00	12.00	19.00	26.00	10.00	18.00	29.00	15.00	22.00	27.00	19.00	23.00	24.00	17.00	20.50	26.00	20.00	23.00
Feb 20	27.00	13.00	20.00	27.00	12.00	19.50	27.00	15.00	21.00	28.00	17.00	22.50	28.00	16.00	22.00	26.00	16.00	21.00
Feb 21	29.00	12.00	20.50	33.00	6.00	19.50	28.00	14.00	21.00	34.00	13.00	23.50	29.00	13.00	21.00	28.00	11.00	19.50
Feb 22	34.00	13.00	23.50	30.00	20.00	25.00	34.00	21.00	27.50	31.00	21.00	26.00	34.00	13.00	23.50	34.00	22.00	28.00
Feb 23	31.00	19.00	25.00	29.00	16.00	22.50	31.00	21.00	26.00	28.00	22.00	25.00	31.00	18.00	24.50	30.00	20.00	25.00
Feb 24	33.00	23.00	28.00	43.00	24.00	33.50	27.00	22.00	24.50	41.00	25.00	33.00	27.00	21.00	24.00	40.00	19.00	29.50
Feb 25	40.00	20.00	30.00	42.00	15.00	28.50	40.00	22.00	31.00	46.00	19.00	32.50	43.00	21.00	32.00	43.00	20.00	31.50
Feb 26	42.00	24.00	33.00	40.00	31.00	35.50	44.00	29.00	36.50	37.00	31.00	34.00	44.00	23.00	33.50	46.00	32.00	39.00
Feb 27	37.00	32.00	34.50	36.00	32.00	34.00	44.00	29.00	36.50	39.00	33.00	36.00	42.00	33.00	37.50	39.00	28.00	33.50
Feb 28	40.00	31.00	35.50	36.00	29.00	32.50	38.00	29.00	33.50	34.00	28.00	31.00	37.00	29.00	33.00	34.00	25.00	29.50

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson Temperature			Willmar Temperature			Olivia Temperature			Redwood Falls Temperature			Morris Temperature			Montivideo Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
Mar 1	39.00	29.00	34.00	36.00	28.00	32.00	35.00	28.00	31.50	53.00	28.00	40.50	30.00	28.00	29.00	50.00	27.00	38.50
Mar 2	49.00	29.00	39.00	49.00	26.00	37.50	52.00	27.00	39.50	37.00	20.00	28.50	50.00	26.00	38.00	35.00	27.00	31.00
Mar 3	34.00	14.00	24.00	31.00	13.00	22.00	32.00	14.00	23.00	33.00	15.00	24.00	28.00	13.00	20.50	31.00	26.00	28.50
Mar 4	32.00	18.00	25.00	31.00	14.00	22.50	32.00	19.00	25.50	35.00	25.00	30.00	32.00	13.00	22.50	31.00	15.00	23.00
Mar 5	30.00	23.00	26.50	29.00	22.00	25.50	32.00	18.00	25.00	29.00	23.00	26.00	30.00	23.00	26.50	34.00	24.00	29.00
Mar 6	30.00	16.00	23.00	27.00	15.00	21.00	29.00	16.00	22.50	27.00	17.00	22.00	28.00	13.00	20.50	28.00	23.00	25.50
Mar 7	28.00	13.00	20.50	28.00	15.00	21.50	30.00	14.00	22.00	30.00	15.00	22.50	27.00	13.00	20.00	28.00	13.00	20.50
Mar 8	30.00	18.00	24.00	29.00	16.00	22.50	30.00	14.00	22.00	26.00	22.00	24.00	30.00	17.00	23.50	30.00	19.00	24.50
Mar 9	30.00	22.00	26.00	25.00	22.00	23.50	26.00	17.00	21.50	30.00	23.00	26.50	25.00	21.00	23.00	25.00	22.00	23.50
Mar 10	29.00	11.00	20.00	30.00	16.00	23.00	31.00	6.00	18.50	30.00	16.00	23.00	31.00	21.00	26.00	28.00	22.00	25.00
Mar 11	29.00	10.00	19.50	29.00	8.00	18.50	29.00	5.00	17.00	34.00	12.00	23.00	28.00	9.00	18.50	28.00	15.00	21.50
Mar 12	30.00	9.00	19.50	31.00	8.00	19.50	32.00	6.00	19.00	33.00	7.00	20.00	37.00	8.00	22.50	31.00	8.00	19.50
Mar 13	33.00	13.00	23.00	33.00	15.00	24.00	34.00	11.00	22.50	36.00	16.00	26.00	34.00	13.00	23.50	32.00	6.00	19.00
Mar 14	37.00	15.00	26.00	35.00	14.00	24.50	36.00	14.00	25.00	38.00	16.00	27.00	35.00	23.00	29.00	38.00	17.00	27.50
Mar 15	39.00	18.00	28.50	37.00	16.00	26.50	38.00	12.00	25.00	45.00	26.00	35.50	38.00	23.00	30.50	39.00	19.00	29.00
Mar 16	41.00	25.00	33.00	44.00	26.00	35.00	43.00	27.00	35.00	52.00	30.00	41.00	45.00	29.00	37.00	44.00	24.00	34.00
Mar 17	48.00	34.00	41.00	48.00	32.00	40.00	50.00	27.00	38.50	48.00	32.00	40.00	52.00	32.00	42.00	52.00	29.00	40.50
Mar 18	41.00	28.00	34.50	38.00	27.00	32.50	40.00	28.00	34.00	45.00	29.00	37.00	38.00	27.00	32.50	39.00	32.00	35.50
Mar 19	42.00	23.00	32.50	45.00	16.00	30.50	45.00	28.00	36.50	52.00	27.00	39.50	42.00	27.00	34.50	43.00	26.00	34.50
Mar 20	47.00	33.00	40.00	48.00	19.00	33.50	49.00	28.00	38.50	45.00	32.00	38.50	51.00	28.00	39.50	51.00	24.00	37.50
Mar 21	48.00	28.00	38.00	43.00	27.00	35.00	43.00	28.00	35.50	48.00	29.00	38.50	40.00	27.00	33.50	45.00	32.00	38.50
Mar 22	44.00	23.00	33.50	47.00	25.00	36.00	48.00	27.00	37.50	51.00	27.00	39.00	46.00	26.00	36.00	46.00	26.00	36.00
Mar 23	47.00	28.00	37.50	47.00	26.00	36.50	48.00	27.00	37.50	55.00	27.00	41.00	48.00	26.00	37.00	49.00	24.00	36.50
Mar 24	52.00	23.00	37.50	49.00	23.00	36.00	52.00	24.00	38.00	42.00	25.00	33.50	47.00	21.00	34.00	39.00	24.00	31.50
Mar 25	40.00	22.00	31.00	45.00	23.00	34.00	43.00	22.00	32.50	47.00	24.00	35.50	40.00	19.00	29.50	40.00	20.00	30.00
Mar 26	43.00	29.00	36.00	53.00	23.00	38.00	45.00	30.00	37.50	56.00	29.00	42.50	45.00	22.00	33.50	46.00	19.00	32.50
Mar 27	52.00	29.00	40.50	52.00	34.00	43.00	54.00	34.00	44.00	56.00	34.00	45.00	55.00	31.00	43.00	55.00	28.00	41.50
Mar 28	58.00	39.00	48.50	52.00	37.00	44.50	54.00	36.00	45.00	54.00	37.00	45.50	48.00	35.00	41.50	53.00	34.00	43.50
Mar 29	51.00	32.00	41.50	51.00	33.00	42.00	52.00	33.00	42.50	62.00	33.00	47.50	53.00	32.00	42.50	56.00	36.00	46.00
Mar 30	58.00	32.00	45.00	59.00	33.00	46.00	59.00	37.00	48.00	73.00	34.00	53.50	59.00	34.00	46.50	63.00	29.00	46.00
Mar 31	72.00	47.00	59.50	71.00	43.00	57.00	71.00	37.00	54.00	74.00	50.00	62.00	68.00	40.00	54.00	72.00	34.00	53.00
Apr 1	69.00	48.00	58.50	67.00	48.00	57.50	71.00	47.00	59.00	61.00	47.00	54.00	65.00	45.00	55.00	54.00	48.00	51.00
Apr 2	59.00	38.00	48.50	53.00	35.00	44.00	58.00	35.00	46.50	47.00	36.00	41.50	46.00	33.00	39.50	48.00	42.00	45.00
Apr 3	47.00	38.00	42.50	42.00	35.00	38.50	43.00	35.00	39.00	46.00	35.00	40.50	38.00	32.00	35.00	42.00	33.00	37.50
Apr 4	44.00	34.00	39.00	42.00	32.00	37.00	42.00	32.00	37.00	57.00	33.00	45.00	39.00	32.00	35.50	56.00	31.00	43.50
Apr 5	55.00	34.00	44.50	54.00	33.00	43.50	57.00	32.00	44.50	46.00	33.00	39.50	52.00	33.00	42.50	50.00	31.00	40.50
Apr 6	46.00	35.00	40.50	46.00	33.00	39.50	45.00	33.00	39.00	59.00	33.00	46.00	46.00	33.00	39.50	60.00	40.00	50.00
Apr 7	57.00	35.00	46.00	56.00	33.00	44.50	58.00	35.00	46.50	72.00	45.00	58.50	57.00	35.00	46.00	68.00	32.00	50.00
Apr 8	71.00	37.00	54.00	65.00	40.00	52.50	69.00	33.00	51.00	53.00	37.00	45.00	64.00	34.00	49.00	56.00	45.00	50.50
Apr 9	55.00	40.00	47.50	56.00	38.00	47.00	53.00	38.00	45.50	59.00	39.00	49.00	56.00	37.00	46.50	62.00	35.00	48.50
Apr 10	58.00	39.00	48.50	60.00	37.00	48.50	59.00	38.00	48.50	48.00	37.00	42.50	59.00	38.00	48.50	56.00	39.00	47.50
Apr 11	46.00	33.00	39.50	45.00	33.00	39.00	42.00	34.00	38.00	44.00	35.00	39.50	45.00	34.00	39.50	50.00	41.00	45.50
Apr 12	43.00	29.00	36.00	43.00	28.00	35.50	43.00	30.00	36.50	61.00	30.00	45.50	48.00	31.00	39.50	62.00	29.00	45.50
Apr 13	59.00	38.00	48.50	59.00	33.00	46.00	60.00	37.00	48.50	63.00	45.00	54.00	60.00	34.00	47.00	67.00	30.00	48.50
Apr 14	62.00	45.00	53.50	64.00	43.00	53.50	64.00	44.00	54.00	57.00	42.00	49.50	65.00	45.00	55.00	64.00	46.00	55.00
Apr 15	61.00	41.00	51.00	53.00	41.00	47.00	58.00	38.00	48.00	44.00	34.00	39.00	50.00	36.00	43.00	47.00	43.00	45.00
Apr 16	43.00	31.00	37.00	45.00	30.00	37.50	44.00	29.00	36.50	34.00	28.00	31.00	45.00	27.00	36.00	40.00	37.00	38.50
Apr 17	44.00	31.00	37.50	39.00	30.00	34.50	38.00	29.00	33.50	43.00	31.00	37.00	34.00	27.00	30.50	45.00	26.00	35.50
Apr 18	41.00	31.00	36.00	38.00	28.00	33.00	40.00	28.00	34.00	56.00	27.00	41.50	37.00	26.00	31.50	58.00	26.00	42.00
Apr 19	53.00	37.00	45.00	53.00	32.00	42.50	54.00	34.00	44.00	59.00	38.00	48.50	55.00	29.00	42.00	57.00	24.00	40.50
Apr 20	57.00	39.00	48.00	56.00	40.00	48.00	63.00	40.00	51.50	65.00	41.00	53.00	55.00	37.00	46.00	69.00	37.00	53.00
Apr 21	54.00	42.00	48.00	58.00	41.00	49.50	53.00	40.00	46.50	55.00	46.00	50.50	61.00	42.00	51.50	57.00	41.00	49.00
Apr 22	55.00	34.00	44.50	55.00	43.00	49.00	55.00	42.00	48.50	50.00	39.00	44.50	55.00	41.00	48.00	60.00	41.00	50.50
Apr 23	53.00	35.00	44.00	53.00	34.00	43.50	51.00	33.00	42.00	61.00	35.00	48.00	56.00	33.00	44.50	62.00	42.00	52.00
Apr 24	58.00	28.00	43.00	55.00	33.00	44.00	62.00	37.00	49.50	65.00	34.00	49.50	60.00	33.00	46.50	67.00	31.00	49.00
Apr 25	64.00	28.00	46.00	66.00	38.00	52.00	66.00	39.00	52.50	67.00	39.00	53.00	67.00	37.00	52.00	69.00	34.00	51.50
Apr 26	65.00	46.00	55.50	68.00	44.00	56.00	69.00	45.00	57.00	62.00	48.00	55.00	69.00	47.00	58.00	62.00	34.00	48.00
Apr 27	63.00	48.00	55.50	63.00	47.00	55.00	62.00	47.00	54.50	58.00	49.00	53.50	62.00	49.00	55.50	69.00	47.00	58.00
Apr 28	58.00	41.00	49.50	60.00	43.00	51.50	58.00	41.00	49.50	70.00	46.00	58.00	62.00	42.00	52.00	71.00	48.00	59.50
Apr 29	67.00	38.00	52.50	69.00	41.00	55.00	71.00	37.00	54.00	73.00	42.00	57.50	70.00	39.00	54.50	74.00	43.00	58.50
Apr 30	69.00	41.00	55.00	71.00	38.00	54.50	73.00	39.00	56.00	76.00	42.00	59.00	72.00	41.00	56.50	78.00	41.00	59.50

