1996 Research Report

SMBSC

1/1/1996
Southern Minnesota Beet Sugar Company
SMBSC

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VARIETY EVALUATION

Twenty four varieties have full approval for planting in 1997 growing season. Three test market varieties: HM 7048, HM 7049, HM RH 3 and two special varieties: ACH 198 and ACH 205 were also approved.

The approved varieties for Southern Minnesota Beet Sugar Cooperative since 1982 are listed in Table 1. Certain varieties have been approved for a number of years, such as Hilleshog 5135 for the last ten years and Mitsui Monohikari for the last nine years. The remaining varieties range in approval from one to seven years. This indicates a continuous introduction of varieties. The genetic material available to grower today and the future as evident by looking through Tables 5 - 20, will aid the production of sugar by SMSC in the upcoming challenging years.

In the years to come many challenges will come apparent. Production problems will entail cercospora leaf spot, Aphanomyces root rot, and the newest discovery, Rhizomania,as well as many other production problems. There also will be efficiency needed in sugar production at SMSC to remain competitive, which in part can be achieved through genetic progress. A comparison of average performance for all approved varieties is listed in Table 2. Tables 3 - 8 list the three and two year performance of the 24 fully approved varieties, 3 test market varieties and 2 special use varieties. Data from coded trial results for all varieties evaluated for the past three years are presented in Tables 5 - 10.

The seed issued to SMSC growers in 1992-1996 are presented in Tables 3 and 4. The most popular varieties grown in 1996 by SMSC growers are as follows:

ACH 309	HM 5135
ACH 302	HM Hector
KW 6770	HM Niagra
KW 2398	

Use of mini and regular pellets has increased from 45% in 1995 to 80% in 1996. Seed treated with Tachigaren was 27% and PAT was 8% in 1996.

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties since 1980

Table 1.

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

Table 1. (cont.)

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	1996 (cont.)	1997	1997 (cont.)
ACH 194	KW 6770	ACH 196	KW 2398
ACH 196	Maribo 875	ACH 302	KW 6770
ACH 302	Maribo 923	ACH 309	Maribo 875
ACH 309	Mitsui Monohikari	Beta 1492	Maribo 923
Beta 1492	Seedex Laser (1004)	Beta 6963	Maribo 9363
Beta 2010	VDH H66140	Beta 1994	SX Laser
Beta 3712		Beta 2010	VDH 66140
Beta 6863		Beta 2074	
HM 5135		Beta 5014	
HM Niagara (7505)		Beta 6904	
HM Shasta (2416)		HM 5135	
HM Hector (2418)		HM Hector	
KW 1800		HM Niagara	
KW 2398		HM Shasta	
KW 2249 (Blend)		HM Viking	
KW 3291		HM Resist	

Table 2. Comparison of Approved Varieties for Southern Minnesota over a seventeen 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
1991 (89-90-91)	21	6,831	276.6	24.8	15.50	4.60	1.60
1991 (90-91-92)	19	6,943	296.2	23.5	16.30	4.83	1.49
1993 (91-92-93)	21	5,961	308.8	19.6	16.90	4.80	1.40
1994 (92-93-94)	29	6,783	323.0	20.9	17.48	5.02	1.32
1995 (93-94-95)	22	6,259	306.6	20.8	16.79	4.81	1.47
1996 (94-95-96)	24	7,234	304.6	23.5	16.65	4.52	1.42

Table 3.

SEED USAGE
SMSC, 1991 - 1996

YEAR	SMALL	MEDIUM	LARGE	X-LARGE	MINI	REGULAR	TOTAL
1991 LBS	20,196	77,116	32,528	26,564	4,961	1,939	163,304
%	12.37	47.22	19.92	16.27	3.04	1.19	100.00
1992 LBS	27,249	50,143	41,256	23,720	13,803	1,584	157,755
%	17.27	31.79	26.15	15.04	8.75	1.00	100.00
1993 LBS	34,119	50,748	36,134	43,010	25,964	5,068	195,043
%	17.49	26.02	18.53	22.05	13.31	2.60	100.00
1994 LBS	27,320	38,423	22,116	42,111	44,910	6,287	181,167
%	14.90	20.96	12.06	22.97	24.50	3.43	100.00
1995 LBS	19,644	23,288	32,265	28,805	46,935	11,566	162,503
%	13.55	13.53	15.67	12.68	37.11	7.45	100.00
1996 LBS	5,325	9,855	13,691	5,870	54,843	55,500	145,084
%	3.67	6.79	9.44	4.05	37.80	38.25	100.00
AVE.	22,309	41,596	29,665	28,347	31,903	13,657	167,476
%	13.21	24.39	16.96	15.51	20.75	8.99	100.00

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

Table 4.

SEED USAGE
POUNDS PLANTED PER ACRE
SMSC, 1991 - 1996

YEAR	ACRES PLANTED	ACRES REPLANTED	TOTAL ACRES	TOTAL SEED USED, LBS.	AVE. SEED/ ACRE LBS.
1991	82,284	7,600	89,884	163,304	1.82
1992	87,324	1,000	88,324	157,755	1.79
1993	101,781	8,814	110,595	195,043	1.76
1994	111,547	5,048	116,595	183,337	1.57
1995	109,738	425	110,163	162,505	1.48
1996	108,783	1,697	110,480	145,084	1.31
AVERAGE	**100,243**	**4,097**	**104,340**	**167,838**	**1.62**

107,715 1143

SMSC APPROVED VARIETIES-1997

TABLE 5. Mean of Three Year Performance Summary of SMSC Commercial Coded Entries, 1994-1996.

VARIETIES	Rec. S./ Ton 3 Yr Mean	Rec. S./ Acre 3 Yr Mean	Percent LTM 3 Yr Mean	Leaf* Spot 3 Yr Mean	Percent SUGAR 3 Yr Mean	Tons/ Acre 3 Yr Mean	SEEDLNG* VIGOR 3 Yr Mean	FIELD EMERG. (%) 3 Yr Mean
ACH 196	296.8	7207	1.52	4.83	16.36	22.0	1.33	54.6
ACH 302	308.1	7125	1.45	3.86	16.85	23.0	1.37	63.1
ACH 309	306.6	7251	1.44	3.95	16.77	23.5	1.28	66.1
Beta 1492	300.2	7299	1.45	4.83	16.46	24.1	1.83	59.5
Beta 1994	310.1	7108	1.38	4.62	16.89	22.9	1.77	
Beta 2010	293.3	7319	1.43	4.67	16.10	24.8	1.66	64.8
Beta 2074	307.3	7597	1.39	4.85	16.75	24.6	1.59	
Beta 5014	315.4	7128	1.38	3.71	17.15	22.5	1.37	
Beta 6863	309.0	7237	1.37	4.51	16.82	23.3	1.59	
Beta 6904	314.0	7448	1.33	4.38	17.03	23.6	1.51	
HM 5135	296.7	7204	1.52	4.81	16.35	24.1	1.66	59.9
HM 7518 (Viking)	309.0	7329	1.42	4.55	16.87	23.6	1.73	
HM Hector	304.1	7447	1.41	4.68	16.62	24.3	2.17	
HM Niagara	309.6	7222	1.40	4.14	16.88	23.2	2.26	58.2
HM Resist	304.2	7404	1.35	4.03	16.56	24.2	2.35	
HM Shasta	307.5	7161	1.38	4.85	16.75	23.2	1.59	63.2
KW 2398	315.4	7158	1.38	4.63	17.15	22.6	1.70	61.0
KW 6770	303.6	7342	1.39	4.89	16.57	24.0	1.88	57.4
Maribo 875	302.7	6898	1.47	4.64	16.60	22.6	1.33	61.9
Maribo 923	301.0	7282	1.47	5.00	16.53	24.1	1.35	61.3
Maribo 9363	305.7	7159	1.42	4.73	16.71	23.2	1.49	
Mitsui Monohikari	292.7	7065	1.34	4.40	15.97	24.0	2.41	61.4
Seedex Laser	304.8	7019	1.44	3.76	16.67	23.0	1.55	59.3
Van der Have H66140	292.4	7204	1.45	5.18	16.07	24.5	1.41	62.6
Mean	**304.6**	**7234**	**1.42**	**4.52**	**16.65**	**23.5**	**1.67**	**61.0**

**** Lower numbers indicate better seedling vigor and cerc. resistance (1=ex.,9=poor)***

SMSC APPROVED VARIETIES-1997

TABLE 6. Percent of Mean of Three Year Performance Summary of SMSC Commercial Coded Entries, 1994-1996.

VARIETIES	Rec. S./ Ton % OF Mean	Rec. S./ Acre % OF Mean	Percent LTM % OF Mean	Leaf Spot % OF Mean	Percent SUGAR % OF Mean	Tons/ Acre % OF Mean	SEEDLNG VIGOR % OF Mean	FIELD EMERG. (%) % OF Mean
ACH 196	97.4	99.6	107.4	106.8	98.7	101.3	78.7	88.9
ACH 302	101.1	98.5	102.2	85.5	101.7	97.4	80.9	102.7
ACH 309	100.7	100.2	101.5	87.4	101.2	99.6	75.6	107.7
Beta 1492	98.6	100.9	102.7	106.8	99.3	102.1	108.5	96.9
Beta 1994	101.8	98.3	97.5	102.1	101.9	96.6	104.6	
Beta 2010	96.3	101.2	101.2	103.3	97.2	104.9	98.1	105.5
Beta 2074	100.9	105.0	97.9	107.2	101.1	104.0	94.3	
Beta 5014	103.5	98.5	97.5	82.1	103.5	95.2	81.3	
Beta 6863	101.5	100.0	96.5	99.8	101.5	98.4	94.3	
Beta 6904	103.1	103.0	93.7	96.9	102.8	100.0	89.4	
HM 5135	97.4	99.6	107.4	106.4	98.7	102.0	98.1	97.6
HM 7518 (Viking)	101.5	101.3	100.5	100.6	101.8	99.6	102.2	
HM Hector	99.8	102.9	99.6	103.6	100.3	102.9	128.4	
HM Niagara	101.7	99.8	99.1	91.6	101.9	98.1	133.8	94.8
HM Resist	99.9	102.3	95.1	89.1	99.9	102.4	138.9	
HM Shasta	100.9	99.0	97.2	107.3	101.1	98.0	93.9	103.0
KW 2398	103.6	98.9	97.7	102.5	103.5	95.5	100.6	99.3
KW 6770	99.7	101.5	98.2	108.2	100.0	101.6	111.3	93.5
Maribo 875	99.4	95.4	103.6	102.7	100.2	95.7	78.5	100.8
Maribo 923	98.8	100.7	104.1	110.5	99.7	101.8	80.1	99.9
Maribo 9363	100.4	99.0	100.5	104.6	100.8	98.2	88.0	
Mitsui Monohikari	96.1	97.7	94.7	97.3	96.4	101.5	142.7	99.9
Seedex Laser	100.1	97.0	101.5	83.2	100.6	97.1	91.6	96.6
Van der Have H66140	96.0	99.6	102.7	114.6	97.0	103.4	83.7	102.0
Mean	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

SMSC TEST MARKET VARIETIES-1997

TABLE 7. Mean of Two Year Performance Summary of SMSC Commercial Coded Entries, 1995-1996.

VARIETY	REC S./ TON 2 YR MEAN	REC S./ ACRE 2 YR MEAN	percent LTM 2 YR MEAN	Leaf* Spot 2 YR MEAN	Percent Sugar 2 YR MEAN	Tons/ Acre 2 YR MEAN	SEEDLING* VIGOR 2 YR MEAN	FIELD EMERG. % 2 YR MEAN
ACH 196	283.7	6269	1.53	4.90	15.71	22.00	1.19	63.08
ACH 302	299.5	6440	1.44	3.88	16.42	21.49	1.24	66.50
ACH 309	297.5	6487	1.43	3.86	16.30	21.79	1.31	68.17
Beta 1492	289.4	6338	1.48	4.82	15.95	21.87	1.75	63.68
Beta 1994	304.1	6199	1.36	4.34	16.57	20.39	1.84	56.01
Beta 2074	298.1	6711	1.39	4.89	16.30	22.50	1.58	58.52
Beta 5014	307.1	6411	1.42	3.65	16.78	20.86	1.39	63.41
Beta 6863	298.7	6336	1.36	4.27	16.30	21.19	1.54	65.59
Beta 6904	305.9	6593	1.35	4.32	16.65	21.58	1.48	60.94
HM 5135	284.0	6344	1.54	4.76	15.74	22.32	1.67	62.11
HM 7518 (Viking)	298.1	6445	1.41	4.40	16.32	21.58	1.78	56.44
HM Hector	295.3	6575	1.40	4.59	16.17	22.21	2.27	69.63
HM Niagara	299.8	6402	1.41	4.10	16.40	21.32	2.29	61.71
HM Resist	295.5	6546	1.34	3.89	16.11	22.13	2.28	58.30
HM Shasta	295.9	6361	1.37	4.76	16.16	21.50	1.57	65.61
KW 2398	306.6	6302	1.39	4.57	16.71	20.53	1.68	63.64
KW 6770	295.3	6377	1.38	4.90	16.15	21.53	1.76	61.21
Maribo 875	293.0	6023	1.46	4.64	16.11	20.52	1.26	64.57
Maribo 923	290.2	6484	1.47	5.03	15.98	22.32	1.32	67.07
Maribo 9363	293.3	6207	1.45	4.77	16.12	21.11	1.50	59.17
Seedex Laser	296.2	6306	1.43	3.69	16.24	21.32	1.49	62.06
Mean	**296.5**	**6388**	**1.42**	**4.43**	**16.24**	**21.52**	**1.63**	**62.7**
Test Market								
HM 7048 (Victory)	300.3	6599	1.35	4.59	16.37	21.98	2.29	
HM 7049 (Tahoe)	300.5	6364	1.38	4.51	16.40	21.17	2.23	
HM RH3 (Rhiz. Spec.)	296.6	6269	1.37	3.72	16.19	21.16	2.67	

*Lower numbers indicate better cerc. resistance (1=ex.,9=poor)

SMSC TEST MARKET VARIETIES-1997

TABLE 8. Percent of Mean of Two Year Performance Summary of SMSC Commercial Coded Entries, 1995-1996.

VARIETY	REC/S TON % OF MEAN	REC/S ACRE % OF MEAN	Percent LTM % OF MEAN	Leaf Spot % OF MEAN	Percent Sugar % OF MEAN	Tons/ Acre % OF MEAN	SEEDLING VIGOR % OF MEAN	FIELD EMERG. % % OF MEAN
ACH 196	95.7	98.1	107.6	110.7	96.7	101.4	73.2	100.5
ACH 302	101.0	100.8	101.3	87.5	101.1	99.0	76.0	106.0
ACH 309	100.3	101.5	100.6	87.2	100.3	100.4	80.6	108.7
Beta 1492	97.6	99.2	104.1	108.8	98.2	100.8	107.6	101.5
Beta 1994	102.6	97.0	96.0	98.0	102.0	93.0	113.2	89.3
Beta 2074	100.5	105.0	98.1	110.3	100.3	92.8	97.2	93.3
Beta 5014	103.6	100.4	100.2	82.3	103.3	92.1	85.2	101.1
Beta 6863	100.7	99.2	96.0	96.4	100.3	97.7	94.7	104.6
Beta 6904	103.2	103.2	94.9	97.5	102.5	91.5	90.7	97.1
HM 5135	95.8	99.3	108.7	107.5	96.9	102.9	102.7	99.0
HM 7518 (Viking)	100.5	100.9	99.5	99.4	100.4	91.2	109.5	90.0
HM Hector	99.6	102.9	98.8	103.6	99.5	102.4	139.6	111.0
HM Niagara	101.1	100.2	99.5	92.5	100.9	98.2	140.6	98.4
HM Resist	99.6	102.5	94.2	87.9	99.2	90.7	139.9	92.9
HM Shasta	99.8	99.6	96.3	107.5	99.5	99.1	96.3	104.6
KW 2398	103.4	98.7	97.7	103.1	102.9	94.6	103.0	101.4
KW 6770	99.6	99.8	97.4	110.7	99.4	99.2	108.0	97.6
Maribo 875	98.8	94.3	102.7	104.8	99.1	94.6	77.5	102.9
Maribo 923	97.9	101.5	103.4	113.5	98.4	102.9	81.2	106.9
Maribo 9363	98.9	97.2	102.3	107.6	99.2	90.5	92.3	94.3
Seedex Laser	99.9	98.7	100.6	83.2	99.9	98.3	91.3	98.9
Mean	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Test Market								
HM 7048 (Victory)	101.3	103.3	94.9	103.7	100.7	102.1	140.9	
HM 7049 (Tahoe)	101.3	99.6	97.4	101.8	101.0	98.4	136.9	
HM RH3 (Rhiz. Spec.)	100.0	98.1	96.3	84.0	99.6	98.3	164 2	

TABLE 9. Comparison of Special varieties to Commercial Varieties, 1994-1996.

VARIETIES	RST 3 Yr Mean	RSA 3 Yr Mean	LTM 3 Yr Mean	CLS 3 Yr Mean	SUGAR % 3 Yr Mean	TON/A 3 Yr Mean	SEEDLNG VIGOR 3 Yr Mean	FIELD EMERG.(%) 3 Yr Mean
ACH 196	296.8	7207	1.52	4.83	16.36	22.0	1.33	54.6
ACH 302	308.1	7125	1.45	3.86	16.85	23.0	1.37	63.1
ACH 309	306.6	7251	1.44	3.95	16.77	23.5	1.28	66.1
Beta 1492	300.2	7299	1.45	4.83	16.46	24.1	1.83	59.5
Beta 1994	310.1	7108	1.38	4.62	16.89	22.9	1.77	
Beta 2010	293.3	7319	1.43	4.67	16.10	24.8	1.66	64.8
Beta 2074	307.3	7597	1.39	4.85	16.75	24.6	1.59	
Beta 5014	315.4	7128	1.38	3.71	17.15	22.5	1.37	
Beta 6863	309.0	7237	1.37	4.51	16.82	23.3	1.59	
Beta 6904	314.0	7448	1.33	4.38	17.03	23.6	1.51	
HM 5135	296.7	7204	1.52	4.81	16.35	24.1	1.66	59.9
HM 7518 (Viking)	309.0	7329	1.42	4.55	16.87	23.6	1.73	
HM Hector	304.1	7447	1.41	4.68	16.62	24.3	2.17	
HM Niagara	309.6	7222	1.40	4.14	16.88	23.2	2.26	58.2
HM Resist	304.2	7404	1.35	4.03	16.56	24.2	2.35	
HM Shasta	307.5	7161	1.38	4.85	16.75	23.2	1.59	63.2
KW 2398	315.4	7158	1.38	4.63	17.15	22.6	1.70	61.0
KW 6770	303.6	7342	1.39	4.89	16.57	24.0	1.88	57.4
Maribo 875	302.7	6898	1.47	4.64	16.60	22.6	1.33	61.9
Maribo 923	301.0	7282	1.47	5.00	16.53	24.1	1.35	61.3
Maribo 9363	305.7	7159	1.42	4.73	16.71	23.2	1.49	
Mitsui Monohikari	292.7	7065	1.34	4.40	15.97	24.0	2.41	61.4
Seedex Laser	304.8	7019	1.44	3.76	16.67	23.0	1.55	59.3
Van der Have H66140	292.4	7204	1.45	5.18	16.07	24.5	1.41	62.6
Mean	**304.6**	**7234**	**1.42**	**4.52**	**16.65**	**23.5**	**1.67**	**61.0**
SPECIALTY								
ACH 198(Aphan.Spec.)	301.1	7081	1.53	3.97	16.59	23.42	1.34	61.5
ACH 205(Aphan.Spec.)	291.9	7120	1.39	3.72	15.99	24.26	1.68	67.9

TABLE 10. Percent of Mean Comparison of Special varieties to Commercial Varieties, 1994-1995.

VARIETIES	REC. S./ TON % OF Mean	REC. S./ ACRE % OF Mean	PERCENT LTM % OF Mean	LEAF SPOT % OF Mean	PERCENT SUGAR % OF Mean	TONS/ ACRE % OF Mean	SEEDLNG VIGOR % OF Mean	FIELD EMERG. (%) % OF Mean
ACH 196	97.4	99.6	107.4	106.8	98.3	93.6	79.5	89.6
ACH 302	101.1	98.5	102.2	85.5	101.2	97.9	81.7	103.4
ACH 309	100.7	100.2	101.5	87.4	100.7	100.0	76.3	108.5
Beta 1492	98.6	100.9	102.7	106.8	98.9	102.6	109.6	97.6
Beta 1994	101.8	98.3	97.5	102.1	101.4	97.1	105.6	
Beta 2010	96.3	101.2	101.2	103.3	96.7	105.3	99.0	106.2
Beta 2074	100.9	105.0	97.9	107.2	100.6	104.5	95.2	
Beta 5014	103.5	98.5	97.5	82.1	103.0	95.6	82.1	
Beta 6863	101.5	100.0	96.5	99.8	101.0	98.8	95.2	
Beta 6904	103.1	103.0	93.7	96.9	102.3	100.4	90.2	
HM 5135	97.4	99.6	107.4	106.4	98.2	102.5	99.0	98.3
HM 7518 (Viking)	101.5	101.3	100.5	100.6	101.4	100.1	103.2	
HM Hector	99.8	102.9	99.6	103.6	99.8	103.4	129.7	
HM Niagara	101.7	99.8	99.1	91.6	101.4	98.5	135.0	95.5
HM Resist	99.9	102.3	95.1	89.1	99.5	102.9	140.2	
HM Shasta	100.9	99.0	97.2	107.3	100.6	98.5	94.8	103.7
KW 2398	103.6	98.9	97.7	102.5	103.0	95.9	101.6	100.0
KW 6770	99.7	101.5	98.2	108.2	99.6	102.1	112.3	94.2
Maribo 875	99.4	95.4	103.6	102.7	99.7	96.1	79.3	101.5
Maribo 923	98.8	100.7	104.1	110.5	99.3	102.3	80.9	100.6
Maribo 9363	100.4	99.0	100.5	104.6	100.4	98.6	88.8	
Mitsui Monohikari	96.1	97.7	94.7	97.3	96.0	101.9	144.0	
Seedex Laser	100.1	97.0	101.5	83.2	100.2	97.6	92.4	
Van der Have H66140	96.0	99.6	102.7	114.6	96.5	103.9	84.5	
Mean	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
SPECIALTY								
ACH 198(Aphan.Spec.)	99.4	98.3	107.4	87.3	100.1	99.0	79.3	100.2
ACH 205(Aphan.Spec.)	96.4	98.9	97.4	81.7	96.5	102.6	99.6	110.5

TABLE 11A. COMBINED ANALYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/04/96