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson			Willmar			Olivia			Redwood Falls			Morris			Montivideo		
	Temperature			Temperature			Temperature			Temperature			Temperature			Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
May 1	75.00	45.00	60.00	76.00	44.00	60.00	77.00	47.00	62.00	77.00	45.00	61.00	77.00	45.00	61.00	75.00	40.00	57.50
May 2	74.00	55.00	64.50	77.00	49.00	63.00	79.00	47.00	63.00	77.00	46.00	61.50	80.00	48.00	64.00	77.00	42.00	59.50
May 3	75.00	56.00	65.50	78.00	55.00	66.50	79.00	49.00	64.00	79.00	58.00	68.50	79.00	55.00	67.00	78.00	47.00	62.50
May 4	78.00	61.00	69.50	79.00	55.00	67.00	80.00	57.00	68.50	76.00	62.00	69.00	74.00	56.00	65.00	73.00	55.00	64.00
May 5	74.00	57.00	65.50	74.00	54.00	64.00	77.00	58.00	67.50	66.00	52.00	59.00	76.00	57.00	66.50	76.00	52.00	64.00
May 6	66.00	50.00	58.00	67.00	50.00	58.50	67.00	51.00	59.00	56.00	52.00	54.00	63.00	51.00	57.00	63.00	55.00	59.00
May 7	57.00	46.00	51.50	57.00	45.00	51.00	58.00	48.00	53.00	55.00	42.00	48.50	55.00	44.00	49.50	55.00	51.00	53.00
May 8	47.00	42.00	44.50	46.00	42.00	44.00	58.00	41.00	49.50	52.00	40.00	46.00	44.00	37.00	40.50	51.00	44.00	47.50
May 9	55.00	36.00	45.50	55.00	37.00	46.00	54.00	33.00	43.50	72.00	35.00	53.50	51.00	36.00	43.50	66.00	39.00	52.50
May 10	68.00	47.00	57.50	68.00	48.00	58.00	70.00	49.00	59.50	71.00	58.00	64.50	66.00	44.00	55.00	70.00	51.00	60.50
May 11	71.00	50.00	60.50	64.00	49.00	56.50	69.00	48.00	58.50	60.00	49.00	54.50	63.00	47.00	55.00	64.00	55.00	59.50
May 12	56.00	49.00	52.50	59.00	48.00	53.50	69.00	48.00	58.50	54.00	49.00	51.50	59.00	47.00	53.00	61.00	46.00	53.50
May 13	51.00	45.00	48.00	52.00	44.00	48.00	54.00	46.00	50.00	53.00	47.00	50.00	53.00	45.00	49.00	55.00	46.00	50.50
May 14	52.00	46.00	49.00	52.00	44.00	48.00	55.00	41.00	48.00	64.00	49.00	56.50	53.00	46.00	49.50	53.00	44.00	48.50
May 15	57.00	53.00	55.00	66.00	51.00	58.50	64.00	54.00	59.00	67.00	55.00	61.00	66.00	52.00	59.00	65.00	47.00	56.00
May 16	64.00	57.00	60.50	62.00	56.00	59.00	65.00	59.00	62.00	72.00	60.00	66.00	66.00	56.00	61.00	66.00	54.00	60.00
May 17	67.00	51.00	59.00	65.00	53.00	59.00	69.00	52.00	60.50	64.00	53.00	58.50	68.00	49.00	58.50	65.00	58.00	61.50
May 18	65.00	45.00	55.00	65.00	46.00	55.50	66.00	42.00	54.00	72.00	43.00	57.50	66.00	43.00	54.50	65.00	49.00	57.00
May 19	67.00	53.00	60.00	68.00	52.00	60.00	69.00	51.00	60.00	83.00	59.00	71.00	70.00	50.00	60.00	69.00	42.00	55.50
May 20	80.00	59.00	69.50	82.00	58.00	70.00	83.00	57.00	70.00	68.00	60.00	64.00	77.00	60.00	68.50	84.00	53.00	68.50
May 21	64.00	53.00	58.50	67.00	54.00	60.50	66.00	54.00	60.00	76.00	52.00	64.00	74.00	50.00	62.00	68.00	61.00	64.50
May 22	72.00	50.00	61.00	73.00	51.00	62.00	75.00	52.00	63.50	79.00	53.00	66.00	71.00	53.00	62.00	70.00	51.00	60.50
May 23	73.00	48.00	60.50	77.00	48.00	62.50	78.00	47.00	62.50	59.00	49.00	54.00	79.00	46.00	62.50	68.00	53.00	60.50
May 24	57.00	42.00	49.50	58.00	46.00	52.00	59.00	42.00	50.50	65.00	45.00	55.00	60.00	42.00	51.00	61.00	46.00	53.50
May 25	64.00	46.00	55.00	65.00	47.00	56.00	65.00	44.00	54.50	72.00	47.00	59.50	65.00	45.00	55.00	65.00	42.00	53.50
May 26	69.00	42.00	55.50	71.00	38.00	54.50	73.00	43.00	58.00	78.00	43.00	60.50	71.00	41.00	56.00	69.00	46.00	57.50
May 27	75.00	56.00	65.50	77.00	52.00	64.50	77.00	49.00	63.00	83.00	57.00	70.00	79.00	55.00	67.00	78.00	41.00	59.50
May 28	82.00	51.00	66.50	81.00	49.00	65.00	73.00	56.00	64.50	88.00	54.00	71.00	81.00	49.00	65.00	79.00	56.00	67.50
May 29	86.00	58.00	72.00	86.00	59.00	72.50	88.00	59.00	73.50	87.00	64.00	75.50	85.00	60.00	72.50	86.00	49.00	67.50
May 30	90.00	55.00	72.50	87.00	62.00	74.50	88.00	62.00	75.00	86.00	58.00	72.00	89.00	63.00	76.00	88.00	60.00	74.00
May 31	84.00	49.00	66.50	85.00	52.00	68.50	88.00	51.00	69.50	61.00	51.00	56.00	87.00	48.00	67.50	63.00	61.00	62.00
Jun 1	59.00	50.00	54.50	58.00	48.00	53.00	53.00	47.00	50.00	53.00	47.00	50.00	54.00	48.00	51.00	55.00	49.00	52.00
Jun 2	51.00	43.00	47.00	51.00	47.00	49.00	74.00	47.00	60.50	74.00	47.00	60.50	59.00	44.00	51.50	75.00	47.00	61.00
Jun 3	70.00	46.00	58.00	71.00	50.00	60.50	81.00	54.00	67.50	81.00	54.00	67.50	79.00	47.00	63.00	82.00	56.00	69.00
Jun 4	77.00	63.00	70.00	70.00	60.00	65.00	89.00	61.00	75.00	89.00	61.00	75.00	81.00	62.00	71.50	91.00	65.00	78.00
Jun 5	83.00	64.00	73.50	86.00	64.00	75.00	91.00	65.00	78.00	91.00	65.00	78.00	91.00	65.00	78.00	83.00	63.00	73.00
Jun 6	88.00	68.00	78.00	83.00	68.00	75.50	89.00	67.00	78.00	89.00	67.00	78.00	80.00	67.00	73.50	85.00	66.00	75.50
Jun 7	86.00	61.00	73.50	87.00	60.00	73.50	89.00	57.00	73.00	89.00	57.00	73.00	86.00	59.00	72.50	85.00	59.00	72.00
Jun 8	86.00	66.00	76.00	85.00	64.00	74.50	89.00	81.00	85.00	89.00	81.00	85.00	86.00	64.00	75.00	87.00	63.00	75.00
Jun 9	85.00	64.00	74.50	84.00	64.00	74.00	92.00	67.00	79.50	92.00	67.00	79.50	84.00	64.00	74.00	89.00	63.00	76.00
Jun 10	86.00	65.00	75.50	88.00	65.00	76.50	78.00	61.00	69.50	78.00	61.00	69.50	87.00	62.00	74.50	74.00	61.00	67.50
Jun 11	76.00	58.00	67.00	77.00	58.00	67.50	78.00	57.00	67.50	78.00	57.00	67.50	74.00	57.00	65.50	75.00	58.00	66.50
Jun 12	73.00	54.00	63.50	76.00	55.00	65.50	84.00	56.00	70.00	84.00	56.00	70.00	76.00	57.00	66.50	79.00	50.00	64.50
Jun 13	80.00	61.00	70.50	80.00	62.00	71.00	76.00	57.00	66.50	76.00	57.00	66.50	81.00	56.00	68.50	80.00	55.00	67.50
Jun 14	72.00	50.00	61.00	73.00	50.00	61.50	70.00	50.00	60.00	70.00	50.00	60.00	70.00	47.00	58.50	66.00	47.00	56.50
Jun 15	65.00	48.00	56.50	67.00	47.00	57.00	68.00	50.00	59.00	68.00	50.00	59.00	67.00	48.00	57.50	68.00	49.00	58.50
Jun 16	65.00	46.00	55.50	66.00	48.00	57.00	73.00	50.00	61.50	73.00	50.00	61.50	69.00	49.00	59.00	67.00	48.00	57.50
Jun 17	67.00	43.00	55.00	67.00	43.00	55.00	77.00	43.00	60.00	77.00	43.00	60.00	67.00	46.00	56.50	75.00	43.00	59.00
Jun 18	72.00	56.00	64.00	73.00	53.00	63.00	69.00	56.00	62.50	69.00	56.00	62.50	75.00	55.00	65.00	63.00	54.00	58.50
Jun 19	69.00	55.00	62.00	68.00	55.00	61.50	65.00	56.00	60.50	65.00	56.00	60.50	68.00	56.00	62.00	65.00	56.00	60.50
Jun 20	63.00	55.00	59.00	63.00	58.00	60.50	78.00	64.00	71.00	78.00	64.00	71.00	66.00	57.00	61.50	76.00	62.00	69.00
Jun 21	75.00	65.00	70.00	74.00	63.00	68.50	87.00	65.00	76.00	87.00	65.00	76.00	74.00	65.00	69.50	85.00	65.00	75.00
Jun 22	83.00	70.00	76.50	83.00	66.00	74.50	81.00	68.00	74.50	81.00	68.00	74.50	85.00	69.00	77.00	82.00	68.00	75.00
Jun 23	83.00	64.00	73.50	80.00	63.00	71.50	85.00	64.00	74.50	85.00	64.00	74.50	82.00	63.00	72.50	82.00	62.00	72.00
Jun 24	83.00	66.00	74.50	82.00	63.00	72.50	93.00	64.00	78.50	93.00	64.00	78.50	82.00	58.00	70.00	88.00	60.00	74.00
Jun 25	86.00	61.00	73.50	87.00	61.00	74.00	93.00	69.00	81.00	93.00	69.00	81.00	88.00	64.00	76.00	89.00	64.00	76.50
Jun 26	89.00	69.00	79.00	87.00	68.00	77.50	92.00	74.00	83.00	92.00	74.00	83.00	90.00	69.00	79.50	88.00	70.00	79.00
Jun 27	89.00	64.00	76.50	90.00	64.00	77.00	75.00	61.00	68.00	75.00	61.00	68.00	86.00	60.00	73.00	74.00	60.00	67.00
Jun 28	71.00	55.00	63.00	77.00	59.00	68.00	66.00	54.00	60.00	66.00	54.00	60.00	74.00	57.00	65.50	64.00	55.00	59.50
Jun 29	65.00	50.00	57.50	67.00	47.00	57.00	73.00	50.00	61.50	73.00	50.00	61.50	65.00	47.00	56.00	74.00	48.00	61.00
Jun 30	74.00	58.00	66.00	73.00	56.00	64.50	77.00	57.00	67.00	77.00	57.00	67.00	74.00	56.00	65.00	75.00	55.00	65.00

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson			Willmar			Olivia			Redwood Falls			Morris			Montivideo		
	Temperature			Temperature			Temperature			Temperature			Temperature			Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
Jul 1	75.00	54.00	64.50	76.00	55.00	65.50	75.00	55.00	65.00	77.00	55.00	66.00	76.00	57.00	66.50	74.00	53.00	63.50
Jul 2	77.00	57.00	67.00	75.00	54.00	64.50	72.00	56.00	64.00	78.00	47.00	62.50	75.00	54.00	64.50	78.00	56.00	67.00
Jul 3	78.00	62.00	70.00	78.00	60.00	69.00	81.00	62.00	71.50	92.00	68.00	80.00	79.00	60.00	69.50	91.00	66.00	78.50
Jul 4	90.00	70.00	80.00	90.00	68.00	79.00	93.00	75.00	84.00	95.00	78.00	86.50	91.00	70.00	80.50	89.00	78.00	83.50
Jul 5	92.00	78.00	85.00	91.00	76.00	83.50	91.00	77.00	84.00	90.00	63.00	76.50	91.00	75.00	83.00	88.00	64.00	76.00
Jul 6	90.00	58.00	74.00	86.00	59.00	72.50	87.00	56.00	71.50	83.00	59.00	71.00	84.00	59.00	71.50	80.00	55.00	67.50
Jul 7	82.00	60.00	71.00	82.00	59.00	70.50	81.00	57.00	69.00	90.00	59.00	74.50	82.00	55.00	68.50	86.00	56.00	71.00
Jul 8	87.00	64.00	75.50	84.00	64.00	74.00	85.00	56.00	70.50	91.00	65.00	78.00	86.00	65.00	75.50	91.00	64.00	77.50
Jul 9	87.00	57.00	72.00	87.00	60.00	73.50	89.00	57.00	73.00	73.00	56.00	64.50	84.00	56.00	70.00	74.00	56.00	65.00
Jul 10	74.00	54.00	64.00	73.00	55.00	64.00	73.00	51.00	62.00	82.00	53.00	67.50	70.00	54.00	62.00	76.00	51.00	63.50
Jul 11	78.00	57.00	67.50	78.00	53.00	65.50	79.00	54.00	66.50	83.00	55.00	69.00	78.00	53.00	65.50	81.00	52.00	66.50
Jul 12	81.00	60.00	70.50	79.00	57.00	68.00	79.00	56.00	67.50	84.00	56.00	70.00	81.00	56.00	68.50	83.00	55.00	69.00
Jul 13	82.00	65.00	73.50	82.00	63.00	72.50	81.00	61.00	71.00	88.00	61.00	74.50	84.00	64.00	74.00	86.00	62.00	74.00
Jul 14	83.00	68.00	75.50	83.00	61.00	72.00	91.00	69.00	80.00	94.00	73.00	83.50	84.00	66.00	75.00	91.00	64.00	77.50
Jul 15	90.00	73.00	81.50	89.00	73.00	81.00	91.00	72.00	81.50	95.00	71.00	83.00	91.00	73.00	82.00	92.00	72.00	82.00
Jul 16	94.00	71.00	82.50	92.00	70.00	81.00	91.00	70.00	80.50	83.00	64.00	73.50	90.00	67.00	78.50	78.00	68.00	73.00
Jul 17	82.00	58.00	70.00	82.00	57.00	69.50	82.00	55.00	68.50	82.00	58.00	70.00	77.00	56.00	66.50	77.00	55.00	66.00
Jul 18	78.00	62.00	70.00	77.00	64.00	70.50	80.00	58.00	69.00	78.00	66.00	72.00	75.00	64.00	69.50	77.00	56.00	66.50
Jul 19	72.00	66.00	69.00	72.00	65.00	68.50	75.00	63.00	69.00	84.00	68.00	76.00	74.00	65.00	69.50	82.00	66.00	74.00
Jul 20	83.00	67.00	75.00	83.00	67.00	75.00	83.00	67.00	75.00	74.00	66.00	70.00	84.00	66.00	75.00	78.00	68.00	73.00
Jul 21	74.00	67.00	70.50	78.00	64.00	71.00	76.00	69.00	72.50	81.00	66.00	73.50	82.00	61.00	71.50	80.00	65.00	72.50
Jul 22	81.00	60.00	70.50	82.00	60.00	71.00	81.00	61.00	71.00	91.00	62.00	76.50	83.00	65.00	74.00	92.00	64.00	78.00
Jul 23	88.00	65.00	76.50	89.00	68.00	78.50	92.00	67.00	79.50	92.00	70.00	81.00	90.00	65.00	77.50	91.00	66.00	78.50
Jul 24	92.00	68.00	80.00	90.00	66.00	78.00	90.00	67.00	78.50	93.00	71.00	82.00	90.00	66.00	78.00	93.00	67.00	80.00
Jul 25	95.00	73.00	84.00	94.00	73.00	83.50	93.00	73.00	83.00	96.00	74.00	85.00	91.00	73.00	82.00	95.00	74.00	84.50
Jul 26	93.00	69.00	81.00	93.00	66.00	79.50	91.00	67.00	79.00	87.00	65.00	76.00	91.00	61.00	76.00	80.00	62.00	71.00
Jul 27	84.00	54.00	69.00	84.00	57.00	70.50	85.00	60.00	72.50	88.00	59.00	73.50	79.00	58.00	68.50	88.00	59.00	73.50
Jul 28	87.00	64.00	75.50	86.00	61.00	73.50	86.00	62.00	74.00	94.00	64.00	79.00	88.00	60.00	74.00	89.00	60.00	74.50
Jul 29	89.00	73.00	81.00	88.00	70.00	79.00	88.00	70.00	79.00	101.00	79.00	90.00	89.00	68.00	78.50	96.00	73.00	84.50
Jul 30	96.00	78.00	87.00	95.00	74.00	84.50	95.00	77.00	86.00	97.00	68.00	82.50	94.00	72.00	83.00	94.00	75.00	84.50
Jul 31	93.00	65.00	79.00	94.00	66.00	80.00	94.00	64.00	79.00	80.00	61.00	70.50	92.00	60.00	76.00	77.00	60.00	68.50
Aug 1	78.00	60.00	69.00	77.00	62.00	69.50	76.00	56.00	66.00	77.00	59.00	68.00	73.00	57.00	65.00	77.00	60.00	68.50
Aug 2	76.00	51.00	63.50	76.00	53.00	64.50	75.00	51.00	63.00	83.00	52.00	67.50	75.00	52.00	63.50	73.00	58.00	65.50
Aug 3	79.00	59.00	69.00	79.00	57.00	68.00	79.00	52.00	65.50	85.00	61.00	73.00	79.00	62.00	70.50	80.00	53.00	66.50
Aug 4	81.00	55.00	68.00	80.00	57.00	68.50	81.00	53.00	67.00	85.00	55.00	70.00	78.00	56.00	67.00	80.00	59.00	69.50
Aug 5	82.00	55.00	68.50	81.00	56.00	68.50	79.00	54.00	66.50	89.00	55.00	72.00	80.00	56.00	68.00	80.00	53.00	66.50
Aug 6	85.00	60.00	72.50	84.00	64.00	74.00	84.00	62.00	73.00	88.00	60.00	74.00	85.00	61.00	73.00	86.00	55.00	70.50
Aug 7	85.00	60.00	72.50	86.00	63.00	74.50	84.00	62.00	73.00	86.00	60.00	73.00	86.00	62.00	74.00	86.00	60.00	73.00
Aug 8	81.00	48.00	64.50	83.00	55.00	69.00	81.00	51.00	66.00	80.00	55.00	67.50	78.00	50.00	64.00	78.00	64.00	71.00
Aug 9	73.00	56.00	64.50	75.00	60.00	67.50	76.00	55.00	65.50	91.00	60.00	75.50	75.00	58.00	66.50	80.00	63.00	71.50
Aug 10	80.00	53.00	66.50	82.00	60.00	71.00	83.00	59.00	71.00	85.00	64.00	74.50	83.00	62.00	72.50	86.00	60.00	73.00
Aug 11	83.00	61.00	72.00	81.00	61.00	71.00	80.00	61.00	70.50	89.00	63.00	76.00	80.00	63.00	71.50	81.00	60.00	70.50
Aug 12	85.00	68.00	76.50	65.00	66.00	75.50	82.00	55.00	68.50	83.00	61.00	72.00	86.00	67.00	76.50	87.00	62.00	74.50
Aug 13	75.00	58.00	66.50	73.00	58.00	65.50	79.00	58.00	68.50	76.00	56.00	66.00	71.00	56.00	63.50	85.00	65.00	75.00
Aug 14	72.00	50.00	61.00	74.00	47.00	60.50	74.00	49.00	61.50	78.00	49.00	63.50	72.00	49.00	60.50	79.00	55.00	67.00
Aug 15	75.00	59.00	67.00	74.00	59.00	66.50	74.00	48.00	61.00	79.00	60.00	69.50	75.00	58.00	66.50	76.00	47.00	61.50
Aug 16	75.00	62.00	68.50	75.00	61.00	68.00	76.00	63.00	69.50	87.00	64.00	75.50	79.00	59.00	69.00	75.00	47.00	61.00
Aug 17	82.00	57.00	69.50	79.00	57.00	68.00	79.00	55.00	67.00	88.00	56.00	72.00	80.00	55.00	67.50	83.00	59.00	71.00
Aug 18	83.00	64.00	73.50	82.00	57.00	69.50	82.00	60.00	71.00	82.00	61.00	71.50	84.00	62.00	73.00	85.00	53.00	69.00
Aug 19	74.00	60.00	67.00	79.00	58.00	68.50	80.00	53.00	66.50	76.00	56.00	66.00	76.00	54.00	65.00	77.00	64.00	70.50
Aug 20	72.00	53.00	62.50	74.00	55.00	64.50	74.00	57.00	65.50	81.00	55.00	68.00	77.00	57.00	67.00	76.00	52.00	64.00
Aug 21	78.00	58.00	68.00	78.00	59.00	68.50	78.00	56.00	67.00	82.00	65.00	73.50	79.00	62.00	70.50	81.00	56.00	68.50
Aug 22	83.00	56.00	69.50	77.00	67.00	72.00	77.00	66.00	71.50	81.00	66.00	73.50	75.00	65.00	70.00	79.00	53.00	66.00
Aug 23	81.00	64.00	72.50	81.00	62.00	71.50	80.00	61.00	70.50	75.00	62.00	68.50	84.00	59.00	71.50	84.00	64.00	74.00
Aug 24	76.00	63.00	69.50	73.00	63.00	68.00	73.00	59.00	66.00	77.00	60.00	68.50	74.00	59.00	66.50	74.00	59.00	66.50
Aug 25	75.00	58.00	66.50	77.00	57.00	67.00	76.00	54.00	65.00	81.00	56.00	68.50	82.00	58.00	70.00	80.00	59.00	69.50
Aug 26	80.00	58.00	69.00	80.00	62.00	71.00	80.00	61.00	70.50	90.00	63.00	76.50	81.00	62.00	71.50	82.00	56.00	69.00
Aug 27	84.00	67.00	75.50	87.00	67.00	77.00	86.00	64.00	75.00	96.00	67.00	81.50	91.00	61.00	76.00	94.00	65.00	79.50
Aug 28	90.00	62.00	76.00	92.00	60.00	76.00	92.00	63.00	77.50	77.00	65.00	71.00	92.00	65.00	78.50	78.00	62.00	70.00
Aug 29	82.00	64.00	73.00	78.00	57.00	67.50	79.00	57.00	68.00	74.00	60.00	67.00	80.00	58.00	69.00	73.00	65.00	69.00
Aug 30	71.00	58.00	64.50	64.00	58.00	61.00	73.00	58.00	65.50	68.00	58.00	63.00	70.00	58.00	64.00	76.00	47.00	61.50
Aug 31	70.00	56.00	63.00	66.00	48.00	57.00	73.00	57.00	65.00	84.00	61.00	72.50	66.00	56.00	61.00	83.00	58.00	70.50