30 Entries 8 RepsXLocs 3 Tests Combined 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	305.01	99	0.46	7066.67	105	0.01	1.28	107	0.00	16.53	100	0.81	23.13	105	0.00
ACH 197 (Cerc. Spec.)	95	302.32	98	0.11	6343.11	94	0.00	1.21	101	0.44	16.33	99	0.11	20.93	95	0.00
ACH 198 (Aphan. Spec.)	82	302.12	98	0.09	6497.91	96	0.04	1.28	107	0.00	16.38	99	0.22	21.49	98	0.15
ACH 205 (Aphan. Spec.)	102	291.12	95	0.00	6706.16	99	0.68	1.22	102	0.25	15.78	95	0.00	23.04	105	0.00
ACH 302 (Aphan. Spec.)	75	314.38	102	0.02	6760.88	100	0.96	1.15	96	0.05	16.87	102	0.03	21.48	98	0.15
ACH 309	86	307.68	100	0.89	6687.66	99	0.58	1.21	101	0.58	16.59	100	0.81	21.71	99	0.43
Beta 1492	73	306.98	100	0.92	6759.48	100	0.97	1.20	100	0.92	16.55	100	0.93	21.97	100	0.99
Beta 1994 (NC)	91	321.42	105	0.00	6415.72	95	0.01	1.12	93	0.00	17.20	104	0.00	19.90	91	0.00
Beta 2010 (Aphan. Spec.)	76	304.11	99	0.30	6769.25	100	0.90	1.19	99	0.80	16.40	99	0.26	22.25	101	0.40
Beta 2074 (NC)	99	309.22	101	0.52	6853.06	101	0.41	1.17	98	0.34	16.63	100	0.60	22.13	101	0.62
Beta 5014 (Aphan. Spec.)	85	320.85	104	0.00	6738.74	100	0.89	1.15	96	0.07	17.19	104	0.00	20.98	95	0.00
Beta 6863 (Aphan. Spec.)	89	312.36	102	0.10	6811.09	101	0.64	1.15	96	0.07	16.77	101	0.14	21.81	99	0.64
Beta 6904 (APhan. Spec.)	79	322.12	105	0.00	6712.40	99	0.72	1.16	97	0.11	17.27	104	0.00	20.82	95	0.00
HM 5135	83	298.23	97	0.00	6778.22	100	0.84	1.31	109	0.00	16.22	98	0.02	22.73	103	0.03
HM 7518	74	313.13	102	0.06	6750.66	100	0.97	1.20	100	0.79	16.86	102	0.04	21.52	98	0.18
HM Hector	96	308.83	101	0.61	6895.94	102	0.24	1.14	95	0.02	16.58	100	0.90	22.29	101	0.34
HM Niagara	90	309.60	101	0.44	6703.21	99	0.67	1.21	101	0.59	16.69	101	0.37	21.63	98	0.31
HM Resist (Aphan. Spec.)	81	311.25	101	0.19	6968.33	103	0.08	1.15	96	0.08	16.72	101	0.25	22.33	102	0.28
HM Shasta	93	311.31	101	0.19	6807.78	101	0.66	1.13	94	0.01	16.70	101	0.33	21.86	99	0.74
KW 2398 (Aphan. Spec.)	101	315.43	103	0.01	6632.59	98	0.31	1.19	99	0.83	16.96	102	0.01	20.99	96	0.00
KW 6770	77	310.73	101	0.26	6968.38	103	0.08	1.17	98	0.28	16.71	101	0.31	22.39	102	0.21
Maribo 875	88	303.19	99	0.18	6517.98	96	0.05	1.26	105	0.02	16.41	99	0.31	21.48	98	0.15
Maribo 923	80	305.05	99	0.46	6951.27	103	0.10	1.23	103	0.13	16.49	100	0.61	22.77	104	0.02
Maribo 9363	98	304.56	99	0.37	6725.04	100	0.80	1.21	101	0.50	16.44	99	0.40	22.05	100	0.82
Maribo 9369 (NC)	78	299.80	98	0.02	6823.47	101	0.57	1.27	106	0.00	16.27	98	0.04	22.71	103	0.03
Mitusui Monohikari	87	294.76	96	0.00	6525.10	97	0.06	1.11	93	0.00	15.84	96	0.00	22.07	100	0.77
Seedex SX Laser	92	304.67	99	0.39	6494.96	96	0.03	1.17	98	0.35	16.41	99	0.28	21.30	97	0.05
Van der Have H66140	94	300.02	98	0.02	6782.48	100	0.82	1.21	101	0.52	16.21	98	0.02	22.61	103	0.06
Van der Have H66186 (NC)	84	303.50	99	0.22	7128.96	106	0.00	1.20	100	1.00	16.37	99	0.18	23.51	107	0.00
Van der Have H66240 (NC)	97	304.36	99	0.34	7065.98	105	0.01	1.22	102	0.38	16.43	99	0.38	23.19	106	0.00

General Mean	307.27			6754.75			1.20			16.56			21.97		
Coeff. of Var. (%)	3.42			7.15			7.73			2.96			6.32		
F Value	5.77	**		2.52	**		4.10	**		5.80	**		5.88	**	
L.S.D. (.05)	8.70	3		342.65	5		0.07	6		0.41	2		0.95	4	
L.S.D. (.01)	11.57	4		455.68	7		0.09	8		0.54	3		1.27	6	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 11B. COMBINED ANALYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/04/96

30 Entries 8 RepsXLocs 3 Tests Combined 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %			Emergence %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	259.96	105	0.36	2490.38	112	0.00	234.06	96	0.38	3.12	95	0.53	56.65	100	0.98
ACH 197 (Cerc. Spec.)	95	239.63	97	0.51	2242.20	100	0.81	258.70	106	0.24	3.64	111	0.10	50.13	88	0.00
ACH 198 (Aphan. Spec.)	82	234.21	94	0.28	2370.25	106	0.00	276.39	113	0.01	3.04	93	0.31	55.92	99	0.60
ACH 205 (Aphan. Spec.)	102	240.01	97	0.53	2177.99	98	0.24	283.53	116	0.00	3.61	110	0.14	63.30	112	0.00
ACH 302 (Aphan. Spec.)	75	202.52	82	0.00	2201.24	99	0.51	232.56	95	0.32	3.83	117	0.02	59.90	106	0.03
ACH 309	86	201.61	81	0.00	2329.81	104	0.03	245.31	100	0.95	3.50	107	0.31	58.53	103	0.21
Beta 1492	73	251.13	101	0.82	2156.45	97	0.10	264.51	108	0.10	2.85	87	0.07	56.16	99	0.72
Beta 1994 (NC)	91	193.62	78	0.00	2036.26	91	0.00	258.72	106	0.24	3.55	109	0.22	56.01	99	0.65
Beta 2010 (Aphan. Spec.)	76	224.43	90	0.07	2209.40	99	0.63	254.01	104	0.44	2.95	90	0.16	61.42	108	0.00
Beta 2074 (NC)	99	236.75	95	0.38	2191.18	98	0.38	241.50	99	0.80	2.87	88	0.08	58.52	103	0.21
Beta 5014 (Aphan. Spec.)	85	225.07	91	0.08	2192.86	98	0.40	228.38	93	0.18	3.41	104	0.55	63.41	112	0.00
Beta 6863 (Aphan. Spec.)	89	228.30	92	0.13	2045.22	92	0.00	266.51	109	0.07	3.12	95	0.52	60.38	107	0.01
Beta 6904 (APhan. Spec.)	79	243.38	98	0.71	2167.10	97	0.16	234.90	96	0.42	3.63	111	0.11	60.94	108	0.00
HM 5135	83	318.87	129	0.00	2443.36	109	0.00	253.02	103	0.48	3.00	92	0.24	50.21	89	0.00
HM 7518	74	230.02	93	0.16	2248.71	101	0.70	250.73	103	0.61	3.20	98	0.77	56.44	100	0.87
HM Hector	96	223.64	90	0.06	2152.77	96	0.09	229.71	94	0.22	3.35	102	0.71	62.55	110	0.00
HM Niagara	90	251.58	101	0.79	2264.65	101	0.47	244.19	100	0.97	3.29	101	0.92	52.81	93	0.01
HM Resist (Aphan. Spec.)	81	254.54	103	0.62	2135.41	96	0.04	237.02	97	0.53	3.17	97	0.66	58.30	103	0.27
HM Shasta	93	256.21	103	0.53	2123.22	95	0.02	220.24	90	0.05	3.45	106	0.43	57.01	101	0.82
KW 2398 (Aphan. Spec.)	101	261.33	105	0.31	2203.81	99	0.54	243.59	100	0.93	3.23	99	0.88	53.38	94	0.03
KW 6770	77	239.06	96	0.48	2297.50	103	0.15	209.55	86	0.00	2.76	84	0.03	53.81	95	0.05
Maribo 875	88	300.09	121	0.00	2404.95	108	0.00	224.96	92	0.11	3.57	109	0.19	58.44	103	0.23
Maribo 923	80	266.50	107	0.16	2382.10	107	0.00	229.26	94	0.20	3.64	111	0.10	60.33	106	0.01
Maribo 9363	98	285.58	115	0.01	2291.39	103	0.19	227.63	93	0.16	3.03	93	0.30	53.54	94	0.03
Maribo 9369 (NC)	78	308.75	124	0.00	2309.19	103	0.09	262.37	107	0.14	2.96	91	0.18	51.68	91	0.00
Mitusui Monohikari	87	244.27	98	0.76	2095.54	94	0.00	212.70	87	0.02	3.83	117	0.02	54.34	96	0.11
Seedex SX Laser	92	240.13	97	0.54	2226.57	100	0.92	230.88	94	0.26	3.64	111	0.10	54.62	96	0.16
Van der Have H66140	94	262.48	106	0.27	2216.70	99	0.75	254.79	104	0.40	3.00	92	0.24	55.62	98	0.47
Van der Have H66186 (NC)	84	256.81	103	0.50	2135.79	96	0.04	265.25	108	0.09	2.97	91	0.19	55.81	98	0.55
Van der Have H66240 (NC)	97	263.68	106	0.23	2200.70	99	0.50	263.26	108	0.12	2.83	87	0.06	50.16	88	0.00

General Mean	248.14			2231.42			244.61			3.27			56.68			
Coeff. of Var. (%)	19.65			7.46			16.80			30.90			9.34			
F Value	4.65	**		5.79	**		2.35	**		1.93	**		6.55	**		
L.S.D. (.05)	37.07	15		130.44	6		34.46	14		0.65	20		4.19	7		
L.S.D. (.01)	49.32	20		173.62	8		45.85	19		0.86	26		5.57	10		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 11C. COMBINED ANALYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/04/96

30 Entries 8 RepsXLocs 3 Tests Combined 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	0.00			1.29	74	0.01
ACH 197 (Cerc. Spec.)	95	0.07			2.11	121	0.02
ACH 198 (Aphan. Spec.)	82	0.00			1.46	84	0.08
ACH 205 (Aphan. Spec.)	102	0.00			1.72	99	0.91
ACH 302 (Aphan. Spec.)	75	0.07			1.26	72	0.00
ACH 309	86	0.00			1.35	78	0.02
Beta 1492	73	0.00			1.81	104	0.66
Beta 1994 (NC)	91	0.00			2.17	125	0.01
Beta 2010 (Aphan. Spec.)	76	0.00			1.84	106	0.53
Beta 2074 (NC)	99	0.00			1.52	87	0.18
Beta 5014 (Aphan. Spec.)	85	0.00			1.40	80	0.03
Beta 6863 (Aphan. Spec.)	89	0.00			1.52	87	0.16
Beta 6904 (APhan. Spec.)	79	0.00			1.40	80	0.03
HM 5135	83	0.00			2.10	121	0.02
HM 7518	74	0.00			1.99	114	0.12
HM Hector	96	0.00			2.46	141	0.00
HM Niagara	90	0.00			2.28	131	0.00
HM Resist (Aphan. Spec.)	81	0.00			2.37	136	0.00
HM Shasta	93	0.00			1.71	98	0.84
KW 2398 (Aphan. Spec.)	101	0.00			2.22	128	0.00
KW 6770	77	0.00			1.80	103	0.70
Maribo 875	88	0.00			1.21	70	0.00
Maribo 923	80	0.00			1.58	91	0.33
Maribo 9363	98	0.00			1.60	92	0.37
Maribo 9369 (NC)	78	0.00			1.54	89	0.22
Mitusui Monohikari	87	0.00			2.94	169	0.00
Seedex SX Laser	92	0.00			1.80	103	0.71
Van der Have H66140	94	0.00			1.34	77	0.01
Van der Have H66186 (NC)	84	0.00			1.11	64	0.00
Van der Have H66240 (NC)	97	0.07			1.29	74	0.01

General Mean		1.74	
Coeff. of Var. (%)		28.05	
F Value		7.57	**
L.S.D. (.05)		0.45	26
L.S.D. (.01)		0.60	35

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 12A. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/30/96

30 Entries **8 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	284.77	96	0.00	6525.47	103	0.24	1.41	112	0.00	15.65	97	0.01	22.94	108	0.00
ACH 197 (Cerc. Spec.)	95	293.33	99	0.30	5994.66	95	0.05	1.28	102	0.56	15.95	99	0.33	20.42	96	0.06
ACH 198 (Aphan. Spec.)	82	296.00	100	0.77	6069.99	96	0.13	1.33	106	0.06	16.13	100	0.91	20.59	97	0.13
ACH 205 (Aphan. Spec.)	102	276.16	93	0.00	6450.54	102	0.46	1.32	105	0.07	15.13	94	0.00	23.29	109	0.00
ACH 302 (Aphan. Spec.)	75	300.52	101	0.32	6417.47	101	0.59	1.20	95	0.11	16.23	101	0.47	21.44	101	0.80
ACH 309	86	291.61	98	0.13	6235.75	99	0.59	1.31	104	0.13	15.89	99	0.20	21.35	100	0.96
Beta 1492	73	294.82	99	0.53	6205.53	98	0.47	1.30	103	0.30	16.04	100	0.69	21.03	99	0.55
Beta 1994 (NC)	91	301.92	102	0.16	5442.22	86	0.00	1.23	98	0.42	16.32	101	0.20	17.94	84	0.00
Beta 2010 (Aphan. Spec.)	76	293.69	99	0.35	6514.62	103	0.26	1.25	99	0.88	15.94	99	0.31	22.16	104	0.08
Beta 2074 (NC)	99	300.95	101	0.26	6359.97	101	0.84	1.25	99	0.88	16.30	101	0.25	21.06	99	0.60
Beta 5014 (Aphan. Spec.)	85	312.14	105	0.00	6378.23	101	0.76	1.24	98	0.56	16.84	105	0.00	20.49	96	0.09
Beta 6863 (Aphan. Spec.)	89	304.37	102	0.04	6599.51	104	0.10	1.16	92	0.01	16.37	102	0.11	21.60	101	0.56
Beta 6904 (APhan. Spec.)	79	313.19	105	0.00	6573.90	104	0.14	1.25	99	0.76	16.90	105	0.00	21.01	99	0.52
HM 5135	83	290.75	98	0.08	6332.25	100	0.97	1.39	110	0.00	15.93	99	0.27	21.82	102	0.30
HM 7518	74	300.38	101	0.34	6243.41	99	0.62	1.24	98	0.59	16.26	101	0.36	20.87	98	0.35
HM Hector	96	297.50	100	0.89	6241.96	99	0.61	1.17	93	0.02	16.05	100	0.72	20.97	98	0.47
HM Niagara	90	300.52	101	0.32	6389.04	101	0.71	1.30	103	0.27	16.32	101	0.20	21.23	100	0.86
HM Resist (Aphan. Spec.)	81	296.33	100	0.85	6366.83	101	0.81	1.23	98	0.46	16.04	100	0.70	21.43	101	0.82
HM Shasta	93	296.69	100	0.93	6261.31	99	0.69	1.13	90	0.00	15.97	99	0.39	21.08	99	0.62
KW 2398 (Aphan. Spec.)	101	310.87	105	0.00	6473.27	102	0.38	1.17	93	0.02	16.71	104	0.00	20.86	98	0.34
KW 6770	77	302.56	102	0.12	6497.35	103	0.31	1.21	96	0.22	16.35	101	0.15	21.59	101	0.57
Maribo 875	88	290.43	98	0.06	6056.60	96	0.11	1.30	103	0.26	15.82	98	0.08	20.86	98	0.34
Maribo 923	80	297.80	100	0.82	6418.49	101	0.58	1.30	103	0.24	16.19	100	0.63	21.62	101	0.53
Maribo 9363	98	296.77	100	0.95	6119.17	97	0.22	1.23	98	0.47	16.07	100	0.80	20.64	97	0.16
Maribo 9369 (NC)	78	294.52	99	0.48	6362.36	101	0.83	1.37	109	0.00	16.10	100	0.95	21.65	102	0.50
Mitsui Monohikari	87	286.54	96	0.00	6006.51	95	0.06	1.18	94	0.04	15.51	96	0.00	21.02	99	0.53
Seedex SX Laser	92	294.72	99	0.52	6287.31	99	0.81	1.24	98	0.54	15.97	99	0.41	21.40	100	0.86
Van der Have H66140	94	294.44	99	0.47	6539.45	103	0.21	1.26	100	0.86	15.99	99	0.48	22.11	104	0.10
Van der Have H66186 (NC)	84	295.08	99	0.58	6750.64	107	0.01	1.22	97	0.37	15.98	99	0.45	22.82	107	0.00
Van der Have H66240 (NC)	97	300.74	101	0.29	6695.21	106	0.03	1.26	100	0.95	16.30	101	0.24	22.30	105	0.04

General Mean	297.00		6326.97		1.26		16.11		21.32				
Coeff. of Var. (%)	3.37		7.45		8.15		2.94		6.19				
F Value	4.65	**	2.28	**	3.32	**	4.51	**	4.06	**			
L.S.D. (.05)	9.95		474.04		0.10		0.47		1.36				
L.S.D. (.01)	13.13		625.18		0.14		0.62		1.80				

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 12B. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/30/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %			Emergence %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	217.71	116	0.04	2870.63	113	0.00	252.58	108	0.22	4.10	96	0.63	60.05	99	0.82
ACH 197 (Cerc. Spec.)	95	177.99	95	0.48	2475.35	98	0.43	266.23	113	0.03	4.69	109	0.33	53.80	89	0.00
ACH 198 (Aphan. Spec.)	82	174.69	93	0.35	2782.75	110	0.00	234.05	100	0.95	3.81	89	0.24	59.79	99	0.73
ACH 205 (Aphan. Spec.)	102	191.32	102	0.83	2540.50	100	0.92	281.96	120	0.00	3.89	91	0.32	66.26	109	0.01
ACH 302 (Aphan. Spec.)	75	148.43	79	0.01	2460.93	97	0.32	226.40	96	0.55	5.00	117	0.08	66.15	109	0.01
ACH 309	86	167.35	89	0.15	2616.13	103	0.26	259.72	111	0.09	3.94	92	0.39	64.07	106	0.09
Beta 1492	73	192.85	102	0.75	2554.13	101	0.77	254.73	108	0.17	3.85	90	0.28	59.08	98	0.49
Beta 1994 (NC)	91	170.23	90	0.22	2281.88	90	0.00	279.14	119	0.00	4.64	108	0.40	60.06	99	0.82
Beta 2010 (Aphan. Spec.)	76	167.95	89	0.16	2488.25	98	0.54	246.55	105	0.42	3.29	77	0.01	63.89	106	0.11
Beta 2074 (NC)	99	171.72	91	0.26	2512.39	99	0.78	242.13	103	0.62	3.78	88	0.21	59.21	98	0.53
Beta 5014 (Aphan. Spec.)	85	177.46	94	0.46	2540.88	100	0.91	224.20	95	0.46	5.03	117	0.07	68.00	112	0.00
Beta 6863 (Aphan. Spec.)	89	186.63	99	0.91	2216.38	88	0.00	236.72	101	0.90	4.37	102	0.85	63.68	105	0.13
Beta 6904 (APhan. Spec.)	79	184.19	98	0.78	2519.13	99	0.85	233.23	99	0.91	4.59	107	0.46	65.03	107	0.03
HM 5135	83	217.62	116	0.04	2791.21	110	0.00	256.68	109	0.13	3.99	93	0.45	56.97	94	0.09
HM 7518	74	166.46	88	0.13	2514.25	99	0.80	229.55	98	0.71	4.12	96	0.68	61.92	102	0.50
HM Hector	96	180.15	96	0.58	2359.25	93	0.02	219.82	94	0.29	4.54	106	0.54	63.40	105	0.17
HM Niagara	90	193.50	103	0.72	2612.25	103	0.28	237.41	101	0.86	4.10	96	0.63	55.14	91	0.01
HM Resist (Aphan. Spec.)	81	199.80	106	0.43	2528.13	100	0.95	212.26	90	0.12	4.46	104	0.69	62.07	103	0.46
HM Shasta	93	195.45	104	0.62	2259.74	89	0.00	204.57	87	0.04	4.61	107	0.44	58.85	97	0.42
KW 2398 (Aphan. Spec.)	101	179.81	96	0.56	2419.38	96	0.12	204.56	87	0.04	4.58	107	0.49	57.07	94	0.10
KW 6770	77	180.22	96	0.58	2592.45	102	0.42	189.51	81	0.00	3.62	84	0.10	59.66	99	0.68
Maribo 875	88	226.25	120	0.01	2613.00	103	0.27	228.72	97	0.67	4.31	100	0.96	61.97	102	0.49
Maribo 923	80	187.42	100	0.95	2750.50	109	0.00	219.08	93	0.27	5.04	117	0.07	65.35	108	0.02
Maribo 9363	98	214.09	114	0.08	2529.38	100	0.96	207.89	88	0.06	3.67	86	0.13	57.66	95	0.17
Maribo 9369 (NC)	78	243.36	129	0.00	2734.98	108	0.01	255.96	109	0.14	3.97	93	0.43	56.83	94	0.08
Mitusui Monohikari	87	192.11	102	0.79	2446.50	97	0.24	200.92	86	0.02	4.46	104	0.68	54.98	91	0.01
Seedex SX Laser	92	190.75	101	0.86	2517.00	99	0.83	219.99	94	0.30	4.62	108	0.42	54.44	90	0.00
Van der Have H66140	94	187.56	100	0.96	2523.00	100	0.89	239.77	102	0.73	4.68	109	0.34	62.87	104	0.26
Van der Have H66186 (NC)	84	188.08	100	0.99	2464.00	97	0.35	225.90	96	0.53	4.69	109	0.33	61.31	101	0.70
Van der Have H66240 (NC)	97	176.07	94	0.40	2475.65	98	0.43	257.05	109	0.12	4.34	101	0.90	56.01	93	0.03

General Mean		188.24			2533.00			234.91			4.29			60.52		
Coeff. of Var. (%)		20.86			8.28			16.61			27.33			9.24		
F Value		1.63	**		4.16	**		2.54	**		1.16	NS		3.23	**	
L.S.D. (.05)		41.10			206.88			40.68			1.16			5.90		
L.S.D. (.01)		54.21			272.82			53.65			1.52			7.78		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 12C. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/30/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	0.00	0	0.85	1.23	70	0.01
ACH 197 (Cerc. Spec.)	95	0.00	0	0.85	2.12	121	0.06
ACH 198 (Aphan. Spec.)	82	0.00	0	0.85	1.58	90	0.37
ACH 205 (Aphan. Spec.)	102	0.00	0	0.85	1.66	95	0.63
ACH 302 (Aphan. Spec.)	75	0.20	3000	0.00	1.34	77	0.03
ACH 309	86	0.00	0	0.85	1.55	89	0.29
Beta 1492	73	0.00	0	0.85	1.86	106	0.60
Beta 1994 (NC)	91	0.00	0	0.85	1.72	98	0.86
Beta 2010 (Aphan. Spec.)	76	0.00	0	0.85	1.82	104	0.74
Beta 2074 (NC)	99	0.00	0	0.85	1.57	90	0.35
Beta 5014 (Aphan. Spec.)	85	0.00	0	0.85	1.57	90	0.34
Beta 6863 (Aphan. Spec.)	89	0.00	0	0.85	1.51	86	0.20
Beta 6904 (APhan. Spec.)	79	0.00	0	0.85	1.77	101	0.95
HM 5135	83	0.00	0	0.85	1.80	103	0.83
HM 7518	74	0.00	0	0.85	2.26	129	0.01
HM Hector	96	0.00	0	0.85	2.56	146	0.00
HM Niagara	90	0.00	0	0.85	2.29	131	0.01
HM.Resist (Aphan. Spec.)	81	0.00	0	0.85	2.07	118	0.10
HM Shasta	93	0.00	0	0.85	1.79	102	0.85
KW 2398 (Aphan. Spec.)	101	0.00	0	0.85	2.18	125	0.03
KW 6770	77	0.00	0	0.85	1.96	112	0.30
Maribo 875	88	0.00	0	0.85	1.09	62	0.00
Maribo 923	80	0.00	0	0.85	1.46	83	0.13
Maribo 9363	98	0.00	0	0.85	1.66	95	0.62
Maribo 9369 (NC)	78	0.00	0	0.85	1.69	97	0.75
Mitusui Monohikari	87	0.00	0	0.85	2.81	161	0.00
Seedex SX Laser	92	0.00	0	0.85	2.11	121	0.07
Van der Have H66140	94	0.00	0	0.85	1.33	76	0.03
Van der Have H66186 (NC)	84	0.00	0	0.85	1.21	69	0.01
Van der Have H66240 (NC)	97	0.00	0	0.85	1.06	61	0.00