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson			Willmar			Olivia			Redwood Falls			Morris			Montivideo		
	Temperature			Temperature			Temperature			Temperature			Temperature			Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
Sep 1	82.00	63.00	72.50	81.00	62.00	71.50	82.00	61.00	71.50	89.00	62.00	75.50	85.00	63.00	74.00	85.00	61.00	73.00
Sep 2	86.00	63.00	74.50	85.00	64.00	74.50	87.00	63.00	75.00	88.00	65.00	76.50	80.00	64.00	72.00	85.00	63.00	74.00
Sep 3	88.00	68.00	78.00	84.00	58.00	71.00	86.00	66.00	76.00	91.00	67.00	79.00	75.00	63.00	69.00	86.00	61.00	73.50
Sep 4	88.00	69.00	78.50	87.00	47.00	67.00	88.00	68.00	78.00	77.00	67.00	72.00	82.00	62.00	72.00	87.00	62.00	74.50
Sep 5	86.00	57.00	71.50	76.00	56.00	66.00	76.00	53.00	64.50	67.00	54.00	60.50	78.00	54.00	66.00	78.00	62.00	70.00
Sep 6	70.00	48.00	59.00	68.00	46.00	57.00	68.00	48.00	58.00	80.00	48.00	64.00	67.00	48.00	57.50	78.00	51.00	64.50
Sep 7	78.00	63.00	70.50	77.00	52.00	64.50	78.00	57.00	67.50	84.00	63.00	73.50	80.00	55.00	67.50	80.00	46.00	63.00
Sep 8	82.00	54.00	68.00	79.00	52.00	65.50	82.00	50.00	66.00	67.00	51.00	59.00	76.00	51.00	63.50	79.00	62.00	70.50
Sep 9	68.00	46.00	57.00	65.00	47.00	56.00	67.00	45.00	56.00	65.00	46.00	55.50	63.00	47.00	55.00	67.00	47.00	57.00
Sep 10	62.00	46.00	54.00	63.00	41.00	52.00	64.00	43.00	53.50	70.00	48.00	59.00	63.00	46.00	54.50	65.00	46.00	55.50
Sep 11	71.00	42.00	56.50	70.00	43.00	56.50	71.00	43.00	57.00	78.00	46.00	62.00	69.00	43.00	56.00	70.00	42.00	56.00
Sep 12	68.00	50.00	59.00	71.00	50.00	60.50	74.00	45.00	59.50	67.00	54.00	60.50	68.00	49.00	58.50	71.00	41.00	56.00
Sep 13	73.00	42.00	57.50	65.00	50.00	57.50	67.00	50.00	58.50	62.00	50.00	56.00	63.00	49.00	56.00	73.00	44.00	58.50
Sep 14	61.00	42.00	51.50	59.00	42.00	50.50	62.00	42.00	52.00	61.00	43.00	52.00	60.00	42.00	51.00	61.00	49.00	55.00
Sep 15	60.00	47.00	53.50	59.00	43.00	51.00	61.00	46.00	53.50	67.00	49.00	58.00	61.00	47.00	54.00	61.00	41.00	51.00
Sep 16	64.00	40.00	52.00	65.00	40.00	52.50	67.00	43.00	55.00	75.00	39.00	57.00	67.00	43.00	55.00	68.00	47.00	57.50
Sep 17	71.00	48.00	59.50	72.00	46.00	59.00	73.00	49.00	61.00	78.00	48.00	63.00	75.00	47.00	61.00	75.00	40.00	57.50
Sep 18	76.00	50.00	63.00	76.00	51.00	63.50	76.00	49.00	62.50	82.00	45.00	63.50	78.00	53.00	65.50	77.00	47.00	62.00
Sep 19	81.00	51.00	66.00	78.00	40.00	59.00	82.00	52.00	67.00	66.00	42.00	54.00	76.00	52.00	64.00	79.00	51.00	65.00
Sep 20	65.00	35.00	50.00	62.00	44.00	53.00	65.00	41.00	53.00	56.00	37.00	46.50	60.00	35.00	47.50	63.00	50.00	56.50
Sep 21	55.00	35.00	45.00	56.00	34.00	45.00	57.00	31.00	44.00	68.00	32.00	50.00	56.00	34.00	45.00	55.00	34.00	44.50
Sep 22	66.00	44.00	55.00	69.00	37.00	53.00	68.00	35.00	51.50	83.00	43.00	63.00	74.00	38.00	56.00	71.00	30.00	50.50
Sep 23	80.00	48.00	64.00	80.00	44.00	62.00	82.00	48.00	65.00	75.00	49.00	62.00	83.00	45.00	64.00	82.00	42.00	62.00
Sep 24	70.00	50.00	60.00	69.00	42.00	55.50	73.00	43.00	58.00	75.00	41.00	58.00	69.00	42.00	55.50	71.00	45.00	58.00
Sep 25	70.00	47.00	58.50	71.00	44.00	57.50	73.00	44.00	58.50	81.00	56.00	68.50	73.00	46.00	59.50	75.00	40.00	57.50
Sep 26	76.00	40.00	58.00	70.00	44.00	57.00	80.00	55.00	67.50	72.00	56.00	64.00	67.00	52.00	59.50	70.00	56.00	63.00
Sep 27	67.00	40.00	53.50	63.00	34.00	48.50	65.00	40.00	52.50	65.00	41.00	53.00	63.00	39.00	51.00	65.00	51.00	58.00
Sep 28	64.00	34.00	49.00	62.00	43.00	52.50	63.00	39.00	51.00	64.00	38.00	51.00	63.00	39.00	51.00	63.00	37.00	50.00
Sep 29	64.00	43.00	53.50	61.00	33.00	47.00	64.00	32.00	48.00	65.00	34.00	49.50	59.00	32.00	45.50	57.00	38.00	47.50
Sep 30	64.00	38.00	51.00	63.00	38.00	50.50	64.00	40.00	52.00	62.00	44.00	53.00	64.00	36.00	50.00	65.00	30.00	47.50
Oct 1	60.00	34.00	47.00	58.00	35.00	46.50	60.00	31.00	45.50	39.00	33.00	36.00	57.00	33.00	45.00	59.00	42.00	50.50
Oct 2	44.00	30.00	37.00	43.00	33.00	38.00	40.00	26.00	33.00	48.00	28.00	38.00	41.00	28.00	34.50	39.00	32.00	35.50
Oct 3	46.00	31.00	38.50	47.00	33.00	40.00	48.00	30.00	39.00	51.00	37.00	44.00	44.00	28.00	36.00	44.00	24.00	34.00
Oct 4	49.00	34.00	41.50	48.00	33.00	40.50	51.00	34.00	42.50	61.00	35.00	48.00	49.00	31.00	40.00	48.00	35.00	41.50
Oct 5	58.00	36.00	47.00	59.00	34.00	46.50	60.00	36.00	48.00	63.00	36.00	49.50	58.00	32.00	45.00	60.00	30.00	45.00
Oct 6	61.00	32.00	46.50	58.00	32.00	45.00	62.00	31.00	46.50	64.00	33.00	48.50	55.00	32.00	43.50	67.00	33.00	50.00
Oct 7	58.00	52.00	55.00	58.00	31.00	44.50	62.00	31.00	46.50	80.00	52.00	66.00	58.00	33.00	45.50	62.00	32.00	47.00
Oct 8	79.00	49.00	64.00	72.00	41.00	56.50	73.00	49.00	61.00	75.00	49.00	62.00	62.00	43.00	52.50	76.00	50.00	63.00
Oct 9	73.00	38.00	55.50	72.00	42.00	57.00	74.00	44.00	59.00	82.00	43.00	62.50	72.00	43.00	57.50	76.00	44.00	60.00
Oct 10	79.00	40.00	59.50	81.00	44.00	62.50	80.00	43.00	61.50	68.00	43.00	55.50	83.00	45.00	64.00	83.00	42.00	62.50
Oct 11	67.00	34.00	50.50	65.00	35.00	50.00	67.00	39.00	53.00	68.00	34.00	51.00	65.00	34.00	49.50	67.00	41.00	54.00
Oct 12	66.00	54.00	60.00	66.00	35.00	50.50	67.00	38.00	52.50	67.00	47.00	57.00	63.00	31.00	47.00	67.00	35.00	51.00
Oct 13	67.00	43.00	55.00	62.00	42.00	52.00	69.00	37.00	53.00	58.00	40.00	49.00	52.00	40.00	46.00	59.00	44.00	51.50
Oct 14	55.00	42.00	48.50	56.00	41.00	48.50	68.00	38.00	53.00	71.00	34.00	52.50	57.00	41.00	49.00	55.00	37.00	46.00
Oct 15	69.00	43.00	56.00	69.00	44.00	56.50	71.00	44.00	57.50	65.00	44.00	54.50	71.00	45.00	58.00	73.00	40.00	56.50
Oct 16	64.00	44.00	54.00	62.00	39.00	50.50	69.00	42.00	55.50	53.00	35.00	44.00	57.00	36.00	46.50	60.00	40.00	50.00
Oct 17	53.00	29.00	41.00	52.00	31.00	41.50	53.00	28.00	40.50	51.00	32.00	41.50	52.00	30.00	41.00	53.00	48.00	50.50
Oct 18	54.00	32.00	43.00	48.00	32.00	40.00	52.00	32.00	42.00	53.00	36.00	44.50	49.00	31.00	40.00	46.00	28.00	37.00
Oct 19	47.00	32.00	39.50	50.00	30.00	40.00	54.00	29.00	41.50	47.00	32.00	39.50	52.00	34.00	43.00	53.00	37.00	45.00
Oct 20	48.00	24.00	36.00	48.00	25.00	36.50	53.00	26.00	39.50	63.00	26.00	44.50	45.00	25.00	35.00	45.00	32.00	38.50
Oct 21	59.00	43.00	51.00	62.00	36.00	49.00	62.00	26.00	44.00	75.00	44.00	59.50	65.00	27.00	46.00	65.00	24.00	44.50
Oct 22	71.00	32.00	51.50	62.00	31.00	46.50	71.00	38.00	54.50	48.00	34.00	41.00	67.00	36.00	51.50	72.00	42.00	57.00
Oct 23	47.00	25.00	36.00	47.00	11.00	29.00	49.00	24.00	36.50	47.00	26.00	36.50	46.00	24.00	35.00	46.00	38.00	42.00
Oct 24	47.00	23.00	35.00	49.00	22.00	35.50	51.00	19.00	35.00	62.00	22.00	42.00	45.00	22.00	33.50	46.00	22.00	34.00
Oct 25	58.00	35.00	46.50	62.00	36.00	49.00	62.00	20.00	41.00	67.00	41.00	54.00	66.00	25.00	45.50	64.00	20.00	42.00
Oct 26	65.00	33.00	49.00	62.00	30.00	46.00	65.00	36.00	50.50	64.00	36.00	50.00	63.00	31.00	47.00	64.00	35.00	49.50
Oct 27	59.00	31.00	45.00	59.00	39.00	49.00	61.00	38.00	49.50	78.00	37.00	57.50	60.00	32.00	46.00	63.00	33.00	48.00
Oct 28	73.00	42.00	57.50	73.00	29.00	51.00	75.00	25.00	50.00	58.00	29.00	43.50	75.00	24.00	49.50	79.00	39.00	59.00
Oct 29	55.00	28.00	41.50	55.00	33.00	44.00	57.00	36.00	46.50	71.00	33.00	52.00	55.00	24.00	39.50	55.00	26.00	40.50
Oct 30	67.00	38.00	52.50	65.00	42.00	53.50	69.00	36.00	52.50	59.00	43.00	51.00	60.00	36.00	48.00	66.00	34.00	50.00
Oct 31	59.00	36.00	47.50	57.00	35.00	46.00	57.00	37.00	47.00	73.00	35.00	54.00	58.00	32.00	45.00	66.00	42.00	54.00

Table 1. 1999 Weather Data-High, Low, Average Temperature

	Hutchinson			Willmar			Olivia			Redwood Falls			Morris			Montivideo		
	Temperature			Temperature			Temperature			Temperature			Temperature			Temperature		
Date	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.	high	Low	Avg.
Nov 1	73.00	43.00	58.00	71.00	41.00	56.00	71.00	44.00	57.50	58.00	36.00	47.00	76.00	32.00	54.00	76.00	34.00	55.00
Nov 2	49.00	26.00	37.50	47.00	26.00	36.50	49.00	26.00	37.50	48.00	25.00	36.50	46.00	26.00	36.00	54.00	32.00	43.00
Nov 3	44.00	20.00	32.00	45.00	17.00	31.00	49.00	23.00	36.00	63.00	20.00	41.50	46.00	20.00	33.00	47.00	25.00	36.00
Nov 4	54.00	31.00	42.50	59.00	24.00	41.50	59.00	24.00	41.50	65.00	23.00	44.00	59.00	19.00	39.00	59.00	20.00	39.50
Nov 5	58.00	30.00	44.00	60.00	29.00	44.50	62.00	27.00	44.50	52.00	33.00	42.50	65.00	27.00	46.00	66.00	21.00	43.50
Nov 6	51.00	25.00	38.00	49.00	26.00	37.50	62.00	27.00	44.50	60.00	26.00	43.00	49.00	28.00	38.50	50.00	34.00	42.00
Nov 7	56.00	29.00	42.50	57.00	30.00	43.50	58.00	34.00	46.00	70.00	33.00	51.50	62.00	31.00	46.50	62.00	28.00	45.00
Nov 8	65.00	37.00	51.00	68.00	35.00	51.50	69.00	40.00	54.50	82.00	38.00	60.00	71.00	35.00	53.00	72.00	33.00	52.50
Nov 9	81.00	46.00	63.50	80.00	41.00	60.50	82.00	47.00	64.50	75.00	45.00	60.00	78.00	38.00	58.00	80.00	37.00	58.50
Nov 10	72.00	45.00	58.50	68.00	41.00	54.50	73.00	39.00	56.00	54.00	38.00	46.00	68.00	37.00	52.50	68.00	43.00	55.50
Nov 11	49.00	36.00	42.50	53.00	36.00	44.50	58.00	37.00	47.50	55.00	38.00	46.50	53.00	33.00	43.00	54.00	35.00	44.50
Nov 12	50.00	33.00	41.50	51.00	30.00	40.50	54.00	31.00	42.50	56.00	34.00	45.00	54.00	30.00	42.00	57.00	37.00	47.00
Nov 13	60.00	36.00	48.00	60.00	31.00	45.50	62.00	38.00	50.00	78.00	42.00	60.00	61.00	29.00	45.00	65.00	29.00	47.00
Nov 14	72.00	34.00	53.00	68.00	30.00	49.00	74.00	30.00	52.00	49.00	34.00	41.50	69.00	31.00	50.00	74.00	37.00	55.50
Nov 15	47.00	28.00	37.50	48.00	27.00	37.50	49.00	25.00	37.00	61.00	26.00	43.50	46.00	27.00	36.50	47.00	31.00	39.00
Nov 16	57.00	27.00	42.00	55.00	31.00	43.00	60.00	28.00	44.00	51.00	31.00	41.00	54.00	28.00	41.00	56.00	25.00	40.50
Nov 17	49.00	27.00	38.00	51.00	30.00	40.50	53.00	30.00	41.50	55.00	37.00	46.00	52.00	28.00	40.00	52.00	22.00	37.00
Nov 18	54.00	33.00	43.50	53.00	32.00	42.50	54.00	33.00	43.50	67.00	34.00	50.50	52.00	30.00	41.00	53.00	30.00	41.50
Nov 19	57.00	33.00	45.00	54.00	34.00	44.00	66.00	30.00	48.00	42.00	25.00	33.50	51.00	27.00	39.00	60.00	33.00	46.50
Nov 20	40.00	19.00	29.50	37.00	19.00	28.00	35.00	17.00	26.00	45.00	19.00	32.00	37.00	19.00	28.00	36.00	25.00	30.50
Nov 21	44.00	22.00	33.00	43.00	27.00	35.00	44.00	29.00	36.50	50.00	37.00	43.50	42.00	21.00	31.50	45.00	17.00	31.00
Nov 22	50.00	33.00	41.50	42.00	25.00	33.50	48.00	32.00	40.00	43.00	32.00	37.50	43.00	28.00	35.50	43.00	32.00	37.50
Nov 23	44.00	30.00	37.00	43.00	29.00	36.00	42.00	31.00	36.50	36.00	29.00	32.50	44.00	27.00	35.50	41.00	29.00	35.00
Nov 24	36.00	27.00	31.50	36.00	23.00	29.50	35.00	29.00	32.00	43.00	29.00	36.00	37.00	26.00	31.50	36.00	28.00	32.00
Nov 25	44.00	27.00	35.50	48.00	23.00	35.50	47.00	22.00	34.50	46.00	22.00	34.00	48.00	22.00	35.00	50.00	23.00	36.50
Nov 26	44.00	26.00	35.00	43.00	27.00	35.00	44.00	22.00	33.00	47.00	30.00	38.50	42.00	22.00	32.00	45.00	19.00	32.00
Nov 27	45.00	21.00	33.00	43.00	24.00	33.50	45.00	26.00	35.50	42.00	25.00	33.50	41.00	23.00	32.00	46.00	30.00	38.00
Nov 28	45.00	23.00	34.00	38.00	21.00	29.50	40.00	19.00	29.50	42.00	21.00	31.50	38.00	17.00	27.50	41.00	22.00	31.50
Nov 29	42.00	17.00	29.50	41.00	12.00	26.50	42.00	15.00	28.50	38.00	17.00	27.50	39.00	12.00	25.50	41.00	22.00	31.50
Nov 30	36.00	16.00	26.00	35.00	13.00	24.00	37.00	20.00	28.50	46.00	31.00	38.50	37.00	12.00	24.50	37.00	13.00	25.00
Dec 1	48.00	32.00	40.00	42.00	34.00	38.00	43.00	33.00	38.00	53.00	37.00	45.00	49.00	34.00	41.50	51.00	30.00	40.50
Dec 2	49.00	32.00	40.50	51.00	33.00	42.00	52.00	31.00	41.50	50.00	33.00	41.50	49.00	31.00	40.00	52.00	35.00	43.50
Dec 3	49.00	25.00	37.00	46.00	31.00	38.50	49.00	29.00	39.00	46.00	29.00	37.50	44.00	32.00	38.00	45.00	30.00	37.50
Dec 4	47.00	34.00	40.50	46.00	33.00	39.50	47.00	30.00	38.50	38.00	31.00	34.50	42.00	31.00	36.50	43.00	21.00	32.00
Dec 5	37.00	16.00	26.50	35.00	18.00	26.50	36.00	18.00	27.00	33.00	14.00	23.50	36.00	14.00	25.00	32.00	15.00	23.50
Dec 6	32.00	15.00	23.50	33.00	17.00	25.00	33.00	16.00	24.50	46.00	12.00	29.00	31.00	14.00	22.50	32.00	15.00	23.50
Dec 7	38.00	18.00	28.00	40.00	17.00	28.50	40.00	16.00	28.00	45.00	19.00	32.00	42.00	18.00	30.00	45.00	11.00	28.00
Dec 8	40.00	24.00	32.00	40.00	20.00	30.00	42.00	23.00	32.50	50.00	28.00	39.00	40.00	19.00	29.50	42.00	19.00	30.50
Dec 9	48.00	22.00	35.00	44.00	18.00	31.00	47.00	17.00	32.00	42.00	19.00	30.50	39.00	15.00	27.00	42.00	22.00	32.00
Dec 10	39.00	13.00	26.00	40.00	10.00	25.00	41.00	11.00	26.00	35.00	12.00	23.50	41.00	10.00	25.50	43.00	14.00	28.50
Dec 11	36.00	15.00	25.50	35.00	14.00	24.50	35.00	11.00	23.00	40.00	26.00	33.00	35.00	10.00	22.50	36.00	9.00	22.50
Dec 12	36.00	18.00	27.00	38.00	17.00	27.50	38.00	15.00	26.50	51.00	15.00	33.00	43.00	15.00	29.00	41.00	14.00	27.50
Dec 13	49.00	16.00	32.50	48.00	14.00	31.00	51.00	14.00	32.50	47.00	15.00	31.00	44.00	14.00	29.00	48.00	22.00	35.00
Dec 14	43.00	18.00	30.50	45.00	17.00	31.00	45.00	17.00	31.00	33.00	26.00	29.50	46.00	16.00	31.00	48.00	12.00	30.00
Dec 15	32.00	25.00	28.50	32.00	27.00	29.50	31.00	27.00	29.00	35.00	-1.00	17.00	37.00	24.00	30.50	35.00	26.00	30.50
Dec 16	32.00	-4.00	14.00	30.00	-8.00	11.00	29.00	-8.00	10.50	8.00	-7.00	0.50	24.00	-8.00	8.00	26.00	5.00	15.50
Dec 17	15.00	-4.00	5.50	30.00	10.00	20.00	22.00	-7.00	7.50	23.00	8.00	15.50	12.00	-8.00	2.00	7.00	-9.00	-1.00
Dec 18	22.00	11.00	16.50	20.00	10.00	15.00	33.00	20.00	26.50	24.00	19.00	21.50	21.00	11.00	16.00	21.00	7.00	14.00
Dec 19	27.00	21.00	24.00	28.00	20.00	24.00	37.00	-8.00	14.50	33.00	21.00	27.00	30.00	17.00	23.50	29.00	12.00	20.50
Dec 20	32.00	-3.00	14.50	31.00	-2.00	14.50	12.00	-3.00	4.50	1.00	-2.00	-0.50	33.00	-4.00	14.50	34.00	1.00	17.50
Dec 21	0.00	-10.00	-5.00	-1.00	-13.00	-7.00	10.00	-12.00	-1.00	10.00	-13.00	-1.50	-1.00	-15.00	-8.00	1.00	-5.00	-2.00
Dec 22	12.00	-9.00	1.50	6.00	-11.00	-2.50	12.00	-14.00	-1.00	10.00	-11.00	-0.50	9.00	-15.00	-3.00	9.00	-13.00	-2.00
Dec 23	8.00	-10.00	-1.00	8.00	-11.00	-1.50	13.00	-11.00	1.00	31.00	-1.00	15.00	7.00	-17.00	-5.00	10.00	-14.00	-2.00
Dec 24	23.00	-1.00	11.00	26.00	6.00	16.00	28.00	10.00	19.00	28.00	11.00	19.50	29.00	4.00	16.50	30.00	-5.00	12.50
Dec 25	25.00	8.00	16.50	28.00	11.00	19.50	41.00	12.00	26.50	49.00	14.00	31.50	30.00	12.00	21.00	50.00	13.00	31.50
Dec 26	43.00	14.00	28.50	43.00	13.00	28.00	37.00	11.00	24.00	31.00	21.00	26.00	46.00	13.00	29.50	30.00	16.00	23.00
Dec 27	29.00	6.00	17.50	29.00	10.00	19.50	37.00	8.00	22.50	19.00	13.00	16.00	36.00	9.00	22.50	38.00	2.00	20.00
Dec 28	36.00	9.00	22.50	36.00	8.00	22.00	45.00	24.00	34.50	47.00	26.00	36.50	38.00	7.00	22.50	32.00	8.00	20.00
Dec 29	43.00	28.00	35.50	42.00	27.00	34.50	57.00	21.00	39.00	60.00	24.00	42.00	43.00	26.00	34.50	45.00	32.00	38.50
Dec 30	55.00	22.00	38.50	55.00	19.00	37.00	38.00	17.00	27.50	41.00	25.00	33.00	57.00	21.00	39.00	61.00	24.00	42.50
Dec 31	36.00	16.00	26.00	37.00	15.00	26.00	45.00	15.00	30.00	49.00	18.00	33.50	38.00	15.00	26.50	40.00	20.00	30.00