General Mean		1.75	
Coeff. of Var. (%)		29.21	
F Value		5.03	**
L.S.D. (.05)		0.55	
L.S.D. (.01)		0.72	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 13A. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/02/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	324.79	101	0.23	7969.61	106	0.00	1.22	103	0.23	17.46	102	0.12	24.50	105	0.01
ACH 197 (Cerc. Spec.)	95	319.47	100	0.87	7170.39	96	0.05	1.18	99	0.84	17.15	100	0.82	22.39	96	0.02
ACH 198 (Aphan. Spec.)	82	313.58	98	0.09	7019.74	94	0.00	1.28	108	0.00	16.97	99	0.21	22.30	95	0.01
ACH 205 (Aphan. Spec.)	102	314.49	98	0.15	7257.24	97	0.15	1.13	95	0.06	16.85	98	0.06	23.10	99	0.49
ACH 302 (Aphan. Spec.)	75	325.03	102	0.20	7350.78	98	0.40	1.16	97	0.38	17.41	101	0.21	22.61	97	0.07
ACH 309	86	327.19	102	0.07	7619.04	102	0.39	1.20	101	0.62	17.56	102	0.04	23.30	100	0.83
Beta 1492	73	320.18	100	0.99	7719.88	103	0.14	1.15	97	0.24	17.16	100	0.86	24.22	104	0.06
Beta 1994 (NC)	91	336.96	105	0.00	7307.37	98	0.26	1.07	90	0.00	17.91	104	0.00	21.72	93	0.00
Beta 2010 (Aphan. Spec.)	76	316.68	99	0.37	7464.90	100	0.90	1.21	102	0.44	17.04	99	0.41	23.64	101	0.57
Beta 2074 (NC)	99	320.92	100	0.83	7711.82	103	0.15	1.15	97	0.21	17.19	100	0.98	24.10	103	0.11
Beta 5014 (Aphan. Spec.)	85	329.60	103	0.01	7443.48	99	0.80	1.16	97	0.38	17.64	103	0.01	22.58	96	0.06
Beta 6863 (Aphan. Spec.)	89	319.14	100	0.80	7300.56	98	0.24	1.19	100	0.99	17.14	100	0.77	23.00	98	0.36
Beta 6904 (APhan. Spec.)	79	332.31	104	0.00	7266.20	97	0.17	1.14	96	0.13	17.76	103	0.00	21.77	93	0.00
HM 5135	83	310.44	97	0.01	7474.01	100	0.95	1.28	108	0.00	16.80	98	0.03	24.14	103	0.09
HM 7518	74	327.14	102	0.07	7585.40	101	0.52	1.16	97	0.38	17.52	102	0.06	23.17	99	0.59
HM Hector	96	322.90	101	0.47	7776.94	104	0.06	1.18	99	0.84	17.32	101	0.46	24.10	103	0.11
HM Niagara	90	320.53	100	0.92	7376.42	99	0.49	1.22	103	0.24	17.25	100	0.76	22.97	98	0.33
HM Resist (Aphan. Spec.)	81	327.27	102	0.07	7901.80	106	0.01	1.08	91	0.00	17.44	101	0.15	24.10	103	0.11
HM Shasta	93	322.87	101	0.48	7566.59	101	0.60	1.15	97	0.21	17.29	101	0.59	23.51	100	0.80
KW 2398 (Aphan. Spec.)	101	331.44	104	0.00	7387.98	99	0.54	1.18	99	0.93	17.76	103	0.00	22.29	95	0.01
KW 6770	77	320.09	100	0.99	7621.44	102	0.38	1.19	100	0.77	17.20	100	0.94	23.78	102	0.38
Maribo 875	88	319.31	100	0.84	7124.44	95	0.02	1.23	103	0.17	17.19	100	0.99	22.36	96	0.02
Maribo 923	80	317.70	99	0.53	7703.22	103	0.16	1.23	103	0.13	17.12	100	0.68	24.21	103	0.06
Maribo 9363	98	318.69	100	0.71	7531.30	101	0.77	1.21	102	0.38	17.15	100	0.80	23.66	101	0.55
Maribo 9369 (NC)	78	312.12	98	0.04	7586.42	101	0.52	1.27	107	0.01	16.87	98	0.07	24.25	104	0.05
Mitusui Monohikari	87	313.39	98	0.08	7568.53	101	0.59	1.06	89	0.00	16.73	97	0.01	24.13	103	0.10
Seedex SX Laser	92	316.53	99	0.35	7102.78	95	0.02	1.17	98	0.62	17.00	99	0.27	22.40	96	0.02
Van der Have H66140	94	304.95	95	0.00	7034.16	94	0.00	1.24	104	0.06	16.49	96	0.00	23.16	99	0.58
Van der Have H66186 (NC)	84	303.24	95	0.00	7649.62	102	0.29	1.23	103	0.14	16.39	95	0.00	25.31	108	0.00
Van der Have H66240 (NC)	97	314.53	98	0.15	7937.94	106	0.00	1.25	105	0.03	16.98	99	0.23	25.21	108	0.00

General Mean	320.12			7484.33			1.19			17.19			23.40			
Coeff. of Var. (%)	3.36			5.86			7.36			2.84			5.35			
F Value	3.77	**		2.72	**		3.47	**		3.88	**		4.56	**		
L.S.D. (.05)	10.95			445.50			0.09			0.50			1.23			
L.S.D. (.01)	14.44			587.56			0.11			0.66			1.63			

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 13B. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/02/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %			Emergence %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	203.00	105	0.43	2503.81	108	0.00	209.43	89	0.08	3.04	99	0.91	43.10	105	0.25
ACH 197 (Cerc. Spec.)	95	189.36	98	0.82	2378.02	103	0.26	214.73	92	0.17	3.22	105	0.69	32.27	79	0.00
ACH 198 (Aphan. Spec.)	82	194.64	101	0.87	2398.06	104	0.14	288.13	123	0.00	3.47	113	0.27	40.53	99	0.82
ACH 205 (Aphan. Spec.)	102	150.10	78	0.00	2167.46	94	0.01	244.88	104	0.48	4.02	131	0.01	46.10	113	0.01
ACH 302 (Aphan. Spec.)	75	170.85	89	0.11	2367.59	102	0.35	208.31	89	0.07	3.65	119	0.11	42.77	104	0.33
ACH 309	86	154.76	80	0.01	2430.82	105	0.04	230.00	98	0.74	3.75	122	0.06	38.47	94	0.18
Beta 1492	73	183.99	96	0.52	2152.56	93	0.00	254.85	109	0.16	2.84	92	0.49	41.14	100	0.92
Beta 1994 (NC)	91	138.97	72	0.00	2057.73	89	0.00	233.50	100	0.94	3.43	111	0.32	42.08	103	0.54
Beta 2010 (Aphan. Spec.)	76	166.04	86	0.05	2294.66	99	0.71	269.63	115	0.02	3.12	101	0.91	47.34	116	0.00
Beta 2074 (NC)	99	189.43	98	0.82	2279.76	98	0.52	216.75	92	0.21	2.27	74	0.02	46.84	114	0.00
Beta 5014 (Aphan. Spec.)	85	175.85	91	0.21	2295.59	99	0.72	224.30	96	0.47	3.05	99	0.94	47.70	116	0.00
Beta 6863 (Aphan. Spec.)	89	188.97	98	0.79	2204.29	95	0.05	266.14	113	0.03	2.42	79	0.06	45.57	111	0.01
Beta 6904 (APhan. Spec.)	79	196.27	102	0.78	2247.11	97	0.22	216.00	92	0.19	3.83	124	0.03	42.41	104	0.43
HM 5135	83	248.85	129	0.00	2484.07	107	0.00	239.00	102	0.76	2.94	95	0.68	31.69	77	0.00
HM 7518	74	178.37	93	0.29	2345.57	101	0.59	212.38	91	0.12	3.04	99	0.90	39.48	96	0.42
HM Hector	96	186.58	97	0.66	2354.22	102	0.49	221.06	94	0.34	2.65	86	0.21	48.10	117	0.00
HM Niagara	90	189.80	99	0.84	2394.01	103	0.16	242.38	103	0.59	3.27	106	0.59	34.90	85	0.00
HM Resist (Aphan. Spec.)	81	189.63	99	0.83	2142.62	93	0.00	198.43	85	0.01	2.64	86	0.21	42.18	103	0.51
HM Shasta	93	212.51	110	0.13	2251.48	97	0.25	214.13	91	0.15	3.02	98	0.85	42.66	104	0.36
KW 2398 (Aphan. Spec.)	101	185.39	96	0.60	2271.32	98	0.43	245.95	105	0.43	3.00	97	0.81	38.88	95	0.26
KW 6770	77	197.00	102	0.73	2456.94	106	0.01	202.88	86	0.03	2.83	92	0.46	37.09	91	0.04
Maribo 875	88	222.82	116	0.02	2441.84	105	0.02	221.50	94	0.36	3.73	121	0.07	41.54	101	0.75
Maribo 923	80	226.31	118	0.01	2431.65	105	0.04	226.50	97	0.57	2.87	93	0.55	42.27	103	0.48
Maribo 9363	98	204.57	106	0.36	2391.08	103	0.18	230.25	98	0.76	2.69	87	0.26	35.82	87	0.01
Maribo 9369 (NC)	78	240.40	125	0.00	2327.99	101	0.82	276.63	118	0.00	2.69	87	0.27	38.24	93	0.14
Mitusui Monohikari	87	180.10	94	0.35	2115.98	91	0.00	192.63	82	0.00	4.10	133	0.00	39.54	97	0.44
Seedex SX Laser	92	164.29	85	0.04	2397.47	104	0.14	210.86	90	0.10	3.58	116	0.16	43.91	107	0.11
Van der Have H66140	94	231.00	120	0.00	2310.63	100	0.93	267.13	114	0.02	2.68	87	0.25	37.12	91	0.04
Van der Have H66186 (NC)	84	199.14	103	0.62	2203.12	95	0.05	297.50	127	0.00	2.17	70	0.01	43.16	105	0.23
Van der Have H66240 (NC)	97	215.07	112	0.09	2365.86	102	0.37	264.09	113	0.04	2.46	80	0.08	35.94	88	0.01

General Mean		192.47			2315.44			234.66			3.08			40.96		
Coeff. of Var. (%)		19.02			6.91			17.54			32.08			12.18		
F Value		3.27	**		4.11	**		3.58	**		2.05	NS		5.51	**	
L.S.D. (.05)		37.75			158.71			40.58			0.99			5.23		
L.S.D. (.01)		49.78			209.32			53.52			1.31			6.90		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 13C. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/02/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	0.00	0	0.79	1.38	82	0.06
ACH 197 (Cerc. Spec.)	95	0.21	1000	0.00	2.52	150	0.00
ACH 198 (Aphan. Spec.)	82	0.00	0	0.79	1.64	98	0.82
ACH 205 (Aphan. Spec.)	102	0.00	0	0.79	1.59	95	0.59
ACH 302 (Aphan. Spec.)	75	0.00	0	0.79	1.24	74	0.01
ACH 309	86	0.00	0	0.79	1.36	81	0.05
Beta 1492	73	0.00	0	0.79	1.87	111	0.23
Beta 1994 (NC)	91	0.00	0	0.79	2.99	178	0.00
Beta 2010 (Aphan. Spec.)	76	0.00	0	0.79	1.98	118	0.06
Beta 2074 (NC)	99	0.00	0	0.79	1.11	66	0.00
Beta 5014 (Aphan. Spec.)	85	0.00	0	0.79	1.12	67	0.00
Beta 6863 (Aphan. Spec.)	89	0.00	0	0.79	1.50	89	0.28
Beta 6904 (APhan. Spec.)	79	0.00	0	0.79	1.16	69	0.00
HM 5135	83	0.00	0	0.79	2.25	134	0.00
HM 7518	74	0.00	0	0.79	1.77	105	0.57
HM Hector	96	0.00	0	0.79	2.11	126	0.01
HM Niagara	90	0.00	0	0.79	2.02	120	0.03
HM Resist (Aphan. Spec.)	81	0.00	0	0.79	2.63	157	0.00
HM Shasta	93	0.00	0	0.79	1.62	96	0.72
KW 2398 (Aphan. Spec.)	101	0.00	0	0.79	1.73	103	0.78
KW 6770	77	0.00	0	0.79	1.50	89	0.27
Maribo 875	88	0.00	0	0.79	1.13	67	0.00
Maribo 923	80	0.00	0	0.79	1.63	97	0.78
Maribo 9363	98	0.00	0	0.79	1.48	88	0.22
Maribo 9369 (NC)	78	0.00	0	0.79	1.14	68	0.00
Mitusui Monohikari	87	0.00	0	0.79	3.00	179	0.00
Seedex SX Laser	92	0.00	0	0.79	1.38	82	0.06
Van der Have H66140	94	0.00	0	0.79	1.37	82	0.06
Van der Have H66186 (NC)	84	0.00	0	0.79	1.00	60	0.00
Van der Have H66240 (NC)	97	0.21	1000	0.00	1.12	67	0.00

General Mean		1.68	
Coeff. of Var. (%)		26.79	
F Value		11.59	**
L.S.D. (.05)		0.46	
L.S.D. (.01)		0.60	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 14A. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/04/96

30 Entries **8 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	305.48	100	0.84	6730.07	104	0.15	1.20	104	0.09	16.46	100	0.68	21.86	103	0.22
ACH 197 (Cerc. Spec.)	95	294.50	97	0.01	5887.34	91	0.00	1.19	103	0.18	15.90	97	0.01	19.89	94	0.02
ACH 198 (Aphan. Spec.)	82	296.53	97	0.04	6389.11	99	0.74	1.22	106	0.02	16.06	98	0.08	21.55	102	0.52
ACH 205 (Aphan. Spec.)	102	282.78	93	0.00	6423.96	100	0.88	1.22	106	0.01	15.36	94	0.00	22.67	107	0.01
ACH 302 (Aphan. Spec.)	75	317.78	104	0.00	6501.93	101	0.80	1.09	95	0.05	16.97	104	0.00	20.50	97	0.22
ACH 309	86	304.41	100	0.94	6211.80	96	0.21	1.12	97	0.35	16.34	100	0.84	20.44	96	0.18
Beta 1492	73	305.76	100	0.79	6345.81	98	0.58	1.15	100	0.98	16.44	100	0.75	20.74	98	0.42
Beta 1994 (NC)	91	325.41	107	0.00	6496.43	101	0.82	1.07	93	0.01	17.34	106	0.00	20.00	94	0.03
Beta 2010 (Aphan. Spec.)	76	302.09	99	0.51	6324.74	98	0.51	1.11	97	0.20	16.22	99	0.38	20.97	99	0.70
Beta 2074 (NC)	99	305.55	100	0.83	6496.95	101	0.82	1.12	97	0.35	16.39	100	0.94	21.23	100	0.94
Beta 5014 (Aphan. Spec.)	85	321.04	105	0.00	6389.14	99	0.74	1.06	92	0.00	17.10	104	0.00	19.91	94	0.02
Beta 6863 (Aphan. Spec.)	89	313.29	103	0.03	6528.35	101	0.70	1.11	97	0.26	16.78	102	0.03	20.86	98	0.56
Beta 6904 (APhan. Spec.)	79	320.49	105	0.00	6308.71	98	0.45	1.09	95	0.05	17.11	104	0.00	19.56	92	0.00
HM 5135	83	293.42	96	0.00	6524.28	101	0.71	1.28	111	0.00	15.95	97	0.02	22.28	105	0.05
HM 7518	74	311.94	102	0.07	6431.56	100	0.91	1.21	105	0.04	16.80	103	0.03	20.53	97	0.24
HM Hector	96	306.56	101	0.64	6671.12	103	0.26	1.06	92	0.01	16.38	100	0.98	21.80	103	0.27
HM Niagara	90	307.69	101	0.45	6354.90	98	0.61	1.11	97	0.22	16.48	101	0.58	20.60	97	0.29
HM Resist (Aphan. Spec.)	81	309.87	102	0.19	6636.12	103	0.34	1.16	101	0.72	16.66	102	0.13	21.38	101	0.73
HM Shasta	93	314.53	103	0.01	6598.89	102	0.45	1.12	97	0.42	16.85	103	0.01	21.01	99	0.75
KW 2398 (Aphan. Spec.)	101	304.12	100	0.89	6040.80	94	0.03	1.22	106	0.01	16.42	100	0.84	19.85	94	0.02
KW 6770	77	309.72	102	0.20	6768.22	105	0.10	1.10	96	0.13	16.59	101	0.26	21.90	103	0.20
Maribo 875	88	299.58	98	0.20	6364.02	99	0.64	1.24	108	0.00	16.22	99	0.39	21.29	100	0.86
Maribo 923	80	299.42	98	0.18	6722.87	104	0.16	1.17	102	0.43	16.14	99	0.21	22.45	106	0.02
Maribo 9363	98	298.06	98	0.09	6530.19	101	0.69	1.20	104	0.09	16.09	98	0.13	21.87	103	0.22
Maribo 9369 (NC)	78	292.21	96	0.00	6513.65	101	0.75	1.18	103	0.28	15.80	96	0.00	22.25	105	0.06
Mitusui Monohikari	87	284.58	93	0.00	5989.24	93	0.02	1.08	94	0.04	15.31	93	0.00	21.08	99	0.85
Seedex SX Laser	92	302.82	99	0.64	6079.02	94	0.05	1.12	97	0.32	16.26	99	0.52	20.14	95	0.06
Van der Have H66140	94	300.77	99	0.32	6781.30	105	0.09	1.13	98	0.53	16.17	99	0.26	22.56	106	0.01
Van der Have H66186 (NC)	84	312.06	102	0.06	6986.52	108	0.01	1.13	98	0.63	16.74	102	0.06	22.40	106	0.03
Van der Have H66240 (NC)	97	298.25	98	0.10	6561.35	102	0.57	1.14	99	0.91	16.06	98	0.08	22.05	104	0.12

General Mean		304.69			6452.95			1.15			16.38			21.19		
Coeff. of Var. (%)		3.54			8.24			7.34			3.13			7.44		
F Value		6.47	**		1.65	**		3.62	**		6.37	**		2.66	**	
L.S.D. (.05)		11.21			546.36			0.08			0.53			1.58		
L.S.D. (.01)		14.78			720.57			0.11			0.70			2.08		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 14B. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/04/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %			Emergence %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196	100	358.92	99	0.84	2096.31	114	0.00	239.65	91	0.11	2.23	92	0.51	66.68	97	0.34
ACH 197 (Cerc. Spec.)	95	351.45	97	0.60	1871.25	101	0.53	293.14	111	0.06	3.04	125	0.04	64.18	94	0.02
ACH 198 (Aphan. Spec.)	82	334.07	92	0.21	1931.38	105	0.03	309.85	117	0.00	1.84	76	0.05	67.41	98	0.56
ACH 205 (Aphan. Spec.)	102	377.59	104	0.55	1827.75	99	0.65	323.13	122	0.00	2.93	121	0.10	77.61	113	0.00
ACH 302 (Aphan. Spec.)	75	290.80	80	0.00	1774.66	96	0.08	261.99	99	0.88	2.82	116	0.19	70.77	103	0.25
ACH 309	86	282.95	78	0.00	1943.38	105	0.02	246.93	93	0.25	2.82	116	0.20	72.97	106	0.02
Beta 1492	73	377.47	104	0.56	1764.38	96	0.04	279.49	106	0.32	1.86	77	0.06	68.28	100	0.89
Beta 1994 (NC)	91	269.07	74	0.00	1769.06	96	0.06	261.27	99	0.84	2.58	106	0.63	66.08	96	0.20
Beta 2010 (Aphan. Spec.)	76	339.68	93	0.31	1847.63	100	0.96	241.71	91	0.14	2.43	100	0.99	73.04	107	0.02
Beta 2074 (NC)	99	348.63	96	0.52	1782.50	97	0.12	264.67	100	0.98	2.58	106	0.62	69.58	102	0.60
Beta 5014 (Aphan. Spec.)	85	324.30	89	0.09	1740.13	94	0.01	240.53	91	0.12	2.12	87	0.30	74.42	109	0.00
Beta 6863 (Aphan. Spec.)	89	307.26	84	0.02	1714.25	93	0.00	294.14	111	0.05	2.59	107	0.60	72.11	105	0.07
Beta 6904 (APhan. Spec.)	79	350.41	96	0.57	1734.88	94	0.01	254.52	96	0.52	2.47	102	0.90	75.34	110	0.00
HM 5135	83	489.98	135	0.00	2054.88	111	0.00	266.70	101	0.87	2.06	85	0.22	61.86	90	0.00
HM 7518	74	346.37	95	0.46	1886.50	102	0.31	306.24	116	0.01	2.43	100	1.00	67.77	99	0.69
HM Hector	96	305.50	84	0.01	1742.13	94	0.01	249.29	94	0.33	2.88	119	0.13	76.16	111	0.00
HM Niagara	90	369.60	102	0.80	1785.45	97	0.13	250.65	95	0.37	2.49	102	0.83	68.43	100	0.95
HM Resist (Aphan. Spec.)	81	374.15	103	0.66	1737.46	94	0.01	299.31	113	0.02	2.42	100	0.97	70.76	103	0.25
HM Shasta	93	359.43	99	0.86	1857.79	101	0.77	242.50	92	0.15	2.73	112	0.32	69.53	101	0.61
KW 2398 (Aphan. Spec.)	101	419.93	115	0.02	1919.63	104	0.07	282.80	107	0.22	2.11	87	0.29	64.26	94	0.03
KW 6770	77	341.13	94	0.34	1844.93	100	0.98	236.05	89	0.06	1.83	75	0.05	64.55	94	0.04
Maribo 875	88	448.20	123	0.00	2159.09	117	0.00	225.02	85	0.01	2.65	109	0.46	71.98	105	0.08
Maribo 923	80	387.90	107	0.30	1963.25	106	0.00	244.30	92	0.19	3.00	123	0.06	73.47	107	0.01
Maribo 9363	98	436.65	120	0.00	1954.63	106	0.01	246.69	93	0.25	2.74	113	0.30	67.16	98	0.47
Maribo 9369 (NC)	78	442.08	122	0.00	1865.75	101	0.62	256.07	97	0.59	2.21	91	0.46	60.06	88	0.00
Mitusui Monohikari	87	361.63	99	0.93	1724.50	93	0.00	249.21	94	0.32	2.91	120	0.11	68.28	100	0.89
Seedex SX Laser	92	363.57	100	1.00	1764.63	96	0.04	263.48	100	0.96	2.71	112	0.35	65.57	96	0.12
Van der Have H66140	94	368.58	101	0.84	1816.00	98	0.46	255.04	97	0.54	1.67	69	0.01	66.92	98	0.40
Van der Have H66186 (NC)	84	384.00	106	0.39	1740.50	94	0.01	272.78	103	0.57	2.06	85	0.22	62.88	92	0.00
Van der Have H66240 (NC)	97	399.87	110	0.13	1760.23	95	0.03	270.43	102	0.68	1.70	70	0.01	58.42	85	0.00