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
Jan 1	0.11	0.00	0.00	0.00	0.01	0.00
Jan 2	0.09	0.38	0.54	0.43	0.42	0.00
Jan 3	0.00	0.16	0.06	0.55	0.12	0.00
Jan 4	0.00	0.00	T	0.00	T	0.00
Jan 5	0.06	T	T	0.00	T	0.00
Jan 6	0.00	0.03	0.01	T	0.03	0.00
Jan 7	2.50	0.00	0.00	0.00	0.00	0.00
Jan 8	0.01	0.07	0.09	0.11	0.06	0.00
Jan 9	0.00	0.00	0.00	T	0.00	0.00
Jan 10	0.06	T	0.00	T	0.03	0.00
Jan 11	0.04	0.03	0.03	0.00	0.04	0.00
Jan 12	0.06	0.03	T	0.36	0.07	0.00
Jan 13	0.12	0.10	0.15	0.15	0.10	0.00
Jan 14	0.00	0.30	0.03	0.02	0.14	0.00
Jan 15	0.00	T	T	0.25	T	0.00
Jan 16	0.00	T	0.15	T	T	0.00
Jan 17	0.22	T	0.00	0.00	T	0.00
Jan 18	0.00	0.15	0.10	0.20	0.03	0.00
Jan 19	0.00	0.00	T	0.12	T	0.00
Jan 20	0.00	0.00	T	0.00	0.00	0.00
Jan 21	0.00	0.00	T	0.00	0.00	0.00
Jan 22	0.00	0.00	T	0.00	T	0.00
Jan 23	0.00	0.00	T	0.00	T	0.00
Jan 24	T	0.00	0.02	0.00	T	0.00
Jan 25	0.00	T	0.02	0.00	0.00	0.00
Jan 26	0.09	0.00	0.00	0.00	0.00	0.00
Jan 27	0.00	0.20	T	0.02	0.22	0.03
Jan 28	0.00	T	0.00	0.00	0.00	0.00
Jan 29	0.00	0.00	0.00	0.00	0.00	0.00
Jan 30	0.00	0.00	0.00	0.00	0.00	0.00
Jan 31	0.12	0.00	0.00	0.00	0.00	0.00
Feb 1	0.00	0.07	T	0.00	0.00	T
Feb 2	0.00	0.00	T	0.00	0.05	T
Feb 3	0.00	0.00	0.00	0.00	0.00	0.00
Feb 4	0.00	0.00	T	0.00	0.00	0.00
Feb 5	0.00	0.00	0.00	0.00	0.00	0.00
Feb 6	0.00	0.00	0.00	0.00	0.00	0.00
Feb 7	T	0.00	0.00	0.00	0.00	0.00
Feb 8	0.00	0.00	0.00	2.02	0.00	T
Feb 9	0.00	T	0.00	0.00	0.00	0.00
Feb 10	T	0.04	0.00	0.00	T	0.00
Feb 11	T	0.00	0.00	0.00	0.00	T
Feb 12	0.00	0.00	0.00	0.00	0.00	T
Feb 13	0.00	0.00	0.00	0.00	0.00	0.00
Feb 14	0.00	0.00	T	0.00	0.00	0.00
Feb 15	0.00	0.00	T	0.00	0.00	0.00
Feb 16	0.00	0.01	0.00	0.00	0.00	0.02
Feb 17	0.00	T	0.00	0.00	0.00	T
Feb 18	0.00	0.00	0.00	0.00	0.00	T
Feb 19	0.00	0.00	0.00	0.00	0.00	0.00
Feb 20	0.00	0.00	0.00	0.00	0.00	0.00
Feb 21	0.00	0.00	0.00	0.00	0.00	0.00
Feb 22	0.01	0.02	0.00	0.12	0.00	0.00
Feb 23	0.15	0.03	0.18	0.00	0.00	0.01
Feb 24	0.00	0.04	T	0.00	0.00	0.02
Feb 25	0.00	0.00	0.00	0.00	0.00	0.00
Feb 26	T	0.00	0.00	0.00	0.00	0.00
Feb 27	0.00	0.00	0.00	0.00	0.00	0.00
Feb 28	0.00	0.00	0.00	0.00	0.00	0.00

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
Mar 1	0.00	0.00	0.00	0.00	0.00	0.00
Mar 2	0.00	0.00	0.00	0.00	0.00	0.00
Mar 3	0.00	0.00	0.00	0.00	0.00	0.00
Mar 4	T	T	T	0.00	0.00	0.00
Mar 5	0.00	T	T	0.00	0.00	0.03
Mar 6	0.00	T	T	0.00	0.00	0.00
Mar 7	0.00	0.00	0.00	0.00	0.00	0.00
Mar 8	0.36	0.03	0.05	0.51	0.60	0.03
Mar 9	0.00	0.43	0.32	0.00	0.00	0.16
Mar 10	0.00	T	T	0.00	0.24	0.00
Mar 11	0.00	0.00	0.00	0.00	0.00	0.00
Mar 12	0.00	0.00	0.00	0.00	0.00	0.00
Mar 13	0.00	0.00	0.00	0.00	0.00	0.00
Mar 14	0.00	0.00	0.00	0.00	0.00	0.00
Mar 15	0.00	0.00	0.00	0.00	0.00	0.00
Mar 16	0.00	0.00	0.00	0.00	0.00	0.00
Mar 17	0.00	T	0.00	0.00	0.00	0.00
Mar 18	0.00	T	0.00	0.00	0.00	0.00
Mar 19	0.00	0.00	0.00	0.00	0.00	0.00
Mar 20	0.00	0.00	0.00	0.00	0.00	0.00
Mar 21	0.00	0.00	0.00	0.00	0.00	0.00
Mar 22	0.00	0.00	0.00	0.00	0.00	0.00
Mar 23	0.00	0.00	0.00	0.00	0.00	0.00
Mar 24	0.00	0.00	0.00	0.00	0.00	0.00
Mar 25	0.00	0.00	0.00	0.00	0.00	0.00
Mar 26	0.00	0.00	0.00	0.00	0.00	0.00
Mar 27	0.60	0.00	0.00	0.00	0.00	0.00
Mar 28	0.00	0.85	0.56	0.57	0.00	0.63
Mar 29	0.00	0.00	0.00	0.00	1.04	T
Mar 30	0.00	0.00	0.00	0.00	0.00	0.00
Mar 31	0.00	0.00	0.00	0.00	0.00	0.00
Apr 1	0.03	0.00	0.00	0.00	0.00	0.00
Apr 2	0.00	0.05	0.00	0.00	T	0.02
Apr 3	0.26	0.01	0.00	0.00	T	0.17
Apr 4	0.00	0.06	0.00	0.00	0.31	0.00
Apr 5	1.15	0.17	0.00	0.00	T	0.00
Apr 6	0.04	0.95	0.72	0.83	0.38	0.60
Apr 7	0.00	0.10	0.05	0.00	T	0.10
Apr 8	0.00	0.00	0.00	0.00	0.00	0.00
Apr 9	0.00	0.00	0.35	1.29	0.00	0.00
Apr 10	0.66	0.00	0.00	0.00	0.00	0.00
Apr 11	0.00	0.50	0.49	0.56	0.37	0.00
Apr 12	T	0.00	0.00	0.00	0.00	0.15
Apr 13	0.00	0.10	T	0.03	0.07	0.00
Apr 14	0.32	0.00	0.00	0.08	0.07	0.00
Apr 15	0.13	0.28	0.17	0.00	0.10	0.35
Apr 16	0.00	0.08	0.24	0.12	0.02	T
Apr 17	0.00	0.03	0.02	0.00	T	0.00
Apr 18	0.02	0.00	0.00	0.00	0.00	0.00
Apr 19	0.03	0.03	T	0.00	T	0.00
Apr 20	0.00	T	0.00	0.00	T	T
Apr 21	0.06	T	0.00	0.00	0.00	0.00
Apr 22	0.00	0.01	0.11	0.11	0.00	0.10
Apr 23	0.00	0.00	T	0.00	0.00	0.00
Apr 24	0.00	0.00	0.00	0.00	0.00	0.00
Apr 25	0.00	0.00	0.00	0.00	0.00	0.00
Apr 26	0.01	T	T	0.00	0.00	T
Apr 27	0.01	0.01	T	0.00	0.05	0.14
Apr 28	0.00	0.00	0.00	0.00	0.00	0.00
Apr 29	0.00	0.00	0.00	0.00	0.00	0.00
Apr 30	0.00	0.00	0.00	0.00	0.00	0.00