General Mean		363.71			1845.83			264.25			2.43			68.55		
Coeff. of Var. (%)		17.92			6.24			16.10			35.46			7.76		
F Value		4.22	**		8.00	**		2.56	**		1.77	NS		5.85	**	
L.S.D. (.05)		66.61			113.56			43.02			0.85			5.49		
L.S.D. (.01)		87.84			149.76			56.73			1.12			7.24		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 14C. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/04/96

30 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Vigor		
		Mean	%	P-Val
ACH 196	100	1.25	70	0.00
ACH 197 (Cerc. Spec.)	95	1.75	98	0.83
ACH 198 (Aphan. Spec.)	82	1.13	63	0.00
ACH 205 (Aphan. Spec.)	102	1.88	105	0.61
ACH 302 (Aphan. Spec.)	75	1.25	70	0.00
ACH 309	86	1.13	63	0.00
Beta 1492	73	1.75	98	0.83
Beta 1994 (NC)	91	1.75	98	0.83
Beta 2010 (Aphan. Spec.)	76	1.75	98	0.83
Beta 2074 (NC)	99	1.88	105	0.61
Beta 5014 (Aphan. Spec.)	85	1.50	84	0.09
Beta 6863 (Aphan. Spec.)	89	1.50	84	0.09
Beta 6904 (APhan. Spec.)	79	1.25	70	0.00
HM 5135	83	2.25	126	0.01
HM 7518	74	2.00	112	0.21
HM Hector	96	2.75	154	0.00
HM Niagara	90	2.50	140	0.00
HM Resist (Aphan. Spec.)	81	2.38	133	0.00
HM Shasta	93	1.75	98	0.83
KW 2398 (Aphan. Spec.)	101	2.75	154	0.00
KW 6770	77	2.00	112	0.21
Maribo 875	88	1.38	77	0.02
Maribo 923	80	1.63	91	0.34
Maribo 9363	98	1.63	91	0.34
Maribo 9369 (NC)	78	1.75	98	0.83
Mitusui Monohikari	87	3.00	168	0.00
Seedex SX Laser	92	1.88	105	0.61
Van der Have H66140	94	1.38	77	0.02
Van der Have H66186 (NC)	84	1.13	63	0.00
Van der Have H66240 (NC)	97	1.75	98	0.83

General Mean	1.79	
Coeff. of Var. (%)	27.33	
F Value	8.38	**
L.S.D. (.05)	0.48	
L.S.D. (.01)	0.63	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 15A. COMBINED ANALYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/05/96

49 Entries **8 RepsXLocs** **3 Tests Combined** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	292.40	98	0.15	6694.52	100	0.98	1.26	106	0.01	15.88	99	0.25	22.87	102	0.41
ACH 261	234	296.17	100	0.72	6591.41	99	0.54	1.19	100	0.89	16.00	100	0.67	22.26	99	0.61
ACH 9601	204	303.51	102	0.08	6719.58	100	0.85	1.19	100	0.91	16.37	102	0.06	22.14	98	0.44
ACH 9603	197	298.93	101	0.66	6759.39	101	0.66	1.29	108	0.00	16.24	101	0.29	22.58	100	0.84
ACH 9605	237	297.57	100	0.97	6985.95	104	0.07	1.25	105	0.04	16.13	100	0.68	23.52	105	0.03
ACH 9608	216	296.06	100	0.69	6253.93	93	0.01	1.22	103	0.41	16.02	100	0.78	21.16	94	0.00
ACH 9609	228	298.05	100	0.86	6509.75	97	0.26	1.15	97	0.12	16.05	100	0.94	21.75	97	0.10
Beta 1216(Aphan. Spec.)	236	305.82	103	0.02	6633.01	99	0.72	1.17	98	0.34	16.46	102	0.02	21.69	96	0.08
Beta 2010 (Check #2)	231	303.75	102	0.07	6946.75	104	0.11	1.21	102	0.46	16.40	102	0.04	22.82	101	0.48
Beta 3026 (Aphan. Spec.)	209	311.64	105	0.00	6233.13	93	0.00	1.07	90	0.00	16.65	104	0.00	19.94	89	0.00
Beta 3945 (Aphan. Spec.)	195	307.85	104	0.00	6898.75	103	0.19	1.11	93	0.00	16.50	103	0.01	22.35	99	0.76
Beta 5296 (Aphan. Spec.)	221	311.94	105	0.00	6881.04	103	0.23	1.13	95	0.02	16.72	104	0.00	22.03	98	0.31
Beta 5335 (Aphan. Spec.)	240	307.99	104	0.00	6256.79	94	0.01	1.16	97	0.28	16.56	103	0.00	20.30	90	0.00
Beta 5416 (Aphan. Spec.)	226	310.80	104	0.00	6216.33	93	0.00	1.08	91	0.00	16.63	103	0.00	20.01	89	0.00
Beta 6035 (6045)(Aphan. Spec.)	201	307.89	104	0.00	6637.61	99	0.74	1.15	97	0.10	16.54	103	0.00	21.44	95	0.02
Beta 6776 (Aphan. Spec.)	218	305.55	103	0.02	6642.98	99	0.77	1.18	99	0.50	16.45	102	0.02	21.70	96	0.09
Cenex/LOL Ex101	238	295.85	99	0.65	6913.44	103	0.16	1.17	98	0.37	15.96	99	0.51	23.36	104	0.06
Filler #3	224	306.42	103	0.01	6284.75	94	0.01	1.21	102	0.60	16.53	103	0.00	20.48	91	0.00
HM 5135 (Check #3)	232	298.18	100	0.83	6760.97	101	0.66	1.29	108	0.00	16.20	101	0.41	22.63	101	0.76
HM 7048	211	310.04	104	0.00	6797.97	102	0.50	1.11	93	0.00	16.62	103	0.00	21.87	97	0.17
HM 7049	198	307.62	103	0.00	6695.09	100	0.97	1.12	94	0.01	16.50	103	0.01	21.73	97	0.10
HM 7054	217	300.68	101	0.35	6967.50	104	0.08	1.13	95	0.03	16.17	101	0.53	23.20	103	0.12
HM 7055	242	301.99	102	0.19	6546.21	98	0.37	1.11	93	0.00	16.21	101	0.37	21.60	96	0.05
HM 7057	230	305.58	103	0.02	6836.57	102	0.36	1.12	94	0.01	16.40	102	0.04	22.32	99	0.70
HM 7058	212	292.22	98	0.13	6613.11	99	0.63	1.33	112	0.00	15.94	99	0.43	22.63	101	0.77
HM E17 (Cerc. Spec.)	223	300.58	101	0.36	6484.58	97	0.20	1.08	91	0.00	16.11	100	0.76	21.51	96	0.03
HM RH3 (Rhiz. Spec.)	229	300.72	101	0.34	6229.74	93	0.00	1.13	95	0.02	16.16	101	0.54	20.68	92	0.00
Holly 96HX401	200	293.12	99	0.21	7048.73	105	0.03	1.16	97	0.17	15.81	98	0.11	24.06	107	0.00
Holly 96HX402	239	294.74	99	0.44	6870.78	103	0.26	1.17	98	0.46	15.91	99	0.33	23.33	104	0.07
Holly 96HX403	235	290.27	98	0.04	7122.84	106	0.01	1.24	104	0.09	15.75	98	0.05	24.51	109	0.00
Holly 96HX404	220	288.02	97	0.01	7119.77	106	0.01	1.20	101	0.88	15.60	97	0.00	24.70	110	0.00
Holly 96HX413	196	286.47	96	0.00	6784.80	101	0.55	1.19	100	0.92	15.51	97	0.00	23.69	105	0.01
Holly 96HX414	207	282.26	95	0.00	6860.28	103	0.29	1.23	103	0.23	15.34	95	0.00	24.20	108	0.00
Holly 96HX415	202	290.96	98	0.06	7021.68	105	0.04	1.19	100	0.79	15.73	98	0.04	24.11	107	0.00
Maribo 875 (Check #4)	205	299.34	101	0.58	6617.80	99	0.65	1.27	107	0.01	16.23	101	0.29	22.04	98	0.32
Maribo 9581	214	300.55	101	0.37	6529.45	98	0.31	1.19	100	0.82	16.21	101	0.35	21.70	96	0.08
Maribo 9584	199	309.39	104	0.00	6485.18	97	0.20	1.15	97	0.16	16.62	103	0.00	20.91	93	0.00
Maribo 9671	206	300.63	101	0.35	6409.79	96	0.08	1.24	104	0.09	16.27	101	0.20	21.31	95	0.01
Maribo 9673	225	284.18	96	0.00	6551.11	98	0.38	1.22	103	0.31	15.43	96	0.00	23.03	102	0.24
Maribo 9674	215	297.49	100	0.99	7393.36	111	0.00	1.20	101	0.82	16.08	100	0.95	24.86	111	0.00
Seedex SX1009	233	300.31	101	0.40	6647.53	99	0.79	1.20	101	0.71	16.22	101	0.33	22.13	98	0.43
Van der Have H66282	222	299.72	101	0.51	6762.91	101	0.65	1.17	98	0.45	16.16	101	0.55	22.53	100	0.94
Van der Have H66287	208	302.88	102	0.12	6883.85	103	0.22	1.13	95	0.03	16.28	101	0.19	22.71	101	0.63
Van der Have H6876	241	284.63	96	0.00	6945.93	104	0.11	1.22	103	0.45	15.44	96	0.00	24.39	108	0.00
Van der Have H6877	219	290.74	98	0.06	6790.78	102	0.53	1.20	101	0.78	15.74	98	0.04	23.29	104	0.08
Van der Have H6878	227	268.86	90	0.00	6158.60	92	0.00	1.38	116	0.00	14.82	92	0.00	22.85	102	0.43
Van der Have H6879	194	278.34	94	0.00	6562.57	98	0.42	1.28	108	0.00	15.20	95	0.00	23.61	105	0.02
Van der Have H6880	210	272.58	92	0.00	6225.25	93	0.00	1.41	118	0.00	15.04	94	0.00	22.85	102	0.43
Van der Have H6881	203	282.63	95	0.00	7022.26	105	0.04	1.26	106	0.03	15.39	96	0.00	24.80	110	0.00

General Mean	297.43			6689.92			1.19			16.07			22.49			
Coeff. of Var. (%)	3.75			8.11			7.55			3.21			7.47			
F Value	8.34	**		3.07	**		6.60	**		7.89	**		7.64	**		
L.S.D. (.05)	9.77	3		449.83	7		0.08	7		0.45	3		1.28	6		
L.S.D. (.01)	12.94	4		595.44	9		0.10	9		0.60	4		1.70	8		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 15B. COMBINED ANALYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/05/96

49 Entries 8 RepsXLocs 3 Tests Combined 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	313.18	121	0.00	2366.50	108	0.00	236.34	95	0.41	3.49	104	0.60
ACH 261	234	212.56	82	0.01	2070.49	94	0.00	295.87	119	0.00	3.46	103	0.68
ACH 9601	204	236.11	92	0.19	2217.58	101	0.65	248.92	100	0.96	4.01	120	0.02
ACH 9603	197	256.70	100	0.94	2300.00	105	0.02	295.36	119	0.00	3.27	98	0.76
ACH 9605	237	237.46	92	0.22	2315.90	105	0.01	270.72	109	0.12	3.74	112	0.16
ACH 9608	216	229.73	89	0.09	2214.83	101	0.70	272.32	110	0.09	3.51	105	0.56
ACH 9609	228	320.74	124	0.00	2066.74	94	0.00	226.35	91	0.13	3.24	97	0.69
Beta 1216(Aphan. Spec.)	236	205.47	80	0.00	2218.64	101	0.64	241.35	97	0.63	3.29	98	0.82
Beta 2010 (Check #2)	231	217.11	84	0.02	2183.03	99	0.71	283.62	114	0.01	3.85	115	0.07
Beta 3026 (Aphan. Spec.)	209	195.46	76	0.00	1968.03	90	0.00	234.10	94	0.33	4.00	119	0.02
Beta 3945 (Aphan. Spec.)	195	231.93	90	0.12	2042.94	93	0.00	231.81	93	0.25	3.20	96	0.57
Beta 5296 (Aphan. Spec.)	221	209.59	81	0.00	2100.17	96	0.02	240.43	97	0.59	3.39	101	0.89
Beta 5335 (Aphan. Spec.)	240	212.62	82	0.01	2113.22	96	0.05	264.38	107	0.26	3.97	119	0.02
Beta 5416 (Aphan. Spec.)	226	214.45	83	0.01	2015.21	92	0.00	226.09	91	0.12	3.32	99	0.92
Beta 6935 (6045)(Aphan. Spec.)	201	222.51	86	0.03	2170.64	99	0.51	232.46	94	0.27	3.19	95	0.56
Beta 6776 (Aphan. Spec.)	218	221.61	86	0.03	2243.45	102	0.29	235.75	95	0.39	3.36	100	0.95
Cenex/LOL Ex101	238	283.64	110	0.12	2105.78	96	0.03	244.46	99	0.80	2.96	88	0.15
Filler #3	224	245.65	95	0.46	2240.98	102	0.32	253.23	102	0.72	3.42	102	0.80
HM 5135 (Check #3)	232	299.88	116	0.01	2383.39	108	0.00	256.57	103	0.56	3.55	106	0.46
HM 7048	211	206.54	80	0.00	2094.48	95	0.02	231.85	93	0.26	3.11	93	0.37
HM 7049	198	234.45	91	0.16	2033.91	93	0.00	243.31	98	0.73	3.77	113	0.12
HM 7054	217	306.91	119	0.00	1956.31	89	0.00	247.14	100	0.94	2.94	88	0.13
HM 7055	242	194.03	75	0.00	2081.14	95	0.01	238.82	96	0.51	3.51	105	0.56
HM 7057	230	226.87	88	0.06	2036.98	93	0.00	243.01	98	0.72	3.33	99	0.95
HM 7058	212	298.38	116	0.02	2304.26	105	0.01	306.87	124	0.00	2.68	80	0.02
HM E17 (Cerc. Spec.)	223	221.39	86	0.03	1997.42	91	0.00	229.30	92	0.19	3.34	100	0.98
HM RH3 (Rhiz. Spec.)	229	231.10	90	0.11	2166.90	99	0.45	214.61	86	0.02	3.64	109	0.28
Holly 96HX401	200	254.96	99	0.86	2162.81	98	0.40	228.86	92	0.18	2.85	85	0.07
Holly 96HX402	239	293.92	114	0.03	2104.30	96	0.03	244.34	98	0.79	3.53	105	0.50
Holly 96HX403	235	264.84	103	0.68	2174.65	99	0.57	289.52	117	0.00	2.71	81	0.02
Holly 96HX404	220	294.25	114	0.03	2178.09	99	0.63	243.92	98	0.77	2.82	84	0.06
Holly 96HX413	196	300.06	116	0.01	2202.43	100	0.93	229.57	93	0.19	3.22	96	0.64
Holly 96HX414	207	331.46	129	0.00	2270.04	103	0.09	228.34	92	0.17	3.02	90	0.22
Holly 96HX415	202	272.15	106	0.39	2194.45	100	0.92	237.96	96	0.48	3.30	99	0.85
Maribo 875 (Check #4)	205	309.56	120	0.00	2333.27	106	0.00	249.24	100	0.94	3.70	110	0.20
Maribo 9581	214	186.24	72	0.00	2216.39	101	0.67	264.15	106	0.26	3.80	113	0.10
Maribo 9584	199	248.45	96	0.57	2124.07	97	0.08	240.54	97	0.59	3.76	112	0.14
Maribo 9671	206	285.57	111	0.10	2273.00	103	0.08	255.44	103	0.61	3.69	110	0.22
Maribo 9673	225	247.84	96	0.54	2308.78	105	0.01	245.16	99	0.83	3.27	98	0.77
Maribo 9674	215	296.79	115	0.02	2291.58	104	0.03	214.01	86	0.02	2.82	84	0.05
Seedex SX1009	233	261.77	101	0.82	2240.86	102	0.32	243.94	98	0.77	3.31	99	0.90
Van der Have H66282	222	254.93	99	0.86	2199.15	100	0.99	232.16	94	0.26	2.75	82	0.03
Van der Have H66287	208	317.63	123	0.00	2058.24	94	0.00	213.47	86	0.02	2.83	84	0.06
Van der Have H6876	241	290.02	112	0.06	2307.93	105	0.01	224.24	90	0.10	2.69	80	0.02
Van der Have H6877	219	268.94	104	0.51	2298.98	105	0.02	224.10	90	0.09	3.03	90	0.24
Van der Have H6878	227	289.47	112	0.06	2518.41	115	0.00	294.00	118	0.00	3.62	108	0.32
Van der Have H6879	194	274.54	106	0.32	2349.07	107	0.00	270.47	109	0.12	3.55	106	0.46
Van der Have H6880	210	309.66	120	0.00	2575.70	117	0.00	297.80	120	0.00	3.73	111	0.16
Van der Have H6881	203	299.12	116	0.01	2341.03	106	0.00	243.26	98	0.73	3.59	107	0.38

General Mean	257.92		2198.62		248.15		3.35		
Coeff. of Var. (%)	20.36		6.45		17.91		34.82		
F Value	5.70	**	9.83	**	2.71	**	1.79	**	
L.S.D. (.05)	46.92	18	119.84	5	40.37	16	0.77	23	
L.S.D. (.01)	62.11	24	158.70	7	53.45	22	1.02	30	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 15C. COMBINED ANALSYSIS

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/05/96

49 Entries 8 RepsXLocs 3 Tests Combined 2 Rows/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	0.08			1.27	67	0.00
ACH 261	234	0.00			1.60	85	0.06
ACH 9601	204	0.00			1.07	57	0.00
ACH 9603	197	0.00			2.27	120	0.02
ACH 9605	237	0.00			2.27	120	0.02
ACH 9608	216	0.00			2.34	124	0.01
ACH 9609	228	0.00			1.20	63	0.00
Beta 1216(Aphan. Spec.)	236	0.00			2.20	116	0.05
Beta 2010 (Check #2)	231	0.00			1.60	85	0.06
Beta 3026 (Aphan. Spec.)	209	0.00			1.80	95	0.53
Beta 3945 (Aphan. Spec.)	195	0.00			1.80	95	0.55
Beta 5296 (Aphan. Spec.)	221	0.00			2.20	116	0.05
Beta 5335 (Aphan. Spec.)	240	0.00			2.67	141	0.00
Beta 5416 (Aphan. Spec.)	226	0.00			1.87	99	0.88
Beta 6935 (6045)(Aphan. Spec.)	201	0.00			1.41	75	0.00
Beta 6776 (Aphan. Spec.)	218	0.00			1.67	88	0.15
Cenex/LOL Ex101	238	0.00			1.41	75	0.00
Filler #3	224	0.00			1.27	67	0.00
HM 5135 (Check #3)	232	0.00			1.94	103	0.75
HM 7048	211	0.00			2.14	113	0.12
HM 7049	198	0.00			2.15	114	0.11
HM 7054	217	0.00			1.81	96	0.58
HM 7055	242	0.00			2.67	141	0.00
HM 7057	230	0.00			2.00	106	0.49
HM 7058	212	0.00			1.74	92	0.31
HM E17 (Cerc. Spec.)	223	0.00			2.33	123	0.01
HM RH3 (Rhiz. Spec.)	229	0.00			2.67	141	0.00
Holly 96HX401	200	0.00			1.80	95	0.56
Holly 96HX402	239	0.00			1.27	67	0.00
Holly 96HX403	235	0.00			1.00	53	0.00
Holly 96HX404	220	0.00			1.34	71	0.00
Holly 96HX413	196	0.00			1.73	92	0.29
Holly 96HX414	207	0.00			2.47	131	0.00
Holly 96HX415	202	0.00			2.67	141	0.00
Maribo 875 (Check #4)	205	0.00			1.07	57	0.00
Maribo 9581	214	0.00			2.40	127	0.00
Maribo 9584	199	0.00			1.47	78	0.01
Maribo 9671	206	0.00			1.94	103	0.77
Maribo 9673	225	0.07			2.07	110	0.26
Maribo 9674	215	0.00			1.80	95	0.54
Seedex SX1009	233	0.00			1.27	67	0.00
Van der Have H66282	222	0.00			1.60	85	0.06
Van der Have H66287	208	0.00			1.74	92	0.31
Van der Have H6876	241	0.08			2.34	124	0.01
Van der Have H6877	219	0.00			2.61	138	0.00
Van der Have H6878	227	0.00			2.07	110	0.27
Van der Have H6879	194	0.00			2.40	127	0.00
Van der Have H6880	210	0.00			2.54	134	0.00
Van der Have H6881	203	0.00			1.87	99	0.89

General Mean					1.89	
Coeff. of Var. (%)					26.39	
F Value					9.71	**
L.S.D. (.05)					0.44	23
L.S.D. (.01)					0.58	31

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 16A. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/29/96