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
May 1	0.00	0.00	0.00	0.00	0.00	0.00
May 2	0.00	0.00	0.00	0.00	0.00	0.00
May 3	0.02	0.04	T	0.00	0.06	T
May 4	0.43	0.37	T	0.05	0.17	T
May 5	0.20	0.20	0.48	0.22	0.60	0.51
May 6	0.22	0.73	0.37	0.25	0.44	0.63
May 7	0.15	0.30	0.15	0.22	0.64	0.40
May 8	0.00	0.18	0.08	0.18	0.20	0.00
May 9	0.48	0.00	0.00	0.00	T	0.00
May 10	0.62	0.66	T	0.00	0.42	0.17
May 11	0.72	0.60	0.72	0.34	0.26	0.45
May 12	0.40	0.01	0.04	0.00	T	0.00
May 13	0.01	0.42	0.33	0.11	T	0.00
May 14	0.10	T	0.02	0.00	0.00	0.00
May 15	0.23	0.22	0.19	0.00	0.17	0.42
May 16	0.21	0.09	0.15	0.24	0.62	0.52
May 17	0.00	0.11	0.07	0.14	0.09	0.15
May 18	0.01	0.00	0.00	0.00	0.00	0.00
May 19	0.00	0.05	T	0.00	0.00	T
May 20	0.30	T	0.00	0.00	0.00	0.00
May 21	0.00	0.06	0.40	0.81	0.00	0.07
May 22	0.26	0.00	0.00	0.00	T	0.01
May 23	0.00	0.20	0.43	1.20	T	0.13
May 24	0.00	0.00	0.00	0.00	0.00	0.00
May 25	0.00	T	0.00	0.00	0.00	T
May 26	T	0.00	0.00	0.00	0.00	0.00
May 27	0.00	0.02	0.00	0.00	T	0.00
May 28	0.00	0.00	0.00	0.00	0.00	T
May 29	0.00	0.00	0.00	0.00	0.00	0.03
May 30	T	0.00	0.00	0.00	0.00	0.00
May 31	0.06	T	0.00	0.00	0.08	0.00
Jun 1	0.20	T	0.34	0.39	T	0.00
Jun 2	0.00	0.29	0.00	0.00	0.00	0.07
Jun 3	0.22	0.00	0.00	0.00	0.00	0.00
Jun 4	0.08	0.00	0.00	0.00	0.00	0.00
Jun 5	0.15	0.66	0.29	0.38	0.57	0.33
Jun 6	0.05	0.37	0.39	0.00	0.05	0.32
Jun 7	0.22	0.00	0.00	0.00	0.00	0.00
Jun 8	0.94	0.17	1.30	0.22	0.36	0.31
Jun 9	1.13	0.32	0.44	0.19	0.32	0.40
Jun 10	0.15	1.65	0.00	0.10	0.26	0.00
Jun 11	0.01	0.01	0.00	0.20	0.00	T
Jun 12	0.00	0.00	0.00	0.00	0.00	0.00
Jun 13	0.00	0.00	0.00	0.00	0.00	0.00
Jun 14	0.00	0.00	0.00	0.00	0.00	0.00
Jun 15	0.03	0.00	0.00	0.00	0.00	0.00
Jun 16	0.00	T	0.00	0.00	0.00	0.00
Jun 17	0.00	0.00	0.00	0.00	0.00	0.00
Jun 18	0.14	0.00	0.62	0.55	0.00	0.00
Jun 19	0.13	0.29	0.08	0.18	0.01	0.83
Jun 20	0.00	0.00	0.00	0.00	0.07	0.00
Jun 21	0.00	0.00	0.00	0.00	T	0.00
Jun 22	0.68	0.00	0.00	0.03	0.00	0.00
Jun 23	0.00	0.70	1.57	0.06	0.65	0.76
Jun 24	0.00	0.00	0.00	0.00	T	0.12
Jun 25	0.00	0.00	0.00	0.00	0.00	0.00
Jun 26	0.00	0.00	0.00	0.42	0.00	0.00
Jun 27	0.02	T	0.00	0.09	0.00	T
Jun 28	0.66	0.08	0.56	0.54	0.39	0.15
Jun 29	0.00	0.39	0.00	0.06	0.26	0.47
Jun 30	0.00	0.05	0.00	0.08	0.37	0.08

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
Jul 1	0.00	0.00	0.00	0.00	0.00	0.00
Jul 2	0.37	0.00	0.00	0.33	0.02	T
Jul 3	0.00	1.30	0.34	0.00	0.16	0.52
Jul 4	0.00	0.00	0.00	0.00	0.00	0.00
Jul 5	0.09	0.00	0.00	0.00	0.00	0.00
Jul 6	0.00	T	0.00	0.00	0.02	T
Jul 7	2.02	0.00	0.00	0.00	0.00	0.00
Jul 8	0.00	2.00	0.80	1.16	1.81	0.43
Jul 9	0.00	0.05	0.00	0.00	0.01	T
Jul 10	0.00	T	0.00	0.00	0.02	0.00
Jul 11	0.00	0.00	0.00	0.00	0.00	0.00
Jul 12	0.00	0.00	0.05	0.00	0.00	0.00
Jul 13	0.00	0.00	0.00	0.00	0.00	0.00
Jul 14	0.00	0.00	0.00	0.00	0.00	0.00
Jul 15	0.11	0.00	0.00	0.00	0.00	0.00
Jul 16	0.00	0.14	0.15	0.16	1.37	0.15
Jul 17	0.00	0.00	0.00	0.00	0.00	0.00
Jul 18	0.00	T	0.00	0.00	T	0.00
Jul 19	0.11	0.01	0.00	0.00	0.03	T
Jul 20	0.00	T	0.00	0.00	0.00	0.00
Jul 21	0.00	T	0.15	0.36	0.00	0.16
Jul 22	0.12	0.00	0.00	0.00	0.00	0.00
Jul 23	0.00	0.16	0.25	0.30	0.34	0.30
Jul 24	0.00	0.00	0.00	0.00	0.00	0.00
Jul 25	0.21	T	0.00	0.00	0.00	0.00
Jul 26	0.00	0.00	0.00	0.00	0.10	0.00
Jul 27	0.70	0.00	0.00	0.00	0.00	0.00
Jul 28	0.09	1.24	0.24	0.02	0.77	0.22
Jul 29	0.00	0.10	0.00	0.02	0.07	0.00
Jul 30	0.36	0.00	0.15	0.00	0.01	0.00
Jul 31	0.00	0.53	0.00	0.00	0.20	0.75
Aug 1	0.00	0.00	0.00	0.00	0.00	0.00
Aug 2	0.00	0.00	0.00	0.00	0.00	0.00
Aug 3	0.00	0.00	0.10	0.00	0.00	0.00
Aug 4	0.00	0.00	0.00	0.00	0.10	0.00
Aug 5	0.00	0.00	0.02	0.00	0.00	0.00
Aug 6	T	0.00	0.00	0.00	0.03	0.00
Aug 7	0.00	T	0.00	0.00	0.00	0.00
Aug 8	1.50	0.00	0.00	0.00	0.00	0.00
Aug 9	0.24	1.92	2.20	1.40	1.62	1.20
Aug 10	0.00	0.16	0.00	0.00	0.08	0.05
Aug 11	0.00	0.00	0.00	0.00	0.00	0.00
Aug 12	0.27	0.00	0.43	0.00	T	0.00
Aug 13	0.00	0.18	0.00	0.00	1.14	0.30
Aug 14	0.04	0.00	0.00	0.00	0.00	0.00
Aug 15	0.00	0.00	0.09	0.00	T	0.00
Aug 16	0.00	T	0.00	0.30	T	0.00
Aug 17	0.30	0.00	0.00	0.00	0.00	0.00
Aug 18	0.12	0.10	0.11	0.07	0.02	0.24
Aug 19	0.00	0.00	0.00	0.06	0.00	0.00
Aug 20	0.01	0.00	0.00	0.00	0.00	0.00
Aug 21	2.77	0.00	0.03	0.00	T	0.12
Aug 22	0.04	T	0.00	0.00	0.00	0.00
Aug 23	0.06	0.06	0.00	0.00	0.01	0.07
Aug 24	0.00	0.00	0.17	0.00	0.02	0.00
Aug 25	0.00	0.00	0.00	0.00	0.00	0.00
Aug 26	0.00	0.00	0.01	0.00	0.00	0.00
Aug 27	0.11	0.00	0.00	0.00	0.00	0.00
Aug 28	0.00	0.90	0.61	0.00	1.10	0.25
Aug 29	0.56	0.05	0.00	0.00	0.00	0.00
Aug 30	0.33	0.10	1.15	0.00	0.36	0.80
Aug 31	0.00	0.81	0.00	3.30	0.42	0.97

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
Sep 1	0.00	0.00	0.00	0.00	0.00	0.00
Sep 2	T	0.28	0.00	0.00	0.02	T
Sep 3	0.00	0.00	0.00	0.00	0.00	0.00
Sep 4	0.11	0.68	0.51	0.00	1.17	0.36
Sep 5	0.30	0.02	0.05	0.00	0.00	0.00
Sep 6	0.00	0.00	0.00	0.00	0.00	0.00
Sep 7	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	0.00	0.00	0.00	0.00	0.16	0.00
Sep 9	0.00	0.01	0.00	0.00	0.01	0.00
Sep 10	0.00	0.00	0.00	0.00	0.00	0.00
Sep 11	0.00	0.00	0.00	0.00	0.00	0.14
Sep 12	1.45	0.43	1.25	0.40	0.41	0.00
Sep 13	T	0.00	T	0.00	0.13	0.00
Sep 14	0.00	0.00	T	0.00	0.02	0.00
Sep 15	0.00	0.00	0.00	0.00	0.00	0.00
Sep 16	0.00	0.00	0.00	0.00	0.00	0.00
Sep 17	0.00	0.00	0.00	0.00	0.01	0.00
Sep 18	0.00	0.00	0.00	0.00	0.00	0.00
Sep 19	0.30	0.71	0.45	0.38	0.10	0.48
Sep 20	0.00	0.00	0.00	0.00	0.00	0.03
Sep 21	0.00	0.00	0.00	0.00	0.00	0.00
Sep 22	0.00	0.00	0.00	0.00	0.00	0.00
Sep 23	0.00	0.00	0.00	0.00	0.00	0.00
Sep 24	0.00	0.00	0.00	0.00	0.00	0.00
Sep 25	0.00	0.00	0.00	0.00	0.01	0.00
Sep 26	0.22	0.20	0.19	0.13	0.49	0.17
Sep 27	0.00	0.00	0.00	0.00	0.02	0.00
Sep 28	0.00	0.00	0.00	0.00	0.00	0.00
Sep 29	0.00	0.00	0.00	0.00	0.00	0.00
Sep 30	0.00	0.00	0.00	0.00	0.00	0.00
Oct 1	0.00	0.00	0.00	0.00	0.00	0.00
Oct 2	0.13	0.03	0.15	0.37	0.00	0.10
Oct 3	0.00	0.00	0.00	0.00	0.00	0.00
Oct 4	0.00	0.00	0.00	0.00	0.00	0.00
Oct 5	0.00	0.00	0.00	0.00	0.00	0.00
Oct 6	0.00	0.00	0.00	0.00	0.00	0.00
Oct 7	0.08	0.00	T	0.00	0.00	0.00
Oct 8	0.18	0.15	0.08	0.08	0.26	0.09
Oct 9	0.00	0.00	0.00	0.00	0.00	0.00
Oct 10	0.00	0.00	0.00	0.00	0.00	0.00
Oct 11	0.00	0.00	0.00	0.00	0.00	0.00
Oct 12	0.00	0.00	0.00	0.00	0.00	0.00
Oct 13	0.00	0.05	0.00	0.00	0.05	0.00
Oct 14	0.00	0.00	0.00	0.00	0.00	0.00
Oct 15	0.00	0.00	0.00	0.00	0.00	0.00
Oct 16	0.00	0.00	0.00	0.00	0.00	0.00
Oct 17	0.00	0.00	0.00	0.00	0.00	0.00
Oct 18	T	0.00	0.00	0.00	0.00	0.00
Oct 19	0.00	0.13	0.00	0.05	0.00	0.08
Oct 20	0.00	0.00	0.00	0.00	0.00	0.00
Oct 21	0.00	0.00	0.00	0.00	0.00	0.00
Oct 22	0.00	0.00	0.00	0.00	0.00	0.00
Oct 23	0.00	0.00	0.00	0.00	0.00	0.00
Oct 24	0.00	0.00	0.00	0.00	0.00	0.00
Oct 25	0.00	0.00	0.00	0.00	0.00	0.00
Oct 26	0.00	0.00	0.00	0.00	0.00	0.00
Oct 27	0.00	0.00	0.00	0.00	0.00	0.00
Oct 28	0.00	0.00	0.00	0.00	0.00	0.00
Oct 29	0.00	0.00	0.00	0.00	0.00	0.00
Oct 30	0.18	0.36	0.66	0.02	0.00	0.20
Oct 31	0.00	0.00	0.00	0.00	0.00	0.00

Table 2. Weather Data-Precipitation.