49 Entries **7 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	279.97	96	0.00	6343.27	108	0.04	1.28	108	0.01	15.27	97	0.00	22.64	112	0.00
ACH 261	234	294.31	101	0.47	5795.95	99	0.73	1.19	100	0.98	15.90	101	0.44	19.70	98	0.53
ACH 9601	204	299.73	103	0.03	5899.22	100	0.92	1.21	102	0.48	16.20	103	0.01	19.65	97	0.48
ACH 9603	197	291.31	100	0.92	5910.05	101	0.88	1.29	108	0.00	15.86	101	0.60	20.35	101	0.82
ACH 9605	237	296.95	102	0.15	6343.68	108	0.04	1.25	105	0.11	16.09	102	0.06	21.48	106	0.09
ACH 9608	216	294.92	101	0.38	5220.22	89	0.00	1.15	97	0.29	15.90	101	0.46	17.75	88	0.00
ACH 9609	228	288.57	99	0.40	5883.24	100	0.97	1.13	95	0.14	15.56	99	0.22	20.36	101	0.81
Beta 1216(Aphan. Spec.)	236	301.38	103	0.01	5892.99	100	0.94	1.20	101	0.77	16.27	103	0.00	19.59	97	0.44
Beta 2010 (Check #2)	231	294.31	101	0.47	5862.50	100	0.95	1.19	100	0.90	15.91	101	0.40	19.95	99	0.76
Beta 3026 (Aphan. Spec.)	209	306.40	105	0.00	5443.38	93	0.06	1.05	88	0.00	16.36	104	0.00	17.73	88	0.00
Beta 3945 (Aphan. Spec.)	195	298.57	102	0.06	5954.48	101	0.73	1.17	98	0.71	16.10	102	0.05	20.00	99	0.81
Beta 5296 (Aphan. Spec.)	221	301.99	104	0.01	6182.95	105	0.18	1.15	97	0.29	16.25	103	0.01	20.49	102	0.69
Beta 5335 (Aphan. Spec.)	240	300.09	103	0.02	5186.57	88	0.00	1.14	96	0.17	16.14	102	0.03	17.26	86	0.00
Beta 5416 (Aphan. Spec.)	226	304.03	104	0.00	5735.37	98	0.54	1.14	96	0.15	16.34	104	0.00	18.85	93	0.08
Beta 6035 (6045)(Aphan. Spec.)	201	294.75	101	0.40	5585.71	95	0.21	1.14	96	0.23	15.88	101	0.52	18.84	93	0.08
Beta 6776 (Aphan. Spec.)	218	296.09	102	0.23	6009.54	102	0.56	1.14	96	0.17	15.95	101	0.30	20.29	101	0.89
Cenex/LOL Ex101	238	295.83	101	0.26	6182.59	105	0.18	1.16	97	0.50	15.96	101	0.28	20.92	104	0.34
Filler #3	224	300.05	103	0.02	5634.89	96	0.30	1.18	99	0.81	16.19	103	0.01	18.82	93	0.08
HM 5135 (Check #3)	232	286.31	98	0.14	6008.58	102	0.56	1.31	110	0.00	15.63	99	0.39	20.99	104	0.29
HM 7048	211	299.26	103	0.04	5877.09	100	1.00	1.16	97	0.38	16.11	102	0.04	19.64	97	0.48
HM 7049	198	301.29	103	0.01	5933.80	101	0.80	1.14	96	0.22	16.21	103	0.01	19.70	98	0.52
HM 7054	217	302.37	104	0.00	5825.13	99	0.83	1.12	94	0.06	16.24	103	0.01	19.29	96	0.24
HM 7055	242	294.78	101	0.40	5710.36	97	0.47	1.16	97	0.44	15.89	101	0.46	19.41	96	0.31
HM 7057	230	294.11	101	0.51	6007.99	102	0.57	1.12	94	0.06	15.83	100	0.74	20.45	101	0.73
HM 7058	212	293.69	101	0.58	6256.40	106	0.10	1.26	106	0.04	15.94	101	0.31	21.20	105	0.18
HM E17 (Cerc. Spec.)	223	294.56	101	0.43	5682.94	97	0.40	1.08	91	0.00	15.81	100	0.82	19.38	96	0.29
HM RH3 (Rhiz. Spec.)	229	297.55	102	0.11	5058.05	86	0.00	1.17	98	0.65	16.05	102	0.10	17.13	85	0.00
Holly 96HX401	200	292.26	100	0.87	6259.18	107	0.10	1.20	101	0.65	15.81	100	0.80	21.46	106	0.10
Holly 96HX402	239	295.56	101	0.29	6299.01	107	0.07	1.13	95	0.14	15.91	101	0.41	21.40	106	0.11
Holly 96HX403	235	289.61	99	0.57	6668.95	114	0.00	1.22	103	0.38	15.70	100	0.67	23.06	114	0.00
Holly 96HX404	220	287.37	99	0.24	6474.77	110	0.01	1.15	97	0.27	15.52	98	0.13	22.49	111	0.00
Holly 96HX413	196	284.38	98	0.05	5887.32	100	0.96	1.14	96	0.24	15.37	97	0.02	20.78	103	0.43
Holly 96HX414	207	278.55	96	0.00	6011.24	102	0.56	1.17	98	0.61	15.09	96	0.00	21.50	107	0.09
Holly 96HX415	202	288.54	99	0.39	6260.28	107	0.10	1.15	97	0.31	15.57	99	0.25	21.68	107	0.05
Maribo 875 (Check #4)	205	288.44	99	0.38	5688.53	97	0.42	1.19	100	1.00	15.61	99	0.34	19.62	97	0.46
Maribo 9581	214	292.77	100	0.77	5441.77	93	0.06	1.19	100	0.98	15.82	100	0.78	18.59	92	0.04
Maribo 9584	199	300.88	103	0.01	5641.87	96	0.31	1.16	97	0.50	16.20	103	0.01	18.80	93	0.07
Maribo 9671	206	293.49	101	0.62	5585.88	95	0.21	1.22	103	0.42	15.89	101	0.49	19.09	95	0.16
Maribo 9673	225	278.79	96	0.00	5583.64	95	0.21	1.26	106	0.30	15.21	96	0.00	20.13	100	0.95
Maribo 9674	215	288.57	99	0.40	6413.62	109	0.02	1.18	99	0.88	15.61	99	0.35	22.32	111	0.01
Seedex SX1009	233	293.52	101	0.61	5817.32	99	0.80	1.17	98	0.55	15.85	101	0.65	19.78	98	0.60
Van der Have H66282	222	289.95	99	0.64	5588.99	95	0.21	1.19	100	0.97	15.69	99	0.62	19.31	96	0.25
Van der Have H66287	208	295.71	101	0.27	6126.32	104	0.28	1.12	94	0.08	15.90	101	0.43	20.74	103	0.46
Van der Have H6876	241	282.23	97	0.01	6192.71	105	0.17	1.19	100	0.89	15.30	97	0.01	21.94	109	0.02
Van der Have H6877	219	279.08	96	0.00	5790.44	99	0.71	1.25	105	0.07	15.21	96	0.00	20.69	103	0.51
Van der Have H6878	227	267.83	92	0.00	5623.77	96	0.28	1.36	114	0.00	14.75	94	0.00	21.02	104	0.27
Van der Have H6879	194	274.40	94	0.00	5674.06	97	0.38	1.24	104	0.13	14.96	95	0.00	20.82	103	0.41
Van der Have H6880	210	269.47	92	0.00	5440.07	93	0.06	1.37	115	0.00	14.84	94	0.00	20.27	100	0.91
Van der Have H6881	203	277.39	95	0.00	6012.84	102	0.55	1.23	103	0.19	15.10	96	0.00	21.61	107	0.06

General Mean		291.67			5875.70			1.19			15.77			20.18		
Coeff. of Var. (%)		3.25			10.15			7.82			2.80			9.96		
F Value		5.96	**		2.23	**		3.19	**		5.72	**		3.14	**	
L.S.D. (.05)		10.30			647.91			0.10			0.48			2.15		
L.S.D. (.01)		13.57			853.59			0.13			0.63			2.83		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 16B. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/29/96

49 Entries **7 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	264.91	138	0.00	2663.25	106	0.03	188.19	102	0.83	4.22	89	0.39
ACH 261	234	181.23	95	0.48	2400.02	96	0.11	217.62	118	0.03	5.41	114	0.26
ACH 9601	204	165.45	86	0.07	2581.32	103	0.32	195.85	106	0.47	6.59	139	0.00
ACH 9603	197	197.46	103	0.67	2711.76	108	0.00	212.70	115	0.07	4.74	100	1.00
ACH 9605	237	173.96	91	0.22	2627.88	105	0.10	203.82	110	0.21	5.34	113	0.31
ACH 9608	216	171.00	89	0.15	2400.78	96	0.12	192.18	104	0.63	4.38	93	0.56
ACH 9609	228	233.43	122	0.00	2390.31	95	0.08	159.99	87	0.10	4.39	93	0.57
Beta 1216(Aphan. Spec.)	236	138.46	72	0.00	2612.06	104	0.15	186.25	101	0.93	4.25	90	0.42
Beta 2010 (Check #2)	231	176.21	92	0.29	2471.06	98	0.56	204.63	111	0.19	5.18	110	0.46
Beta 3026 (Aphan. Spec.)	209	153.06	80	0.01	2207.66	88	0.00	171.93	93	0.39	5.65	119	0.13
Beta 3945 (Aphan. Spec.)	195	183.20	96	0.57	2366.80	94	0.04	214.53	116	0.05	4.70	99	0.95
Beta 5296 (Aphan. Spec.)	221	146.81	77	0.00	2420.06	96	0.19	197.74	107	0.39	4.60	97	0.82
Beta 5335 (Aphan. Spec.)	240	157.98	83	0.02	2444.90	97	0.34	175.70	95	0.54	5.59	118	0.15
Beta 5416 (Aphan. Spec.)	226	160.04	84	0.03	2402.55	96	0.12	183.90	99	0.94	4.26	90	0.43
Beta 6935 (6045)(Aphan. Spec.)	201	181.83	95	0.50	2476.11	99	0.61	165.94	90	0.21	4.24	90	0.40
Beta 6776 (Aphan. Spec.)	218	167.12	87	0.09	2493.17	99	0.79	161.21	87	0.11	5.03	106	0.62
Cenex/LOL Ex101	238	197.15	103	0.69	2463.80	98	0.50	176.49	95	0.57	4.03	85	0.24
Filler #3	224	176.81	92	0.31	2471.95	98	0.57	193.09	104	0.59	5.17	109	0.46
HM 5135 (Check #3)	232	238.78	125	0.00	2760.58	110	0.00	193.74	105	0.56	5.98	126	0.04
HM 7048	211	158.32	83	0.02	2528.38	101	0.81	167.59	91	0.25	4.21	89	0.38
HM 7049	198	181.90	95	0.51	2331.76	93	0.01	201.43	109	0.27	6.03	127	0.03
HM 7054	217	238.76	125	0.00	2231.37	89	0.00	191.14	103	0.68	4.30	91	0.46
HM 7055	242	160.05	84	0.03	2420.58	96	0.20	199.37	108	0.34	4.28	90	0.45
HM 7057	230	187.52	98	0.78	2346.33	93	0.02	176.43	95	0.57	4.41	93	0.59
HM 7058	212	210.48	110	0.18	2604.79	104	0.18	210.33	114	0.09	4.02	85	0.23
HM E17 (Cerc. Spec.)	223	166.62	87	0.08	2288.32	91	0.00	167.57	91	0.25	4.92	104	0.75
HM RH3 (Rhiz. Spec.)	229	157.73	82	0.02	2568.07	102	0.42	169.87	92	0.32	5.47	116	0.22
Holly 96HX401	200	170.86	89	0.15	2577.22	103	0.35	188.81	102	0.80	4.12	87	0.30
Holly 96HX402	239	213.51	112	0.12	2400.84	96	0.12	164.13	89	0.17	4.43	94	0.61
Holly 96HX403	235	176.32	92	0.29	2559.04	102	0.50	202.70	110	0.24	3.41	72	0.03
Holly 96HX404	220	238.01	124	0.00	2342.85	93	0.02	183.22	99	0.91	3.62	77	0.06
Holly 96HX413	196	221.39	116	0.04	2435.43	97	0.28	161.64	87	0.12	4.90	104	0.78
Holly 96HX414	207	209.99	110	0.19	2486.34	99	0.72	172.09	93	0.39	3.99	84	0.22
Holly 96HX415	202	194.76	102	0.82	2384.78	95	0.07	188.39	102	0.82	4.78	101	0.95
Maribo 875 (Check #4)	205	200.32	105	0.53	2541.16	101	0.67	174.29	94	0.48	5.88	124	0.06
Maribo 9581	214	155.01	81	0.01	2573.55	102	0.38	183.27	99	0.91	6.15	130	0.02
Maribo 9584	199	171.07	89	0.16	2472.06	98	0.57	184.87	100	1.00	5.24	111	0.39
Maribo 9671	206	215.32	112	0.10	2615.62	104	0.14	172.59	93	0.41	5.41	114	0.26
Maribo 9673	225	187.03	98	0.76	2657.42	106	0.04	205.74	111	0.17	4.61	97	0.83
Maribo 9674	215	218.50	114	0.06	2567.68	102	0.42	157.73	85	0.07	4.25	90	0.42
Seedex SX1009	233	174.37	91	0.23	2523.71	100	0.86	170.62	92	0.34	4.82	102	0.88
Van der Have H66282	222	196.62	103	0.72	2582.52	103	0.31	162.48	88	0.14	3.68	78	0.08
Van der Have H66287	208	250.66	131	0.00	2331.51	93	0.01	161.92	88	0.13	3.70	78	0.08
Van der Have H6876	241	201.67	105	0.47	2673.57	106	0.02	142.72	77	0.01	3.24	68	0.01
Van der Have H6877	219	225.85	118	0.02	2647.44	105	0.05	187.65	101	0.86	3.98	84	0.21
Van der Have H6878	227	212.33	111	0.14	2849.72	113	0.00	220.62	119	0.02	5.01	106	0.65
Van der Have H6879	194	188.98	99	0.86	2608.12	104	0.17	203.11	110	0.23	4.92	104	0.76
Van der Have H6880	210	215.54	113	0.09	2911.91	116	0.00	213.17	115	0.06	5.00	106	0.66
Van der Have H6881	203	215.24	112	0.10	2632.84	105	0.08	181.50	98	0.82	5.47	116	0.22

General Mean	191.42		2511.45		184.95		4.73	
Coeff. of Var. (%)	18.87		7.16		20.69		33.12	
F Value	4.28	**	4.42	**	1.54	*	1.55	*
L.S.D. (.05)	40.15		197.01		42.20		1.68	
L.S.D. (.01)	52.90		259.55		55.60		2.21	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 16C. STEWART

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 09/29/96

49 Entries 7 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	0.00	0	0.89	1.43	73	0.00
ACH 261	234	0.00	0	0.89	1.86	95	0.58
ACH 9601	204	0.00	0	0.89	1.00	51	0.00
ACH 9603	197	0.00	0	0.89	2.14	109	0.32
ACH 9605	237	0.00	0	0.89	2.43	124	0.01
ACH 9608	216	0.00	0	0.89	2.71	138	0.00
ACH 9609	228	0.00	0	0.89	1.29	66	0.00
Beta 1216(Aphan. Spec.)	236	0.00	0	0.89	2.00	102	0.83
Beta 2010 (Check #2)	231	0.00	0	0.89	1.57	80	0.04
Beta 3026 (Aphan. Spec.)	209	0.00	0	0.89	1.71	87	0.19
Beta 3945 (Aphan. Spec.)	195	0.00	0	0.89	1.86	95	0.58
Beta 5296 (Aphan. Spec.)	221	0.00	0	0.89	2.14	109	0.32
Beta 5335 (Aphan. Spec.)	240	0.00	0	0.89	2.71	138	0.00
Beta 5416 (Aphan. Spec.)	226	0.00	0	0.89	2.00	102	0.83
Beta 6935 (6045)(Aphan. Spec.)	201	0.00	0	0.89	1.71	87	0.19
Beta 6776 (Aphan. Spec.)	218	0.00	0	0.89	1.86	95	0.58
Cenex/LOL Ex101	238	0.00	0	0.89	1.57	80	0.04
Filler #3	224	0.00	0	0.89	1.14	58	0.00
HM 5135 (Check #3)	232	0.00	0	0.89	2.29	117	0.08
HM 7048	211	0.00	0	0.89	2.29	117	0.08
HM 7049	198	0.00	0	0.89	2.57	131	0.00
HM 7054	217	0.00	0	0.89	2.14	109	0.32
HM 7055	242	0.00	0	0.89	2.43	124	0.01
HM 7057	230	0.00	0	0.89	2.00	102	0.83
HM 7058	212	0.00	0	0.89	1.71	87	0.19
HM E17 (Cerc. Spec.)	223	0.00	0	0.89	2.14	109	0.32
HM RH3 (Rhiz. Spec.)	229	0.00	0	0.89	2.57	131	0.00
Holly 96HX401	200	0.00	0	0.89	1.86	95	0.58
Holly 96HX402	239	0.00	0	0.89	1.29	66	0.00
Holly 96HX403	235	0.00	0	0.89	1.00	51	0.00
Holly 96HX404	220	0.00	0	0.89	1.43	73	0.00
Holly 96HX413	196	0.00	0	0.89	1.57	80	0.04
Holly 96HX414	207	0.00	0	0.89	2.57	131	0.00
Holly 96HX415	202	0.00	0	0.89	2.71	138	0.00
Maribo 875 (Check #4)	205	0.00	0	0.89	1.00	51	0.00
Maribo 9581	214	0.00	0	0.89	2.43	124	0.01
Maribo 9584	199	0.00	0	0.89	1.57	80	0.04
Maribo 9671	206	0.00	0	0.89	2.29	117	0.08
Maribo 9673	225	0.24	5000	0.00	2.00	102	0.83
Maribo 9674	215	0.00	0	0.89	1.57	80	0.04
Seedex SX1009	233	0.00	0	0.89	1.29	66	0.00
Van der Have H66282	222	0.00	0	0.89	1.71	87	0.19
Van der Have H66287	208	0.00	0	0.89	1.86	95	0.58
Van der Have H6876	241	0.00	0	0.89	2.43	124	0.01
Van der Have H6877	219	0.00	0	0.89	2.71	138	0.00
Van der Have H6878	227	0.00	0	0.89	2.14	109	0.32
Van der Have H6879	194	0.00	0	0.89	2.43	124	0.01
Van der Have H6880	210	0.00	0	0.89	2.71	138	0.00
Van der Have H6881	203	0.00	0	0.89	2.14	109	0.32

General Mean					1.96	
Coeff. of Var. (%)					25.41	
F Value					7.06	**
L.S.D. (.05)					0.52	
L.S.D. (.01)					0.69	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 17A. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/01/96

49 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	309.25	100	0.91	7117.45	96	0.04	1.24	102	0.72	16.70	100	0.83	23.06	95	0.03
ACH 261	234	306.50	99	0.52	7119.26	96	0.04	1.25	102	0.36	16.58	100	0.58	23.23	96	0.06
ACH 9601	204	310.10	100	0.72	7319.06	98	0.42	1.27	104	0.13	16.78	101	0.47	23.63	98	0.28
ACH 9603	197	310.11	100	0.72	7747.99	104	0.07	1.37	112	0.00	16.88	101	0.17	25.11	104	0.06
ACH 9605	237	304.33	99	0.21	7421.63	100	0.86	1.31	107	0.01	16.53	99	0.39	24.39	101	0.67
ACH 9608	216	298.74	97	0.01	7060.29	95	0.02	1.31	107	0.01	16.25	98	0.01	23.57	98	0.23
ACH 9609	228	312.78	101	0.27	7445.99	100	0.98	1.17	96	0.13	16.81	101	0.35	23.82	99	0.49
Beta 1216(Aphan. Spec.)	236	313.14	101	0.23	7110.01	95	0.04	1.16	95	0.05	16.81	101	0.34	22.70	94	0.00
Beta 2010 (Check #2)	231	314.50	102	0.11	7812.76	105	0.02	1.24	102	0.63	16.96	102	0.06	24.84	103	0.18
Beta 3026 (Aphan. Spec.)	209	330.68	107	0.00	7133.27	96	0.05	1.04	85	0.00	17.58	106	0.00	21.57	89	0.00
Beta 3945 (Aphan. Spec.)	195	323.08	105	0.00	7926.88	106	0.00	1.02	84	0.00	17.17	103	0.00	24.51	101	0.51
Beta 5296 (Aphan. Spec.)	221	323.47	105	0.00	7505.59	101	0.73	1.14	93	0.01	17.31	104	0.00	23.23	96	0.06
Beta 5335 (Aphan. Spec.)	240	316.04	102	0.04	7176.87	96	0.09	1.18	97	0.15	16.98	102	0.05	22.82	94	0.01
Beta 5416 (Aphan. Spec.)	226	319.20	103	0.00	6686.32	90	0.00	1.04	85	0.00	17.00	102	0.03	20.95	87	0.00
Beta 6035 (6045)(Aphan. Spec.)	201	322.70	104	0.00	7531.60	101	0.61	1.20	98	0.51	17.34	104	0.00	23.24	96	0.06
Beta 6776 (Aphan. Spec.)	218	322.10	104	0.00	7475.67	100	0.87	1.20	98	0.48	17.30	104	0.00	23.30	96	0.08
Cenex/LOL Ex101	238	302.72	98	0.09	7491.87	101	0.80	1.16	95	0.06	16.30	98	0.02	24.81	103	0.20
Filler #3	224	320.80	104	0.00	7204.70	97	0.13	1.24	102	0.70	17.28	104	0.00	22.45	93	0.00
HM 5135 (Check #3)	232	309.62	100	0.82	7454.28	100	0.98	1.33	109	0.00	16.81	101	0.34	24.17	100	0.99
HM 7048	211	324.88	105	0.00	7488.95	101	0.81	1.12	92	0.00	17.36	104	0.00	23.14	96	0.04
HM 7049	198	323.93	105	0.00	7676.81	103	0.16	1.13	93	0.01	17.33	104	0.00	23.78	98	0.43
HM 7054	217	309.25	100	0.91	7744.19	104	0.07	1.20	98	0.50	16.66	100	1.00	25.03	104	0.09
HM 7055	242	320.31	104	0.00	7656.19	103	0.20	1.10	90	0.00	17.12	103	0.00	23.99	99	0.71
HM 7057	230	320.53	104	0.00	7426.30	100	0.88	1.10	90	0.00	17.13	103	0.00	23.11	96	0.04
HM 7058	212	293.04	95	0.00	7054.90	95	0.01	1.44	118	0.00	16.09	97	0.00	24.14	100	0.95
HM E17 (Cerc. Spec.)	223	319.03	103	0.00	7696.05	103	0.13	1.07	88	0.00	17.02	102	0.02	24.03	99	0.77
HM RH3 (Rhiz. Spec.)	229	314.03	102	0.15	7280.88	98	0.29	1.11	91	0.00	16.81	101	0.36	23.15	96	0.04
Holly 96HX401	200	293.01	95	0.00	7675.39	103	0.16	1.22	100	0.93	15.87	95	0.00	26.31	109	0.00
Holly 96HX402	239	303.04	98	0.11	7276.91	98	0.28	1.26	103	0.27	16.41	98	0.11	24.10	100	0.89
Holly 96HX403	235	295.83	96	0.00	7385.01	99	0.69	1.33	109	0.00	16.12	97	0.00	25.01	103	0.10
Holly 96HX404	220	286.84	93	0.00	7270.55	98	0.27	1.31	107	0.01	15.65	94	0.00	25.34	105	0.02
Holly 96HX413	196	298.44	97	0.00	7681.15	103	0.15	1.27	104	0.17	16.19	97	0.00	25.79	107	0.00
Holly 96HX414	207	295.28	96	0.00	8102.03	109	0.00	1.27	104	0.18	16.03	96	0.00	27.40	113	0.00
Holly 96HX415	202	301.21	98	0.03	8036.62	108	0.00	1.22	100	0.90	16.28	98	0.01	26.57	110	0.00
Maribo 875 (Check #4)	205	304.04	98	0.18	7222.82	97	0.16	1.40	115	0.00	16.60	100	0.69	23.69	98	0.34
Maribo 9581	214	313.44	101	0.20	7132.12	96	0.05	1.22	100	0.83	16.89	101	0.16	22.86	95	0.01
Maribo 9584	199	328.87	106	0.00	7339.93	99	0.49	1.15	94	0.03	17.59	106	0.00	22.33	92	0.00
Maribo 9671	206	305.07	99	0.30	7005.16	94	0.01	1.32	108	0.00	16.58	100	0.58	22.89	95	0.01
Maribo 9673	225	295.75	96	0.00	7280.65	98	0.29	1.19	98	0.28	15.98	96	0.00	24.68	102	0.32
Maribo 9674	215	305.58	99	0.37	8083.77	109	0.00	1.23	101	0.77	16.51	99	0.33	26.40	109	0.00
Seedex SX1009	233	316.82	103	0.03	7245.20	97	0.20	1.21	99	0.60	17.05	102	0.02	22.91	95	0.01
Van der Have H66282	222	310.41	101	0.66	7506.42	101	0.73	1.17	96	0.13	16.69	100	0.85	24.08	100	0.86
Van der Have H66287	208	316.28	102	0.04	7622.26	102	0.29	1.17	96	0.14	16.99	102	0.04	24.10	100	0.88
Van der Have H6876	241	298.53	97	0.00	7703.57	103	0.12	1.24	102	0.62	16.17	97	0.00	25.88	107	0.00
Van der Have H6877	219	309.34	100	0.89	7842.16	105	0.02	1.15	94	0.03	16.62	100	0.78	25.38	105	0.02
Van der Have H6878	227	293.14	95	0.00	7208.14	97	0.13	1.38	113	0.00	16.04	96	0.00	24.51	101	0.50
Van der Have H6879	194	293.46	95	0.00	7439.66	100	0.95	1.31	107	0.01	15.98	96	0.00	25.35	105	0.02
Van der Have H6880	210	278.53	90	0.00	7222.35	97	0.16	1.46	120	0.00	15.38	92	0.00	26.00	108	0.00
Van der Have H6881	203	294.70	95	0.00	8011.75	108	0.00	1.31	107	0.01	16.05	96	0.00	27.14	112	0.00

General Mean		308.83			7450.19			1.22			16.66			24.17		
Coeff. of Var. (%)		3.32			5.95			7.72			2.69			5.70		
F Value		10.63	**		3.60	**		9.22	**		10.71	**		7.50	**	
L.S.D. (.05)		10.07			452.41			0.09			0.44			1.41		
L.S.D. (.01)		13.27			595.82			0.12			0.58			1.86		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 17B. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/01/96

49 Entries **8 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	242.66	117	0.02	2441.11	110	0.00	222.03	79	0.00	3.35	113	0.30
ACH 261	234	176.38	85	0.04	2064.69	93	0.00	359.52	128	0.00	3.38	114	0.26
ACH 9601	204	214.04	103	0.64	2311.99	104	0.03	296.08	105	0.44	2.66	90	0.40
ACH 9603	197	223.12	108	0.28	2308.51	104	0.04	370.93	132	0.00	3.16	106	0.61
ACH 9605	237	182.30	88	0.09	2355.52	106	0.00	326.37	116	0.02	3.18	107	0.57
ACH 9608	216	175.92	85	0.03	2316.71	104	0.02	336.51	119	0.00	3.16	106	0.60
ACH 9609	228	241.81	117	0.02	2105.77	95	0.00	262.11	93	0.29	2.57	87	0.27
Beta 1216(Aphan. Spec.)	236	162.12	78	0.00	2163.92	97	0.10	264.15	94	0.34	3.32	112	0.34
Beta 2010 (Check #2)	231	172.26	83	0.02	2179.87	98	0.21	319.80	113	0.04	3.37	113	0.28
Beta 3026 (Aphan. Spec.)	209	152.71	74	0.00	1948.65	87	0.00	235.06	83	0.01	3.52	119	0.13
Beta 3945 (Aphan. Spec.)	195	170.39	82	0.01	1948.15	87	0.00	211.04	75	0.00	3.35	113	0.29
Beta 5296 (Aphan. Spec.)	221	189.16	91	0.22	2060.45	92	0.00	268.80	95	0.48	3.53	119	0.13
Beta 5335 (Aphan. Spec.)	240	183.13	88	0.10	2068.76	93	0.00	295.83	105	0.45	3.87	130	0.01
Beta 5416 (Aphan. Spec.)	226	174.55	84	0.03	2025.37	91	0.00	202.15	72	0.00	2.74	92	0.52
Beta 6935 (6045)(Aphan. Spec.)	201	187.76	91	0.19	2235.14	100	0.84	269.45	96	0.51	2.97	100	0.99
Beta 6776 (Aphan. Spec.)	218	180.72	87	0.07	2229.39	100	0.96	273.54	97	0.66	2.86	96	0.76
Cenex/LOL Ex101	238	225.62	109	0.21	2005.44	90	0.00	286.00	101	0.82	2.73	92	0.50
Filler #3	224	205.82	99	0.93	2255.76	101	0.46	284.52	101	0.88	2.50	84	0.19
HM 5135 (Check #3)	232	243.93	118	0.01	2499.97	112	0.00	281.90	100	1.00	2.36	79	0.10
HM 7048	211	170.12	82	0.01	2058.12	92	0.00	262.21	93	0.29	3.34	112	0.32
HM 7049	198	181.44	88	0.08	2033.44	91	0.00	273.67	97	0.66	3.21	108	0.51
HM 7054	217	246.47	119	0.01	2008.29	90	0.00	307.89	109	0.16	2.50	84	0.20
HM 7055	242	155.67	75	0.00	2063.36	93	0.00	252.45	90	0.12	3.54	119	0.12
HM 7057	230	150.90	73	0.00	2009.21	90	0.00	264.68	94	0.36	3.25	109	0.44
HM 7058	212	263.06	127	0.00	2412.82	108	0.00	377.99	134	0.00	2.31	78	0.07
HM E17 (Cerc. Spec.)	223	164.91	80	0.00	1994.46	90	0.00	239.15	85	0.02	2.45	82	0.15
HM RH3 (Rhiz. Spec.)	229	185.44	90	0.14	2209.12	99	0.63	204.49	73	0.00	2.99	101	0.95
Holly 96HX401	200	251.52	121	0.00	2187.22	98	0.29	274.44	97	0.69	2.64	89	0.36
Holly 96HX402	239	258.05	125	0.00	2110.76	95	0.00	322.39	114	0.03	3.37	113	0.28
Holly 96HX403	235	222.48	107	0.30	2186.56	98	0.29	367.09	130	0.00	2.67	90	0.40
Holly 96HX404	220	268.60	130	0.00	2298.87	103	0.06	309.00	110	0.15	2.69	91	0.44
Holly 96HX413	196	221.66	107	0.32	2360.56	106	0.00	276.59	98	0.78	2.37	80	0.10
Holly 96HX414	207	236.67	114	0.05	2342.51	105	0.00	274.86	98	0.71	2.72	92	0.48
Holly 96HX415	202	212.30	102	0.73	2285.57	103	0.13	261.01	93	0.26	2.98	100	0.99
Maribo 875 (Check #4)	205	308.53	149	0.00	2477.62	111	0.00	314.58	112	0.08	2.62	88	0.34
Maribo 9581	214	143.70	69	0.00	2221.64	100	0.88	302.17	107	0.27	2.79	94	0.61
Maribo 9584	199	200.23	97	0.64	2140.62	96	0.02	250.13	89	0.09	3.14	106	0.64
Maribo 9671	206	227.40	110	0.17	2343.70	105	0.00	320.54	114	0.04	3.02	102	0.89
Maribo 9673	225	180.50	87	0.07	2280.17	102	0.17	250.19	89	0.09	3.01	101	0.91
Maribo 9674	215	248.92	120	0.00	2371.49	106	0.00	235.74	84	0.01	2.41	81	0.12
Seedex SX1009	233	199.49	96	0.60	2250.44	101	0.55	265.33	94	0.38	3.08	104	0.76
Van der Have H66282	222	193.94	94	0.37	2177.79	98	0.20	260.38	92	0.25	2.53	85	0.23
Van der Have H66287	208	231.82	112	0.09	2195.72	99	0.41	243.06	86	0.04	2.81	95	0.66
Van der Have H6876	241	240.70	116	0.02	2306.51	104	0.04	261.35	93	0.27	2.98	100	0.98
Van der Have H6877	219	176.12	85	0.04	2241.52	101	0.72	234.87	83	0.01	3.13	105	0.66
Van der Have H6878	227	217.70	105	0.47	2525.45	113	0.00	322.87	115	0.03	2.87	97	0.78
Van der Have H6879	194	216.89	105	0.51	2418.34	109	0.00	294.43	104	0.50	3.27	110	0.41
Van der Have H6880	210	247.46	119	0.01	2668.44	120	0.00	332.96	118	0.01	3.37	113	0.27
Van der Have H6881	203	224.27	108	0.25	2446.40	110	0.00	286.94	102	0.78	2.97	100	1.00

General Mean	207.17		2227.59		281.82		2.97		
Coeff. of Var. (%)	19.93		4.92		18.83		34.61		
F Value	6.07	**	18.35	**	5.02	**	1.03	ns	
L.S.D. (.05)	41.32		107.89		52.30		1.02		
L.S.D. (.01)	54.42		142.09		68.88		1.35		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 17C. DANUBE

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/02/96
Harvest Date: 10/01/96

49 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %		
		Mean	%	P-Val
ACH 196 (Check #1)	213	0.23	5000	0
ACH 261	234	0.00	0	0.89
ACH 9601	204	0.00	0	0.89
ACH 9603	197	0.00	0	0.89
ACH 9605	237	0.00	0	0.89
ACH 9608	216	0.00	0	0.89
ACH 9609	228	0.00	0	0.89
Beta 1216(Aphan. Spec.)	236	0.00	0	0.89
Beta 2010 (Check #2)	231	0.00	0	0.89
Beta 3026 (Aphan. Spec.)	209	0.00	0	0.89
Beta 3945 (Aphan. Spec.)	195	0.00	0	0.89
Beta 5296 (Aphan. Spec.)	221	0.00	0	0.89
Beta 5335 (Aphan. Spec.)	240	0.00	0	0.89
Beta 5416 (Aphan. Spec.)	226	0.00	0	0.89
Beta 6935 (6045)(Aphan. Spec.)	201	0.00	0	0.89
Beta 6776 (Aphan. Spec.)	218	0.00	0	0.89
Cenex/LOL Ex101	238	0.00	0	0.89
Filler #3	224	0.00	0	0.89
HM 5135 (Check #3)	232	0.00	0	0.89
HM 7048	211	0.00	0	0.89
HM 7049	198	0.00	0	0.89
HM 7054	217	0.00	0	0.89
HM 7055	242	0.00	0	0.89
HM 7057	230	0.00	0	0.89
HM 7058	212	0.00	0	0.89
HM E17 (Cerc. Spec.)	223	0.00	0	0.89
HM RH3 (Rhiz. Spec.)	229	0.00	0	0.89
Holly 96HX401	200	0.00	0	0.89
Holly 96HX402	239	0.00	0	0.89
Holly 96HX403	235	0.00	0	0.89
Holly 96HX404	220	0.00	0	0.89
Holly 96HX413	196	0.00	0	0.89
Holly 96HX414	207	0.00	0	0.89
Holly 96HX415	202	0.00	0	0.89
Maribo 875 (Check #4)	205	0.00	0	0.89
Maribo 9581	214	0.00	0	0.89
Maribo 9584	199	0.00	0	0.89
Maribo 9671	206	0.00	0	0.89
Maribo 9673	225	0.00	5000	0.89
Maribo 9674	215	0.00	0	0.89
Seedex SX1009	233	0.00	0	0.89
Van der Have H66282	222	0.00	0	0.89
Van der Have H66287	208	0.00	0	0.89
Van der Have H6876	241	0.00	0	0.89
Van der Have H6877	219	0.00	0	0.89
Van der Have H6878	227	0.00	0	0.89
Van der Have H6879	194	0.00	0	0.89
Van der Have H6880	210	0.00	0	0.89
Van der Have H6881	203	0.00	0	0.89

General Mean			
Coeff. of Var. (%)			
F Value			
L.S.D. (.05)			
L.S.D. (.01)			

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 18A. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/05/96

49 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	REC/T LBS			REC/A LBS			LTM			SUGAR %			YIELD T/A		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	288.24	99	0.43	6668.89	99	0.79	1.28	109	0.00	15.69	99	0.72	23.09	100	0.95
ACH 261	234	287.89	99	0.39	6859.91	102	0.54	1.13	97	0.15	15.52	98	0.27	23.80	103	0.23
ACH 9601	204	300.90	103	0.06	6954.97	103	0.29	1.09	93	0.01	16.13	102	0.11	23.14	100	0.89
ACH 9603	197	295.91	101	0.39	6606.82	98	0.57	1.19	102	0.46	15.99	101	0.33	22.26	97	0.20
ACH 9605	237	292.34	100	0.93	7193.60	107	0.03	1.20	103	0.41	15.81	100	0.84	24.61	107	0.01
ACH 9608	216	294.51	101	0.58	6459.42	96	0.21	1.19	102	0.50	15.92	101	0.51	21.96	95	0.08
ACH 9609	228	292.45	100	0.91	6222.00	92	0.02	1.14	97	0.36	15.77	100	1.00	21.18	92	0.00
Beta 1216(Aphan. Spec.)	236	303.14	104	0.02	6884.29	102	0.47	1.15	98	0.48	16.31	103	0.02	22.75	99	0.62
Beta 2010 (Check #2)	231	301.62	103	0.04	7140.75	106	0.05	1.21	103	0.20	16.29	103	0.02	23.65	103	0.34
Beta 3026 (Aphan. Spec.)	209	298.47	102	0.16	6133.59	91	0.01	1.11	95	0.04	16.03	102	0.24	20.51	89	0.00
Beta 3945 (Aphan. Spec.)	195	302.09	103	0.03	6783.56	101	0.79	1.13	97	0.16	16.23	103	0.04	22.44	97	0.32
Beta 5296 (Aphan. Spec.)	221	310.07	106	0.00	6973.86	104	0.25	1.10	94	0.01	16.60	105	0.00	22.42	97	0.31
Beta 5335 (Aphan. Spec.)	240	307.97	106	0.00	6375.56	95	0.10	1.17	100	0.93	16.57	105	0.00	20.70	90	0.00
Beta 5416 (Aphan. Spec.)	226	308.25	106	0.00	6234.93	93	0.02	1.08	92	0.00	16.50	105	0.00	20.33	88	0.00
Beta 6035 (6045)(Aphan. Spec.)	201	305.16	105	0.01	6774.09	101	0.83	1.11	95	0.03	16.37	104	0.01	22.18	96	0.16
Beta 6776 (Aphan. Spec.)	218	298.12	102	0.19	6459.06	96	0.21	1.19	102	0.58	16.09	102	0.15	21.58	94	0.02
Cenex/LOL Ex101	238	289.40	99	0.59	7063.27	105	0.12	1.18	101	0.77	15.65	99	0.60	24.35	106	0.04
Filler #3	224	297.47	102	0.24	6018.94	89	0.00	1.21	103	0.18	16.09	102	0.15	20.30	88	0.00
HM 5135 (Check #3)	232	298.42	102	0.17	6827.54	101	0.64	1.22	104	0.12	16.14	102	0.10	22.81	99	0.69
HM 7048	211	306.56	105	0.00	7039.19	105	0.15	1.06	91	0.00	16.39	104	0.01	22.88	99	0.78
HM 7049	198	297.63	102	0.22	6452.04	96	0.20	1.08	92	0.00	15.97	101	0.37	21.66	94	0.02
HM 7054	217	289.99	99	0.68	7305.74	109	0.01	1.08	92	0.00	15.58	99	0.41	25.16	109	0.00
HM 7055	242	291.63	100	0.95	6278.57	93	0.04	1.07	91	0.00	15.64	99	0.59	21.42	93	0.01
HM 7057	230	301.70	103	0.04	7065.95	105	0.12	1.13	97	0.15	16.21	103	0.05	23.36	101	0.62
HM 7058	212	290.62	100	0.78	6562.14	98	0.44	1.28	109	0.00	15.81	100	0.85	22.63	98	0.49
HM E17 (Cerc. Spec.)	223	287.75	99	0.38	6066.42	90	0.00	1.10	94	0.02	15.49	98	0.22	21.09	91	0.00
HM RH3 (Rhiz. Spec.)	229	293.25	100	0.78	6185.26	92	0.01	1.14	97	0.24	15.80	100	0.88	21.13	92	0.00
Holly 96HX401	200	295.07	101	0.50	7209.62	107	0.03	1.04	89	0.00	15.79	100	0.92	24.37	106	0.03
Holly 96HX402	239	286.84	98	0.28	7053.94	105	0.13	1.12	96	0.08	15.46	98	0.17	24.51	106	0.02
Holly 96HX403	235	287.97	99	0.40	7225.23	107	0.02	1.17	100	0.92	15.56	99	0.37	24.96	108	0.00
Holly 96HX404	220	289.89	99	0.67	7625.21	113	0.00	1.14	97	0.26	15.63	99	0.54	26.22	114	0.00
Holly 96HX413	196	276.71	95	0.00	6760.47	100	0.88	1.16	99	0.58	14.99	95	0.00	24.45	106	0.02
Holly 96HX414	207	273.20	94	0.00	6484.50	96	0.26	1.24	106	0.02	14.90	94	0.00	23.68	103	0.31
Holly 96HX415	202	283.20	97	0.06	6772.52	101	0.83	1.19	102	0.58	15.35	97	0.06	24.00	104	0.13
Maribo 875 (Check #4)	205	304.72	104	0.01	6931.06	103	0.34	1.21	103	0.21	16.45	104	0.00	22.77	99	0.64
Maribo 9581	214	296.17	101	0.36	6844.74	102	0.58	1.15	98	0.54	15.96	101	0.39	23.07	100	0.98
Maribo 9584	199	298.66	102	0.15	6456.72	96	0.21	1.15	98	0.44	16.08	102	0.17	21.55	93	0.02
Maribo 9671	206	303.13	104	0.02	6646.02	99	0.70	1.19	102	0.59	16.34	104	0.01	21.92	95	0.07
Maribo 9673	225	280.93	96	0.02	6829.78	102	0.63	1.20	103	0.13	15.27	97	0.03	24.26	105	0.05
Maribo 9674	215	297.32	102	0.25	7658.23	114	0.00	1.20	103	0.43	16.06	102	0.19	25.79	112	0.00
Seedex SX1009	233	290.13	99	0.70	6867.07	102	0.52	1.24	106	0.03	15.75	100	0.93	23.67	103	0.32
Van der Have H66282	222	297.66	102	0.22	7153.20	106	0.05	1.17	100	0.87	16.06	102	0.20	24.13	105	0.08
Van der Have H66287	208	296.69	102	0.31	6907.32	103	0.40	1.10	94	0.02	15.94	101	0.45	23.35	101	0.63
Van der Have H6876	241	273.88	94	0.00	6942.06	103	0.32	1.21	103	0.21	14.90	94	0.00	25.28	110	0.00
Van der Have H6877	219	282.77	97	0.05	6716.08	100	0.96	1.21	103	0.20	15.35	97	0.06	23.73	103	0.28
Van der Have H6878	227	245.50	84	0.00	5661.05	84	0.00	1.39	119	0.00	13.67	87	0.00	23.06	100	1.00
Van der Have H6879	194	267.21	92	0.00	6540.62	97	0.38	1.30	111	0.00	14.66	93	0.00	24.56	107	0.02
Van der Have H6880	210	270.03	93	0.00	6025.01	90	0.00	1.40	120	0.00	14.91	95	0.00	22.34	97	0.25
Van der Have H6881	203	274.34	94	0.00	6741.57	100	0.95	1.22	104	0.12	14.94	95	0.00	24.59	107	0.01

General Mean	291.91			6727.40			1.17			15.77			23.05			
Coeff. of Var. (%)	4.51			8.71			7.22			4.00			7.35			
F Value	6.80	**		3.68	**		6.20	**		6.37	**		5.64	**		
L.S.D. (.05)	13.19			603.14			0.08			0.63			1.74			
L.S.D. (.01)	17.37			794.34			0.11			0.83			2.29			

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropriate for comparing entry means with each other when F value is signficant

TABLE 18B. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/05/96

49 Entries **8 RepsXLocs** **2 Rows/Plot** **1 Sample/Plot**

ENTRY	CODE	NA ppm			K ppm			Am. N ppm			Tare %		
		Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	433.21	116	0.02	1998.85	108	0.00	299.75	108	0.11	2.85	122	0.09
ACH 261	234	282.29	75	0.00	1745.09	94	0.02	307.59	111	0.03	1.65	71	0.02
ACH 9601	204	328.30	88	0.06	1759.28	95	0.04	255.94	92	0.14	2.92	125	0.05
ACH 9603	197	352.66	94	0.37	1875.99	101	0.73	298.81	108	0.13	1.91	82	0.16
ACH 9605	237	352.94	94	0.38	1953.28	105	0.05	279.25	101	0.88	2.70	116	0.22
ACH 9608	216	341.46	91	0.18	1924.78	104	0.18	288.18	104	0.43	2.95	127	0.04
ACH 9609	228	483.85	129	0.00	1704.54	92	0.00	255.88	92	0.14	2.72	117	0.20
Beta 1216(Aphan. Spec.)	236	315.90	84	0.02	1886.87	101	0.57	274.89	99	0.88	2.22	95	0.69
Beta 2010 (Check #2)	231	303.86	81	0.00	1897.39	102	0.43	322.81	117	0.00	3.00	129	0.03
Beta 3026 (Aphan. Spec.)	209	279.28	74	0.00	1744.98	94	0.02	294.40	106	0.22	2.85	122	0.09
Beta 3945 (Aphan. Spec.)	195	344.91	92	0.23	1808.38	97	0.30	269.28	97	0.59	1.55	67	0.01
Beta 5296 (Aphan. Spec.)	221	294.59	79	0.00	1821.33	98	0.44	259.03	94	0.21	2.02	87	0.30
Beta 5335 (Aphan. Spec.)	240	295.57	79	0.00	1818.69	98	0.40	318.75	115	0.00	2.47	106	0.66
Beta 5416 (Aphan. Spec.)	226	306.35	82	0.01	1630.03	88	0.00	291.42	105	0.31	2.92	125	0.05
Beta 6935 (6045)(Aphan. Spec.)	201	301.56	80	0.00	1813.34	98	0.34	265.05	96	0.40	2.35	101	0.96
Beta 6776 (Aphan. Spec.)	218	317.46	85	0.02	2005.76	108	0.00	273.34	99	0.80	2.25	97	0.77
Cenex/LOL Ex101	238	425.90	114	0.04	1846.32	99	0.79	268.45	97	0.55	2.09	90	0.41
Filler #3	224	351.68	94	0.35	2001.03	108	0.00	279.33	101	0.87	2.63	113	0.33
HM 5135 (Check #3)	232	415.52	111	0.11	1884.70	101	0.60	291.56	105	0.31	2.40	103	0.82
HM 7048	211	290.53	77	0.00	1703.21	92	0.00	265.31	96	0.41	1.73	74	0.04
HM 7049	198	344.17	92	0.22	1731.78	93	0.01	254.03	92	0.11	2.17	93	0.58
HM 7054	217	436.37	116	0.02	1639.81	88	0.00	244.01	88	0.02	2.04	88	0.32
HM 7055	242	267.72	71	0.00	1745.08	94	0.02	265.70	96	0.43	2.62	112	0.34
HM 7057	230	341.03	91	0.18	1750.04	94	0.02	284.60	103	0.60	2.29	98	0.89
HM 7058	212	419.31	112	0.08	1899.35	102	0.41	330.62	119	0.00	1.70	73	0.03
HM E17 (Cerc. Spec.)	223	328.54	88	0.07	1712.91	92	0.00	278.12	100	0.94	2.68	115	0.24
HM RH3 (Rhiz. Spec.)	229	356.11	95	0.45	1784.35	96	0.12	276.26	100	0.96	2.47	106	0.65
Holly 96HX401	200	346.02	92	0.25	1719.21	92	0.00	223.73	81	0.00	1.77	76	0.06
Holly 96HX402	239	407.06	109	0.20	1785.31	96	0.13	243.65	88	0.02	2.73	117	0.18
Holly 96HX403	235	387.53	103	0.62	1776.44	96	0.09	291.52	105	0.31	1.96	84	0.21
Holly 96HX404	220	378.26	101	0.90	1891.16	102	0.51	241.54	87	0.01	2.14	92	0.51
Holly 96HX413	196	460.35	123	0.00	1806.16	97	0.27	247.43	89	0.04	2.43	104	0.75
Holly 96HX414	207	546.06	146	0.00	1970.34	106	0.02	240.63	87	0.01	2.33	100	0.98
Holly 96HX415	202	407.43	109	0.20	1905.55	102	0.34	265.16	96	0.41	2.19	94	0.63
Maribo 875 (Check #4)	205	417.69	111	0.09	1977.33	106	0.02	259.29	94	0.21	2.72	117	0.20
Maribo 9581	214	266.06	71	0.00	1852.74	100	0.89	304.78	110	0.05	2.55	109	0.46
Maribo 9584	199	378.06	101	0.90	1757.72	95	0.04	285.03	103	0.58	2.91	125	0.05
Maribo 9671	206	415.36	111	0.11	1864.48	100	0.91	273.14	99	0.79	2.71	116	0.21
Maribo 9673	225	372.59	99	0.92	1991.98	107	0.01	278.32	100	0.93	2.18	94	0.60
Maribo 9674	215	424.45	113	0.05	1951.87	105	0.06	253.21	91	0.10	1.81	78	0.08
Seedex SX1009	233	409.19	109	0.18	1943.96	105	0.08	293.34	106	0.25	2.03	87	0.31
Van der Have H66282	222	373.40	100	0.95	1858.97	100	1.00	273.43	99	0.80	1.99	85	0.24
Van der Have H66287	208	471.12	126	0.00	1659.82	89	0.00	238.42	86	0.01	1.88	81	0.13
Van der Have H6876	241	426.02	114	0.04	1938.53	104	0.10	266.24	96	0.45	1.76	76	0.05
Van der Have H6877	219	406.60	108	0.21	2018.94	109	0.00	253.31	91	0.10	1.95	84	0.20
Van der Have H6878	227	435.95	116	0.02	2188.50	118	0.00	335.90	121	0.00	3.00	129	0.03
Van der Have H6879	194	421.80	112	0.06	2023.73	109	0.00	313.80	113	0.01	2.44	105	0.72
Van der Have H6880	210	463.90	124	0.00	2156.88	116	0.00	345.29	125	0.00	2.81	121	0.11
Van der Have H6881	203	450.64	120	0.00	1975.08	106	0.02	255.11	92	0.12	1.99	85	0.24