T=Trace
M=Missing data

Date	Hutchinson Precip.	Willmar Precip.	Olivia Precip.	Redwood Falls Precip.	Morris Precip.	Montivideo Precip.
Nov 1	0.00	0.00	0.00	0.00	0.00	0.00
Nov 2	0.00	0.00	0.00	0.00	0.00	0.00
Nov 3	0.00	0.00	0.00	0.00	0.00	0.00
Nov 4	0.00	0.00	0.00	0.00	0.00	0.00
Nov 5	0.00	0.00	0.00	0.00	0.00	0.00
Nov 6	0.00	0.00	0.00	0.00	0.00	0.00
Nov 7	0.00	0.00	0.00	0.00	0.00	0.00
Nov 8	0.00	0.00	0.00	0.00	0.00	0.00
Nov 9	0.00	0.00	0.00	0.00	0.00	0.00
Nov 10	0.00	0.00	0.00	0.00	0.00	0.00
Nov 11	T	0.00	0.00	0.00	0.00	0.00
Nov 12	0.00	0.00	0.00	0.00	0.00	0.00
Nov 13	0.00	0.00	0.00	0.00	0.00	0.00
Nov 14	0.00	0.00	0.00	0.00	0.00	0.00
Nov 15	0.00	0.00	0.00	0.00	0.00	0.00
Nov 16	0.00	0.00	0.00	0.00	0.00	0.00
Nov 17	0.00	0.00	0.00	0.00	0.00	0.00
Nov 18	0.00	0.00	0.00	0.00	0.00	0.00
Nov 19	0.00	0.00	0.00	0.00	0.07	0.00
Nov 20	0.07	0.06	0.04	0.00	0.00	0.00
Nov 21	0.00	0.00	0.00	0.15	0.00	0.00
Nov 22	0.05	0.13	0.22	0.00	0.00	0.05
Nov 23	0.00	0.00	0.00	0.00	0.00	0.00
Nov 24	0.15	0.00	0.00	0.00	0.00	0.00
Nov 25	0.00	0.00	0.00	0.00	0.00	0.00
Nov 26	0.00	0.00	0.00	0.00	0.00	0.00
Nov 27	0.00	0.00	0.00	0.00	0.00	0.00
Nov 28	0.00	0.00	0.00	0.00	0.00	0.00
Nov 29	0.00	0.00	0.00	0.00	0.00	0.00
Nov 30	0.00	0.00	0.00	0.00	0.00	0.00
Dec 1	0.00	0.00	0.00	0.00	0.00	0.00
Dec 2	0.00	0.00	0.00	0.00	0.00	0.00
Dec 3	0.00	0.00	0.00	0.00	0.00	0.00
Dec 4	0.00	0.00	0.00	0.00	0.00	0.00
Dec 5	0.00	0.00	0.00	0.00	0.00	0.00
Dec 6	0.00	0.00	0.00	0.00	0.00	0.00
Dec 7	0.00	0.00	0.00	0.00	0.00	0.00
Dec 8	0.00	0.00	0.00	0.00	0.00	0.00
Dec 9	0.00	0.00	0.00	0.00	0.00	0.00
Dec 10	0.00	0.00	0.00	0.00	0.00	0.00
Dec 11	0.00	0.00	0.00	0.00	0.00	0.00
Dec 12	0.00	0.00	0.00	0.00	0.00	0.00
Dec 13	0.00	0.00	0.00	0.00	0.00	0.00
Dec 14	0.00	0.00	0.00	0.00	0.00	0.00
Dec 15	0.00	0.15	0.13	0.00	0.15	0.00
Dec 16	0.02	0.00	T	0.04	0.00	0.00
Dec 17	0.00	0.00	0.00	0.02	0.00	0.00
Dec 18	0.00	0.00	0.00	0.00	0.00	0.00
Dec 19	0.00	0.00	0.00	0.00	0.15	0.00
Dec 20	0.02	0.00	0.00	0.00	0.00	0.00
Dec 21	0.00	0.00	0.00	0.00	0.00	0.00
Dec 22	0.00	0.00	0.00	0.00	0.00	0.00
Dec 23	0.00	0.00	0.00	0.02	0.00	0.00
Dec 24	0.08	0.06	0.00	0.00	0.02	0.00
Dec 25	0.00	0.00	0.00	0.00	0.00	0.00
Dec 26	0.00	0.00	T	0.00	0.00	0.00
Dec 27	0.02	0.01	0.00	0.00	T	0.00
Dec 28	0.00	0.00	0.00	0.00	0.00	0.00
Dec 29	0.00	0.00	0.00	0.00	0.00	0.00
Dec 30	0.00	0.00	0.00	0.00	0.00	0.00
Dec 31	0.00	0.00	0.00	0.00	0.00	0.00

1999 LEAF SPOT SUMMARY

DATE	CLARA CITY	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	OLIVIA	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	SACRD HEART	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	BIRD ISLAND	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH
06/26/99	1		4	70	2		8	72	0		2	70				
06/27/99	1	2	8	64	3	5	12	64	1	1	5	64				
06/28/99	0	0	20	59	0	0	18	60	0	0	19	60				
06/29/99	0	0	10	52	0	0	10	53	0	0	10	53	0	0	11	
06/30/99	0	0	14	60	0	0	14	61	0	0	15	61	0	0	16	61
07/01/99	0	0	13	58	0	0	13	60	0	0	16	60	0	0	13	59
07/02/99	1	1	15	62	3	3	14	63	3	3	15	63		0		
07/03/99	6	7	20	75	5	8	17	75	5	8	17	75	4	4	14	73
07/04/99	4	10	10	77	5	10	9	79	4	9	10	78	4	8	14	73
07/05/99	1	5	4	77	1	6	1	77	1	5	2	78		4		
07/06/99	0	1	11	59	0	1	6	58	0	1	8	59	0	0	15	
07/07/99	0	0	10	61	0	0	6	60	0	0	10	62	5	5	17	72
07/08/99	6	6	21	71	4	4	15	71	6	6	20	72	5	10	17	72
07/09/99	1	7	14	64	0	4	9	60	0	6	11	61		5		
07/10/99	3	4	14	64	0	0	10	55	0	0	12	56	0	0	12	55
07/11/99	3	6	14	64	0	0	10	58	0	0	12	58	0	0	12	57
07/12/99					0	0	8	58	0	0	9	60	0	0	10	59
07/13/99	4	4	13	71	1	1	5	66	2	2	8	70	3	3	14	68
07/14/99	3	7	11	74	1	2	5	75	2	4	3	80	4	7	14	74
07/15/99	3	6	13	70	3	4	10	75	4	6	13	71	3	7	10	73
07/16/99	0	3	12	58	3	6	11	71	0	4	13	62	5	8	17	71
07/17/99	6	6	24	68	0	3	9	58	6	6	24	69	0	5	13	62
07/18/99	4	10	13	71	6	6	23	69	3	9	11	75	6	6	24	68
07/19/99	4	8	16	69	3	9	14	69	5	8	18	70	3	9	13	69
07/20/99	6	10	24	70	6	9	24	70	6	11	24	70	6	9	23	69
07/21/99	4	10	17	68	4	10	15	69	4	10	17	68		6		
07/22/99	7	11	21	75	4	8	16	71	5	9	18	73		0		
07/23/99	4	11	16	72	4	8	15	74	4	9	15	73		0		
07/24/99	4	8	15	74	4	8	14	76	5	9	15	76		0		
07/25/99	7	11	19	78	3	7	11	75	6	11	14	78		0		
07/26/99	3	10	12	67	3	6	12	71	3	9	12	70	3	3	12	71
07/27/99	3	6	16	63	3	6	14	65	4	7	15	64	4	7	16	64
07/28/99	4	7	16	70	4	7	14	70	4	8	14	70	4	8	15	68
07/29/99	4	8	12	75	7	11	13	79	7	11	10	81	7	11	16	79
07/30/99	6	10	19	75	6	13	18	76	6	13	18	76	6	13	19	76
07/31/99	3	9	15	63	3	9	13	66	3	9	13	66	3	9	13	65
08/01/99	0	3	14	59	0	3	13	60	0	3	13	60	0	3	13	59
08/02/99	0	0	13	57	0	0	12	57	0	0	12	56	0	0	13	56
08/03/99	1	1	14	62	3	3	14	64	3	3	13	65	5	5	21	66

1999 LEAF SPOT SUMMARY

DATE	CLARA CITY	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	OLIVIA	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	SACRD HEART	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH	BIRD ISLAND	2 DAY TOTAL	# OF HRS	AVG TMP @ > 87% RH
08/04/99	0	1	14	59	0	3	12	59	0	3	12	59	0	5	15	60
08/05/99	1	1	14	62	0	0	10	59	0	0	10	58	3	3	16	63
08/06/99	3	4	14	65	3	3	11	66	3	3	11	64		3		
08/07/99	4	7	17	66	4	7	16	66	3	6	14	66		0		
08/08/99	0	4	14	57	0	4	12	59	0	3	13	59		0		
08/09/99	5	5	20	66	5	5	21	66	5	5	20	67		0		
08/10/99	3	8	14	64	3	8	14	66	3	8	14	66		0		
08/11/99	4	7	15	66	4	7	15	66	4	7	15	67		0		
08/12/99	6	10	24	69	6	10	24	70	6	10	22	70	6	6	24	69
08/13/99	0	6	15	58	0	6	15	59	0	6	15	59	0	6	19	59
08/14/99	0	0	15	56	0	0	14	55	0	0	13	53	0	0	16	54
08/15/99	4	4	16	65	4	4	17	65	4	4	15	65	6	6	24	66
08/16/99	2	6	8	67	3	7	12	69	2	6	10	66	3	9	14	66
08/17/99		2			0	3	12	61	0	2	14	61	0	3	15	60
08/18/99	4	4	15	65	4	4	17	67	4	4	16	66	6	6	24	68
08/19/99	0	4	17	59	0	4	18	60	1	5	18	61	5	11	24	62
08/20/99	2	2	16	62	0	0	15	61	2	3	16	62	5	10	22	63
08/21/99	6	8	22	69	6	6	23	70	6	8	21	70	6	11	24	68
08/22/99	4	10	18	69	4	10	17	70	6	12	20	71	6	12	24	71
08/23/99	4	8	18	65	3	7	14	66	4	10	15	66	6	12	24	67
08/24/99	3	7	16	63	5	8	19	64	5	9	20	65	6	12	24	66
08/25/99	2	5	16	62	3	8	16	63	0	5	16	61	6	12	24	67
08/26/99	4	6	15	68	4	7	15	68	3	3	14	69	4	10		
08/27/99	4	8	15	69	3	7	13	70	3	6	14	69		4		
08/28/99	5	9	21	67	4	7	17	69	5	8	19	68		0		
08/29/99	0	5	14	60	0	4	6	61	0	5	11	60		0		
08/30/99	2	2	24	60	3	3	22	61	3	3	22	61	2	2	24	60
08/31/99	4	6	16	66	2	5	11	63	3	6	13	65	6	8	23	68
09/01/99	4	8	15	67	4	6	16	70	3	6	12	66	6	12	24	71
09/02/99	5	9	13	57	5	9	18	72	6	9	20	71	7	13	24	75
09/03/99	5	10	20	70	4	9	15	71	3	9	13	68	6	13	19	72
09/04/99	6	11	22	68	6	10	23	69	5	8	21	68	3	9	24	68
09/05/99	0	6	15	57	0	6	15	58	0	5	14	57	2	5	24	60
09/06/99	0	0	15	53	0	0	13	53	0	0	10	51	0	2	16	53
09/07/99	3	3	15	63	2	2	10	64	1	1	7	63	0	0	7	62
09/08/99	0	3	14	53	0	2	9	54	0	1	7	54		0		
09/09/99	0	0	12	50	0	0	6	48	0	0	4	48		0		