General Mean	375.03		1859.22		277.03		2.33	
Coeff. of Var. (%)	18.94		7.32		14.38		36.36	
F Value	6.43	**	6.69	**	3.44	*	1.92	*
L.S.D. (.05)	70.65		136.29		40.06		0.84	
L.S.D. (.01)	93.04		179.50		52.76		1.11	

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

TABLE 18C. DEGRAFF

1996 SOUTHERN MINNESOTA COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Planting Date: 05/22/96
Harvest Date: 10/05/96

49 Entries 8 RepsXLocs 2 Rows/Plot 1 Sample/Plot

ENTRY	CODE	Bolters %			Vigor		
		Mean	%	P-Val	Mean	%	P-Val
ACH 196 (Check #1)	213	0.00	0	0.89	1.11	61	0.00
ACH 261	234	0.00	0	0.89	1.36	74	0.01
ACH 9601	204	0.00	0	0.89	1.12	61	0.00
ACH 9603	197	0.00	0	0.89	2.38	130	0.00
ACH 9605	237	0.00	0	0.89	2.12	116	0.10
ACH 9608	216	0.00	0	0.89	2.01	110	0.32
ACH 9609	228	0.00	0	0.89	1.11	61	0.00
Beta 1216(Aphan. Spec.)	236	0.00	0	0.89	2.39	131	0.00
Beta 2010 (Check #2)	231	0.00	0	0.89	1.63	89	0.25
Beta 3026 (Aphan. Spec.)	209	0.00	0	0.89	1.87	102	0.84
Beta 3945 (Aphan. Spec.)	195	0.00	0	0.89	1.75	96	0.64
Beta 5296 (Aphan. Spec.)	221	0.00	0	0.89	2.26	123	0.02
Beta 5335 (Aphan. Spec.)	240	0.00	0	0.89	2.63	144	0.00
Beta 5416 (Aphan. Spec.)	226	0.00	0	0.89	1.75	96	0.63
Beta 6935 (6045)(Aphan. Spec.)	201	0.00	0	0.89	1.14	62	0.00
Beta 6776 (Aphan. Spec.)	218	0.00	0	0.89	1.51	83	0.07
Cenex/LOL Ex101	238	0.00	0	0.89	1.26	69	0.00
Filler #3	224	0.00	0	0.89	1.37	75	0.01
HM 5135 (Check #3)	232	0.00	0	0.89	1.62	89	0.23
HM 7048	211	0.00	0	0.89	1.99	109	0.36
HM 7049	198	0.00	0	0.89	1.76	96	0.67
HM 7054	217	0.00	0	0.89	1.52	83	0.08
HM 7055	242	0.00	0	0.89	2.87	157	0.00
HM 7057	230	0.00	0	0.89	1.99	109	0.36
HM 7058	212	0.00	0	0.89	1.75	96	0.64
HM E17 (Cerc. Spec.)	223	0.00	0	0.89	2.49	136	0.00
HM RH3 (Rhiz. Spec.)	229	0.00	0	0.89	2.76	151	0.00
Holly 96HX401	200	0.00	0	0.89	1.75	96	0.63
Holly 96HX402	239	0.00	0	0.89	1.25	68	0.00
Holly 96HX403	235	0.00	0	0.89	0.99	54	0.00
Holly 96HX404	220	0.00	0	0.89	1.25	68	0.00
Holly 96HX413	196	0.00	0	0.89	1.88	103	0.78
Holly 96HX414	207	0.00	0	0.89	2.37	130	0.00
Holly 96HX415	202	0.00	0	0.89	2.62	143	0.00
Maribo 875 (Check #4)	205	0.00	0	0.89	1.13	62	0.00
Maribo 9581	214	0.00	0	0.89	2.37	130	0.00
Maribo 9584	199	0.00	0	0.89	1.36	74	0.01
Maribo 9671	206	0.00	0	0.89	1.61	88	0.22
Maribo 9673	225	0.00	0	0.89	2.12	116	0.11
Maribo 9674	215	0.00	0	0.89	2.02	110	0.28
Seedex SX1009	233	0.00	0	0.89	1.25	68	0.00
Van der Have H66282	222	0.00	0	0.89	1.50	82	0.06
Van der Have H66287	208	0.00	0	0.89	1.63	89	0.26
Van der Have H6876	241	0.23	5000	0.00	2.24	122	0.02
Van der Have H6877	219	0.00	0	0.89	2.52	138	0.00
Van der Have H6878	227	0.00	0	0.89	1.98	108	0.40
Van der Have H6879	194	0.00	0	0.89	2.39	131	0.00
Van der Have H6880	210	0.00	0	0.89	2.37	130	0.00
Van der Have H6881	203	0.00	0	0.89	1.63	89	0.25

General Mean					1.83		
Coeff. of Var. (%)					27.32		
F Value					8.09		
L.S.D. (.05)					0.5		
L.S.D. (.01)					0.65		

* 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 each trait is prob. that detection of a diff. of this size is due to chance.
Mean LSD is only appropritate for comparing entry means with each other when F value is signficant

Table 19

1996 CERCOSPORA READINGS FOR CODED TEST ENTRIES
BETASEED NURSERY - SHAKOPEE, MN

			Average Rating at Each Date*								
ENTRY	CODE	DESCRIPTION	8/13**	8/21	8/25	8/29	9/3	1996 MEAN	2 YR MEAN	3 YR MEAN	3 YR % MEAN
69	669	ACH 192	2.42	2.96	4.70	5.91	6.92	4.59	4.59	4.67	101.5
41	641	ACH 194	2.58	3.47	4.96	6.31	7.77	4.99	4.81	4.81	104.6
142	742	ACH 196	2.66	3.55	4.79	6.12	7.62	4.96	4.90	4.82	105.0
104	704	ACH 197	2.08	2.31	3.45	3.56	5.40	3.30			
52	652	ACH 198 (Aphan. Spec.)	2.35	2.89	3.45	3.91	5.68	3.65	3.87	3.97	86.4
16	616	ACH 205 (Aphan. Spec.)	2.31	2.60	3.52	4.35	5.82	3.72	3.53	3.72	80.9
35	635	ACH 222 (9490002) (NC)	2.40	2.68	4.46	5.70	6.81	4.41	4.62	4.85	105.4
76	676	ACH 261 (9590002)(NC)	2.63	3.80	4.97	6.99	8.66	5.40	5.22		
89	689	ACH 302	2.32	2.58	3.78	4.32	6.14	3.81	3.88	3.86	84.0
131	731	ACH 306 (Rhizoctonia)	2.18	2.73	3.82	4.50	5.94	3.86	4.42	4.41	96.1
15	615	ACH 309	2.25	2.41	3.85	4.92	6.02	3.88	3.86	3.96	86.1
139	739	ACH 310	2.41	3.52	4.78	6.30	7.46	4.90	4.72	4.72	102.7
114	714	ACH 9601	2.37	2.62	4.47	5.02	6.48	4.19			
27	627	ACH 9602	2.38	3.32	4.71	6.70	7.67	4.97			
49	649	ACH 9603	2.36	3.22	4.64	6.02	7.65	4.77			
3	603	ACH 6904	2.41	2.79	4.70	5.88	7.23	4.61			
60	660	ACH 9605	2.67	3.79	5.32	7.22	8.54	5.51			
118	718	ACH 9606	2.57	2.99	4.81	6.05	6.55	4.60			
93	693	ACH 9607	2.38	3.34	4.77	6.73	8.27	5.12			
47	647	ACH 9608	2.66	3.56	5.06	6.83	8.21	5.28			
80	680	ACH 9609	2.04	2.58	3.78	4.22	6.07	3.69			
58	658	Beta 1144	2.73	3.55	4.72	6.03	7.33	4.89	4.69	4.80	104.4
132	732	Beta 1216	2.38	2.97	4.45	5.31	6.80	4.39			
11	611	Beta 1226	2.71	2.75	4.45	6.64	8.44	5.02			
81	681	Beta 1286	2.36	2.75	4.15	5.78	7.03	4.44			
64	664	Beta 1492	2.47	3.13	4.92	6.23	7.66	4.89	4.81	4.82	105.0
127	727	Beta 1524 (NC)	2.41	3.28	5.02	7.54	8.67	5.38	5.18	5.07	110.4
18	618	Beta 1606	2.91	4.06	5.63	7.51	8.27	5.66			
45	645	Beta 1794 (NC)	2.66	3.34	5.06	6.66	7.84	5.13	4.66	4.67	101.5
135	735	Beta 1796	2.56	3.59	5.32	6.93	8.25	5.36			
83	683	Beta 1885	2.57	2.68	4.74	6.55	8.01	4.91	5.20		
65	665	Beta 1946	2.76	3.98	5.48	7.05	8.32	5.46			
105	705	Beta 1994 (NC)	2.48	3.06	4.40	6.30	7.55	4.79	4.34	4.62	100.5
98	698	Beta 2010	2.48	2.73	4.17	5.13	7.09	4.34	4.56	4.67	101.6
23	623	Beta 2074 (NC)	2.35	3.26	4.77	6.86	8.40	5.13	4.89	4.85	105.5
51	651	Beta 2084 (NC)	2.47	3.00	4.66	5.95	7.07	4.64	4.86	4.86	105.8
48	648	Beta 2086	2.35	2.93	4.51	5.57	7.01	4.47			
67	667	Beta 2276 (Blend)	2.93	3.15	4.71	6.48	7.97	5.03			
25	625	Beta 2286 (Blend)	2.37	2.64	4.68	6.18	7.95	4.77			
110	710	Beta 3026	2.11	2.43	3.38	4.21	6.07	3.66			
122	722	Beta 3456	2.48	2.76	4.46	6.11	7.16	4.63			
20	620	Beta 3555 (Blend)	2.71	3.16	4.68	6.61	7.94	4.98	4.83		
94	694	Beta 3636	2.44	2.97	4.50	6.23	7.72	4.79			
85	685	Beta 3712	2.45	3.53	4.71	6.80	8.02	5.11	4.85	4.96	107.9
140	740	Beta 3843	2.73	3.46	4.68	6.25	7.21	4.86	4.90	4.90	106.7
126	726	Beta 3945	2.57	2.95	4.68	5.44	6.99	4.51			
12	612	Beta 5014 (Aphan. Spec.)	2.31	2.99	4.18	5.09	6.63	4.25	3.64	3.71	80.7
74	674	Beta 5296	2.48	3.01	3.61	4.92	6.57	4.12			
100	700	Beta 5335	1.89	2.34	3.45	3.38	5.64	3.30	3.20		
5	605	Beta 5416	2.15	2.35	3.45	3.47	5.62	3.41			
72	672	Beta 6005	2.58	3.43	4.73	6.90	8.74	5.30	5.02		
1	601	Beta 6035 (6045)	2.41	2.42	4.09	4.77	6.62	4.06	3.92		

Table 19 (continued)

1996 CERCOSPORA READINGS FOR CODED TEST ENTRIES
BETASEED NURSERY - SHAKOPEE, MN

			Average Rating at Each Date*								
ENTRY	CODE	DESCRIPTION	8/13**	8/21	8/25	8/29	9/3	1996 MEAN	2 YR MEAN	3 YR MEAN	3 YR % MEAN
70	670	Beta 6046	2.38	2.60	3.84	5.40	6.36	4.12			
87	687	Beta 6104 (NC)	2.38	3.02	4.73	5.56	6.86	4.52	4.58	4.64	100.9
38	638	Beta 6286	2.56	3.01	4.52	6.67	7.38	4.83			
113	713	Beta 6376	2.43	2.29	4.39	5.91	7.33	4.47			
106	706	Beta 6776	2.36	2.70	4.43	4.61	6.41	4.11			
54	654	Beta 6863	2.56	3.17	4.38	5.58	6.67	4.45	4.27	4.51	98.1
129	729	Beta 6904 (Aphan. Spec.)	2.40	3.09	4.12	5.50	6.74	4.39	4.31	4.38	95.3
53	653	Bush Johnson 1392	2.80	3.74	5.18	7.07	8.71	5.50	5.14	5.04	109.7
91	691	Bush Johnson Apex	2.61	3.82	5.07	7.29	8.14	5.38			
26	626	Bush Johnson Vertex (1412)	2.48	3.60	4.80	6.71	7.74	5.10	5.04	5.05	109.8
121	721	Cenex/LOL EX101	2.76	3.58	4.94	6.75	8.26	5.26			
43	643	Cenex/LOL EX102	2.55	3.53	4.78	6.93	8.28	5.24			
82	682	HM 5135	2.62	3.56	4.76	6.46	7.66	5.03	4.76	4.81	104.6
7	607	HM 7040 (Supreme)	2.43	2.71	4.46	5.84	7.33	4.57	4.25	4.28	93.0
103	703	HM 7044	2.57	3.55	5.59	6.86	8.60	5.45	4.99		
130	730	HM 7048 (Victory)	2.66	3.61	4.14	5.88	7.07	4.68	4.59		
2	602	HM 7049 (Tahoe)	2.60	3.36	4.79	5.89	7.30	4.84	4.61		
78	678	HM 7053	2.63	3.79	5.00	6.31	7.59	5.06			
96	696	HM 7054	5.37	2.93	4.21	5.65	6.86	4.41			
40	640	HM 7055	2.32	2.32	4.11	4.91	5.62	3.85			
84	684	HM 7056	2.15	2.63	3.88	4.71	6.21	3.93			
107	707	HM 7057	2.09	2.41	3.81	4.41	6.17	3.78			
63	663	HM 7058	3.12	4.40	6.14	8.58	9.94	6.41			
33	633	HM 7059	2.40	2.75	4.76	6.41	7.91	4.86			
13	613	HM 7518 (Viking)	2.54	2.93	4.41	5.57	7.19	4.51	4.40	4.54	98.9
56	656	HM 8277	2.83	3.75	5.22	6.46	8.10	5.24	5.11	4.97	108.2
10	610	HM Agate	2.68	3.34	5.05	7.14	8.67	5.39	5.19	5.25	114.2
6	606	HM E17	2.18	2.38	3.82	3.45	5.36	3.46			
79	679	HM Empire	2.96	3.53	5.05	6.64	8.67	5.37	5.10	5.16	112.2
136	736	HM Glacier	2.45	3.48	4.70	6.64	8.04	5.07	5.01	5.11	111.2
36	636	HM Hector	2.58	3.22	4.19	5.62	7.08	4.53	4.58	4.68	101.9
75	675	HM Horizon	2.54	3.61	4.99	6.38	8.27	5.19	4.94	4.94	107.4
109	709	HM Niagara	2.38	2.95	4.45	4.86	6.56	4.25	4.09	4.14	90.1
61	661	HM Resist (Aphan. Spec.)	1.92	2.56	3.75	4.51	6.37	3.79	3.89	4.03	87.6
50	650	HM RH3 (Rhiz. Spec.)	2.21	2.40	4.17	4.48	6.55	3.94	3.72		
117	717	HM Shasta	2.31	3.35	4.80	5.97	7.40	4.78	4.76	4.85	105.5
9	609	HM Summit	2.51	3.40	5.04	7.35	8.34	5.37	5.33	5.37	116.8
116	716	HM Valley (7038)	2.76	4.07	5.02	6.48	8.50	5.33	5.26	5.29	115.1
144	744	HM Yukon	2.38	2.61	3.92	4.66	6.18	3.95	4.15	4.32	93.9
71	671	Holly 96HX401	2.74	3.48	5.29	7.27	8.48	5.42			
137	737	Holly 96HX402	2.95	3.74	4.96	7.16	8.71	5.45			
19	619	Holly 96HX403	2.56	3.81	5.37	7.25	8.19	5.42			
39	639	Holly 96HX404	2.74	3.61	5.03	6.95	8.19	5.32			
66	666	Holly 96HX413	2.50	2.82	4.38	4.38	5.70	3.92			
97	697	Holly 96HX414	2.37	2.67	3.75	4.01	6.12	3.78			
14	614	Holly 96HX415	2.05	2.69	3.63	3.75	6.09	3.66			
46	646	KW 2249 (Blend)	2.32	2.97	4.50	6.44	7.56	4.77	4.63	4.65	101.3
73	673	KW 2398	2.35	3.23	4.39	5.85	7.38	4.64	4.56	4.63	100.8
92	692	KW 3580	2.63	4.06	5.28	7.23	8.78	5.58	5.16	5.06	110.1
143	743	KW 6770	2.57	3.26	4.77	5.91	7.39	4.81	4.90	4.89	106.5
21	621	Maribo 410	2.53	3.02	4.47	6.40	7.73	4.87	4.66	4.72	102.7
77	677	Maribo 862	2.48	3.47	4.63	6.03	7.55	4.84	4.99	4.97	108.1

Table 19 (continued)

1996 CERCOSPORA READINGS FOR CODED TEST ENTRIES
BETASEED NURSERY - SHAKOPEE, MN

			Average Rating at Each Date*								
ENTRY	CODE	DESCRIPTION	8/13**	8/21	8/25	8/29	9/3	1996 MEAN	2 YR MEAN	3 YR MEAN	3 YR % MEAN
123	723	Maribo 875	2.68	3.35	4.67	6.04	7.03	4.79	4.64	4.64	101.0
115	715	Maribo 897	2.41	3.54	4.52	6.23	7.27	4.80	4.65	4.60	100.2
133	733	Maribo 923	2.55	3.52	5.00	6.69	7.94	5.16	5.02	4.99	108.7
111	711	Maribo 9360	2.61	3.61	4.76	6.86	7.77	5.12	5.05	5.17	112.5
138	738	Maribo 9363	2.45	3.17	4.74	6.27	7.26	4.79	4.76	4.73	102.9
24	624	Maribo 9369 (NC)	2.24	2.90	4.80	6.20	7.79	4.78	4.83	4.87	105.9
29	629	Maribo 9581 (NC)	2.42	2.88	4.64	5.17	6.07	4.22	4.06		
34	634	Maribo 9584	2.27	2.97	4.18	5.61	6.76	4.35	4.35		
101	701	Maribo 9671	2.50	3.19	4.59	6.25	8.07	4.92			
4	604	Maribo 9672	2.48	2.97	4.97	7.08	8.20	5.16			
120	720	Maribo 9673	2.80	4.11	5.12	7.84	8.93	5.75			
42	642	Maribo 9674	2.54	3.49	4.74	5.70	7.20	4.72			
90	690	Mitusui Monohikari	2.27	2.90	4.15	5.49	6.47	4.24	4.44	4.40	95.7
141	741	Seedex SX Gladiator	2.48	3.32	5.06	6.63	7.89	5.11	4.87	4.88	106.2
28	628	Seedex SX Laser (SX0808)	2.18	2.32	3.50	4.07	5.70	3.53	3.98	4.27	92.9
28	628	Seedex SX Laser (SX1004)	2.18	2.32	3.50	4.07	5.70	3.53	3.68	3.76	81.8
68	668	Seedex SX Monarch	2.99	3.68	4.63	6.42	8.01	5.09	4.89	4.94	107.5
44	644	Seedex SX0809	2.71	3.76	4.98	6.57	8.04	5.18			
95	695	Seedex SX0908	2.38	2.38	3.59	4.25	6.30	3.79	3.94		
124	724	Seedex SX0911	2.45	3.55	4.64	6.70	7.48	4.98			
55	655	Seedex SX1009	2.60	2.63	4.12	5.03	6.87	4.24	4.09		
108	708	Van der Have H4689	2.47	3.53	5.03	7.28	8.20	5.31			
32	632	Van der Have H66140	2.51	3.76	4.97	6.92	8.12	5.26	5.20	5.18	112.8
112	712	Van der Have H66156	2.37	3.81	4.73	6.58	7.26	4.96	5.05	5.13	111.5
8	608	Van der Have H66168	2.55	3.54	4.96	6.97	8.26	5.28	4.96	5.12	111.5
102	702	Van der Have H66183 (NC)	2.75	3.81	5.26	7.41	8.69	5.58	5.06	5.01	109.0
62	662	Van der Have H66186 (NC)	2.54	3.52	5.05	6.53	7.94	5.09	5.11	5.02	109.3
37	637	Van der Have H66189	2.63	3.23	4.71	6.14	7.29	4.79	4.86	4.99	108.7
119	719	Van der Have H66240 (NC)	2.69	3.28	5.39	7.61	8.38	5.49	5.21		
99	699	Van der Have H66282	2.56	3.62	4.96	6.89	8.20	5.28			
86	686	Van der Have H66283	2.38	3.30	4.81	6.75	7.81	5.03			
125	725	Van der Have H66284	3.04	4.11	5.49	6.93	8.14	5.50			
31	631	Van der Have H66285	2.49	3.53	4.76	6.08	7.19	4.83			
22	622	Van der Have H66286	3.02	3.85	5.97	7.36	8.34	5.69			
57	657	Van der Have H66287	2.58	3.61	4.70	6.83	8.19	5.19			
17	617	Van der Have H6876	2.49	3.15	4.07	4.57	5.89	4.00			
59	659	Van der Have H6877	2.21	2.67	3.52	3.76	5.62	3.53			
128	728	Van der Have H6878	2.14	2.34	3.45	3.35	5.18	3.29			
30	630	Van der Have H6879	1.27	1.43	2.95	2.50	3.73	2.38			
88	688	Van der Have H6880	1.48	2.03	3.22	2.91	4.30	2.79			
134	734	Van der Have H6881	2.30	2.99	4.22	4.58	6.55	4.13			
		Test Mean	2.47	3.15	4.55	5.91	7.31	4.68	4.63	4.71	102.6
		LSD .05	0.44	0.77	0.71	1.05	0.99	0.59			
		CV %	12.61	17.63	11.15	12.78	9.73	9.14			

* Lower numbers indicate better cercospora resistance (1=Ex,9=Poor).
** Aug. 13 rating is the average of ratings from Aug. 9, 13 and 15.
Ratings adjusted to 5.5 equivalent.

Table 20

1996 AMERICAN CRYSTAL ROOT ROT (APHANOMYCES), SHAKOPEE, MN

		R1*		% SURV**		ROOT INDEX ***	
		Actual	% of	% SURV	% of	Actual	% of
CHECK		6.5	USDA	29	USDA	3.6	USDA
LSD5		0.8	Resistant	11	Resistant	1.3	Resistant
MwCh		5.8	CHK	44	CHK	2.9	CHK
1 ACROT01	Beta 2010	6.3	112.5	31	81.6	2.5	104.2
2 ACROT02	Beta 6863	5.5	98.2	49	128.9	2.9	120.8
3 ACROT03	ACH 205	5.6	100.0	41	107.9	2.7	112.5
4 ACROT04	Beta 3465	6.0	107.1	49	128.9	3.8	158.3
5 ACROT05	Beta 1286	6.9	123.2	28	73.7	5.0	208.3
6 ACROT06	Beta 6035	5.1	91.1	57	150.0	2.6	108.3
7 ACROT07	KW 3580	4.9	87.5	55	144.7	2.1	87.5
8 ACROT08	Beta 5296	6.4	114.3	31	81.6	3.0	125.0
9 ACROT09	Beta 6776	6.0	107.1	42	110.5	2.9	120.8
10 ACROT10	Beta 1216	6.8	121.4	29	76.3	3.8	158.3
11 ACROT11	HM Resist	5.3	94.6	44	115.8	2.7	112.5
12 ACROT12	Beta 5416	5.3	94.6	56	147.4	2.6	108.3
13 ACROT13	ACH 198	6.2	110.7	52	136.8	2.8	116.7
14 ACROT14	Beta 3945	5.6	100.0	43	113.2	3.0	125.0
15 ACROT15	Beta 6904	5.3	94.6	45	118.4	2.0	83.3
16 ACROT16	Beta 6046	5.1	91.1	58	152.6	2.5	104.2
17 ACROT17	Beta 5014	5.5	98.2	48	126.3	2.0	83.3
18 ACROT18	Beta 3026	5.7	101.8	50	131.6	2.0	83.3
19 ACROT19	KW 2398	6.1	108.9	33	86.8	3.2	133.3
20 ACROT20	ACH 302	5.6	100.0	45	118.4	2.7	112.5
21 ACROT21	Beta 5335	7.1	126.8	31	81.6	4.5	187.5
22 APHCHK1	Mich-Ohio Tolerant	6.7	119.6	21	55.3	3.1	129.2
23 APHCHK2	RRV Susceptible	7.4	132.1	23	60.5	5.2	216.7
24 APHCHK3	Canadian Susceptible	6.4	114.3	35	92.1	4.0	166.7
25 APHCHK4	USDA Resistant	5.6	100.0	38	100.0	2.4	100.0

* R1 ratings were based on a visual scale of 1-9. This scale factors in plant stand and plant health, where 1 is healthiest and 9 is dead.

** % Surv. is the percent of plants surviving after an initial stand count is taken. This system does not factor the health of the remaining plants.

*** Each plot was scored for root damage and stand loss. Ratings were based on visual score of 1-7 where 1 is the healthiest and 7 is dead.

TABLE 21

ENTRY	DI	% HLTHY	% HRVST	Z%HLTH	Z%HRVST
AC R# 501 ACH 306	1.25	70.53	97.78	57.75	86.11
AC R# 502 HM RH3	1.50	66.31	87.04	55.58	71.36
Susceptible check	2.42	37.24	79.56	36.53	66.52
Highly resistant check	1.33	78.89	93.33	68.32	82.95
Resistant check	2.24	53.63	79.11	46.25	67.14
LSD (5%)	1.13			19.69	19.80

To conserve nursery space, American Crystal contributed lines were evaluated with lines from two other contributors and the ANOVA was performed on a total of 29 lines (including controls). Thus, the LSDS were also calculated on the overall experimental means. Contributors received results only for the lines from their company.

Note: DI = disease index on a scale of 0-7, with 0 = no rot and 7 = plant dead: %HLTHY and %HRVST = percent healthy (DIs of 0+1) and percent beets in DI classes 0 thru 3, respectively. Z%HLTHY and Z%HRVST = arcsin square-root transformations to normalize percentage data. ANOVAs were performed on transformed data.

VARIETIES EVALUATED FOR HIGH SUGAR AND CERCOSPORA LEAF SPOT TOLERANCE

OBJECTIVE: Evaluate varieties for early sugar accumulation and cercospora leaf spot tolerance.

EXPERIMENTAL PROCEDURE

Trials were planted at three locations in 1996. Varieties were replicated eight times in a randomized complete block design. Entries were chosen by their abilities to produce high percent sugar and high tolerance to cercospora leaf spot. Both characteristics had to be apparent for the variety to be selected for testing. The trials were planted May 10, 14 and 24. Varieties planted were as follows:

BG 5981	ACH 9040013	96SXSM-2
BG 2342	ACH 308	96SXSM-3
Beta 5931	HM 94060345	96SXSM-4
BG 5320	HM 93060592	96SXSM-5
BG 5917	HM 94060832	ACH 309
CG 5104	HM 93000625	
ACH 197	HM 93060912	
M 9581	HM 93060609	
ACH 9340058	96SXSM-1	

Trials were harvested on September 13 and 14. Two of the three trials were harvested. The sugarbeets were analyzed for yield and quality.

Varieties were coded and sent to Beta Seed in Shakopee, MN for testing for tolerance to cercospora leaf spot. Sugarbeets were rated for cercospora leaf spot four times periodically from August 13 through September 3. KWS scale of 1-9 was used for rating criteria. American Crystal 309 and Hilleshog Mono-Hy Niagra were used as approved variety checks and will be considered as such in the discussion.

Results and Discussion

Cercospora leaf spot in 1996 was managed by the grower much better than in 1995. The weather conditions were much more conducive to infection of cercospora leaf spot in 1995 than in 1996. However, cercospora leaf spot was still a production problem in 1996 and needs to be considered as sugarbeets are grown in the future. Varieties are the easiest way to manage cercospora leaf spot, that is, as long as the varieties are available that have adequate tolerance for production in the Southern Minnesota Beet Sugar

Cooperative growing area. Therefore, the testing of varieties to determine the genetic potential for tolerance to cercospora leaf spot and ability to produce sugar.

Cercospora leaf spot (CLS) increased over time (Table 2). Tested varieties averaged 3.07 with the range of a low at 2.52 with ACH 197 and a high at 4.16 with the susceptible check. ACH 197 is a Michigan approved variety which typically has high tolerance to cercospora leaf spot. Varieties that had higher cercospora leaf spot early were also high late. ACH 197 was statistically similar to nine other varieties with an average that ranges from 2.52 to 2.98. Thus, 19 varieties had significantly higher cercospora leaf spot than ACH 197, which had the lowest cerocospora leaf spot. ACH 309 and Niagra were the two approved varieties tested. These two varieties are among the lowest cercospora leaf spot rating when compared to the other approved varieties. ACH 309 was as high or higher than 19 of the 28 varieties tested. Niagra was high or higher than 28 varieties tested. Therefore, for cercospora leaf spot tolerance, the genetic material tested appears to be much better than the genetic material within the approved varieties as a whole.

Twenty-four varieties were tested for yield and quality components. Sucrose content ranged from 14.70 percent to 15.73 percent. There was no significant difference among 19 of the higher varieties for sucrose content. Loss to molasses was nonsignificant for all varieties considered. However, one needs to realize that for every .1 percent increase in recoverable sucrose percent (sucrose% - LTM), approximately $.36 is added to the payment per ton. Thus, a significant change in payment to the producer can occur even though the data is statistically nonsignificant.

Sixteen of the twenty-four varieties tested gave statistically nonsignificant yield data. Tons per acre ranged from 20.48 with 96SXSM-1 to a low of 16.88 with CG5104.

The relatively tight data observed for sucrose, loss to molasses and tons per acre resulted in similar results with recoverable sugar per acre. The range from high to low was 5731 with 96SXSM-1 to CG5104. This related directly with tons per acre.

The objective of this trial is to screen varieties to tolerance to cercospora leaf spot and high sucrose production and in particular, high sucrose content. In this author's opinion, to meet this requirement a variety should be below average on cercospora leaf spot tolerance and above average on recoverable sucrose per acre.

Table 1. Cercospora Leaf Spot Evaluation of Varieties, 1996

	TREATMENT	SUCROSE	LTM	TON/AC	RST	RSA
1	BG 5981	14.86	1.02	18.10	276.8	5007
2	BG 2342	14.97	0.96	18.56	280.2	5193
3	Beta 5931	14.70	0.96	18.65	274.8	5128
4	BG 5320	15.36	1.01	17.93	286.9	5147
5	BG 5917	15.24	0.95	18.61	285.8	5319
6	CG 5104	15.36	1.00	16.89	287.1	4836
7	ACH 197	15.21	0.99	18.28	284.4	5183
8	M 9581	15.24	0.98	18.46	285.3	5248
9	ACH 9340058	15.23	1.02	17.99	284.3	5121
10	ACH 9040013	15.74	1.00	19.28	294.8	5679
11	ACH 308	15.71	0.96	18.57	294.9	5483
12	94060345	15.29	0.94	19.25	287.0	5526
13	93060592	15.34	0.95	19.40	287.7	5541
14	94060832	15.68	0.96	18.80	294.4	5520
15	93000625	15.33	0.96	19.19	287.4	5503
16	93060912	15.44	1.00	18.46	288.8	5338
17	93060609	15.36	0.95	17.91	288.2	5157
18	96SXSM-1	14.99	1.02	20.49	279.3	5732
19	96SXSM-2	14.84	1.00	18.18	276.9	5038
20	96SXSM-3	15.37	0.98	17.90	287.7	5151
21	96SXSM-4	15.48	0.97	17.61	290.1	5102
22	96SXSM-5	15.30	1.02	18.98	285.7	5418
23	ACH 309	15.32	0.92	18.65	287.8	5352
24	Niagara	15.25	0.95	17.88	285.9	5093
	LSD (0.05)	0.63	NS	1.98	13.0	606
	C.V. %	5.94	12.21	15.45	6.6	16

Table 2. Cercospora Leaf Spot Evaluation of Varieties, 1996

	TREATMENT	RROT	C8/13	C8/21	C8/25	C9/3	CRAVG
1	BG 5981		2.00	2.31	3.63	4.38	3.08
2	BG 2342		2.00	2.31	3.38	4.50	3.05
3	Beta 5931		1.75	2.19	3.25	4.38	2.89
4	BG 5320		1.88	2.63	3.38	4.63	3.13
5	BG 5917		2.00	2.31	3.25	4.63	3.05
6	CG 5104		1.75	2.25	3.13	4.38	2.88
7	ACH 197		1.50	1.94	3.00	3.63	2.52
8	M 9581		2.00	2.88	3.88	5.63	3.59
9	ACH 9340058		2.00	2.31	3.38	4.63	3.08
10	ACH 9040013		1.63	2.44	3.13	4.13	2.83
11	ACH 308		1.63	2.31	3.38	4.38	2.92
12	94060345		1.75	2.56	3.25	4.38	2.98
13	93060592		2.13	2.69	3.50	4.75	3.27
14	94060832		2.00	2.44	3.00	3.88	2.83
15	93000625		2.13	2.81	3.25	4.75	3.23
16	93060912		1.75	2.50	3.25	4.63	3.03
17	93060609		2.00	2.06	2.88	4.50	2.86
18	96SXSM-1		1.88	2.44	3.13	4.63	3.02
19	96SXSM-2		2.25	2.63	3.38	5.00	3.31
20	96SXSM-3		1.75	2.38	3.38	4.88	3.09
21	96SXSM-4		2.13	2.50	3.25	4.88	3.12
22	96SXSM-5		1.63	2.44	3.38	4.25	2.92
23	ACH 309		1.75	2.38	3.50	4.88	3.13
24	Niagara		2.38	3.31	4.00	5.50	3.80
25	CRCK1____Moderately Resistant		2.25	2.63	3.38	4.50	3.19
26	CRCK2____Moderately Susceptible		2.63	3.25	4.00	6.00	3.97
27	CRCK3____Susceptible		2.25	3.00	4.38	7.00	4.16
28	CRCK4____Resistant		1.75	2.00	3.00	3.88	2.66
	Mean		1.90	2.46	3.33	4.59	3.07
	Check		2.22	2.72	3.69	5.34	3.49
	LSD5		0.51	0.59	0.52	0.56	0.43

EVALUATION OF GRID SOIL TESTING AND VARIABLE RATE FERTILIZATION

A good fertility program with sugarbeets is essential to maximize sugar production. The type of fertility program has changed over time. These changes have come in many aspects. The most recent has been the choice of conventional or grid soil testing and spreading fertilizer as such.

A trial was established with a grower as a cooperator. This test was setup by initially grid soil testing an entire field. The field was fertilizer spread in three separate strips in a north to south direction. The fertilizer was spread in strips 380 feet wide as in Figure 1.

Fertilizer was calculated at 140 - adjusted total N (Table 1) for nitrogen, and conventional over all grids for phosphorus, potassium, zinc and boran at 70, 90, 2, and .5 lbs., respectively (Table 1).

Variable Rate Spreading 1	Conventional Spreading	Variable Rate Spreading 2

The sugarbeets were planted on May 31. The sugarbeet variety was ACH 309. Sugarbeets were maintained by cooperator throughout the growing season with normal production practices. Sugarbeets were sampled for yield and quality analysis on September 30, 1996.

Result and Discussion

Grid soil testing showed the variability within the field. Fields with variability should be spread with variable rate spreaders after grid soil testing.

Soil test results are presented in Tables 1 - 2. These data indicate variability in soils nitrogen, phosphate and potassium availability. Grids were setup by Centrol Inc. as 400 x 400 feet grids. This test will not indicate the size of grids or how many soil probes should be taken from each grid or location of soil probes within grid. This test will only consider the advantage of soil testing by grid and variable rate fertility in comparison to soil testing conventionally and fertilizing as such.

Data was analyzed with each strip in the field representing a treatment. This method of analysis separated the field from east to west as three separate treatments. Two variable rate treatments (grid tested) were separated by one conventional spread

(conventionally tested). This test shows a nonsignificant difference among treatment (Table 1). Variable rate 1 and 2 indicated a slightly higher ton per acre compared to conventional spreading but not significantly different.

Sugar percent of variable rate 1 was significantly higher than conventional and variable rate 2. Conventional and variable rate 2 both gave a sugar percent not significantly different. Loss to molasses was inversely related to sugar percent.

Recoverable sugar per ton was directly related to sugar percent. Thus, variable rate 1 gave a greater recoverable sugar per ton than did conventional spread or variable rate 2. Recoverable sugar per acre was nonsignificant. Variable rate 1 gave recoverable sugar per ton 355 pounds higher than conventional spread. Conventional spread produced recoverable sugar per ton only 43 pounds higher than variable rate 2. However, neither one of the treatments were significantly higher than the other for recoverable sugar per ton.

Revenue per ton and per acre was highest with variable rate 1. Variable rate 1 gave revenue per acre 8 percent higher than conventional spread. Conventional spread was only 2 percent better than variable rate 2. When considering both variable rate treatments together, their average was 102 and thats still 4 percent higher than conventional spread. A 4 percent increase in revenue means a 4 dollar increase in revenue per acre for every 100 dollars of revenue. Soil testing by grid and variable rate spreading generally cost in the range of 16 to 20 dollars per acre. Thus, a revenue of 400 to 500 dollars per acre would have to be achieved to realize a 16 to 20 dollar per acre increase in revenue of variable rate over conventional at a 4 percent difference in revenue per acre. Thus, an average revenue per acre for 1996 crop year would yield approximately an extra 18 to 23 dollars per acre when considering a 4 percent increase in revenue per acre.

Table 1. Soil Test Analysis for Each Grid

Treatment	Soil ID	Adj. Total N	Phosphorus	Potassium	O.M.	pH	Zinc
VRS-1	1	13	32	130	5.5	8.2	2.72
VRS-1	2	57	18	156	4.1	8.0	1.88
VRS-1	3	111	28	200	7.1	7.8	2.88
VRS-1	4	76	21	150	3.1	7.8	3.08
VRS-1	5	33	23	166	3.7	8.1	2.56
VRS-2	26	44	24	135	3.5	7.9	3.30
VRS-2	27	63	21	163	4.0	7.9	3.45
VRS-2	28	47	18	186	3.0	8.0	1.91
VRS-2	29	72	30	187	4.0	7.9	3.88
VRS-2	30	109	27	185	3.7	7.8	3.43
Conv.	21	62	22	198	3.9	8.0	3.45
Conv.	22	30	37	222	4.7	8.2	3.86
Conv.	23	31	40	228	5.3	8.2	5.87
Conv.	24	96	16	148	3.4	8.0	3.19
Conv.	25	73	17	170	3.9	8.0	3.46

Table 2. Design of Test Coinciding with Test Results in Table 1

Soil ID-5 VRS-1	Soil ID-25 Conv.	Soil ID-30 VRS-2
Soil ID-4 VRS-1	Soil ID-24 Conv.	Soil ID-29 VRS-2
Soil ID-3 VRS-1	Soil ID-23 Conv.	Soil ID-28 VRS-2
Soil ID-2 VRS-1	Soil ID-22 Conv.	Soil ID-27 VRS-2
Soil ID-1 VRS-1	Soil ID-21 Conv.	Soil ID-26 VRS-2

TABLE 3. YIELD AND QUALITY DATA FOR VARIABLE RATE VS CONVENTIONAL SPREAD FERTILIZER STUDY.

TREATMENT	TON/A	SUGAR %	LTM %	RST	RSA	REVENUE PER TON (% OF MEAN)	REVENUE PER ACRE (% OF MEAN)
VARIABLE RATE SPREADING 1	20.32	17.15	1.13	321	6514	106	106
CONVENTIONAL SPREADING	20.05	16.55	1.20	307	6159	99	98
VARIABLE RATE SPREADING 2	20.51	16.17	1.26	298	6116	95	96
MEAN	**20.29**	**16.62**	**1.20**	**308.67**	**6263.00**	**100.00**	**100.00**
CV%	6.33	2.06	6.38	2.42	6.95		
LSD	NS	0.55	0.12	12	NS		

EVALUATION OF THE ADDITIONAL LIME TO SOIL FOR SUGARBEET, CORN AND SOYBEAN PRODUCTION

Southern Minnesota Beet Sugar Cooperative in the extraction of sugar produces a lime by-product. The question remains of whether or not the lime could be spread on the soil without a reduction in production. The answer to this question is easy to answer if your talking about low pH acidic soils. However, the answer is not so clear when referring to high pH calcareous soils. These higher pH calcareous soils are more commonly found in the Southern Minnesota Beet Sugar Cooperative growing area. Therefore, testing of lime applied to soils with slightly higher than neutral pH was initiated in 1996. Soils were soil tested for fertility and pH. Soils were fertilized with a N-P-K analysis in accordance with the soil test analysis to meet the sugarbeets nutrient requirements. Experimental units were measured to 11 x 30 ft. Lime was applied to experimental units at 0, 4 and 6 ton of lime per acre. The experimental design was a randomized complete block design with six replications.

Results and Discussion

Lime use did not detrimentally effect yields or quality of sugarbeets (Table 1). All yield and quality factors were non-significant in consideration of treatments. There appeared to be a slight increase in recoverable sugar per acre when adding lime to the soil, although not a significant increase over no lime added. Corn yields were not influenced by the use of lime regardless of rate (Table 2). Soybean yields were equal to or higher with the addition of lime (Table 3). Lime use will be considered over a period of four years; thus, the effect of lime on soil factors, and yield and quality of soybeans, corn, and sugarbeets will be followed over a period of four years.

Table 1. Sugarbeet Yield and Quality as Influenced by Lime Added to Soil

Trt	Tons/A	Sugar	LTM	RST	RSA
No lime	24.78	14.68	1.47	264.1	6516
4 ton lime	24.85	14.68	1.47	264.0	6539
6 ton lime	24.61	14.75	1.43	266.4	6529
Mean	24.75	14.70	1.46	264.8	6528
CV%	7.86	3.89	6.02	4.63	5.94
LSD (0.05)	NS	NS	NS	NS	NS

Table 2. Corn Yield as Influenced by Lime Added To Soil

Trt	Bu/A	Test Wt.	Moisture
No lime	125	52	22.5
4 ton lime	127	51	23.6
6 ton lime	124	52	22.8
Mean	125	52	23.0
CV%	9.68	3.56	10.34
LSD (0.05)	NS	NS	NS

Table 3. Soybean Yields as Influenced by Lime Added to Soil

	Bu/A
No lime	45
4 ton lime	43
6 ton lime	50
Mean	46
CV %	10.38
LSD (0.05)	4

THE EFFECTS OF SOIL pH AND POSTEMERGENCE RAPTOR AND PURSUIT APPLIED TO SOYBEANS IN 1995 ON SUGARBEET INJURY IN 1996 AT LAMBERTON, MN

William E. Luschen, Jodie K. Getting and Ed L. Foland

The objectives in this study were to investigate the effects of soil pH and two rates of application of Raptor and one rate of Pursuit applied postemergence to soybeans in 1995 on carryover potential to sugarbeets grown in 1996. The two sites selected for this study were located approximately 100 yards apart and differed significantly in pH levels. The low pH site had soil pH values that ranged from 5.0 to 6.0 while the high pH site had pH values ranging from 6.2 to 8.1. The soil type at the low pH site was a Ves loam containing 4.5 % organic matter with P and K soil test levels of 60 and 410 lb/A, respectively. The soil type at the high pH site as a Canisteo clay loam containing 5.1% organic matter with P and K soil tests of 28 and 378 lb/A, respectively. The experiment was designed as a randomized complete block at each site with four replications and a plot size of 30 by 30 feet. 'Parker' soybeans were planted on May 12, 1995 at both sites at a seeding rate of 160,000 seeds/A in 30-inch rows. All plots were treated with metolachlor at 2.44 lb/A on May 12, 1995. Postemergence applications of Raptor and Pursuit were applied on June 16, 1995 when the soybeans were in the second trifolioate leaf stage. Crop oil concentrate at 1.25% v/v + 28% nitrogen solution at 1.25% v/v were applied as a tank mixture with each herbicide. Both sites received no tillage in the fall of 1995.

In the spring of 1996 the sites were fertilized with 150 lb/A of nitrogen, applied as urea, and field cultivated once. American Crystal '196' sugarbeets were planted May 17, 1996 in 20-inch rows at a seeding rate of 74,500 seeds/A. Weed control was maintained at both sites with EPTC at 1.0 lb/A + cycloate at 3.0 lb/A applied and incorporated with a field cultivator on May 17, 1996. (Desmedipham & phemedipham & ethofumesate) were applied (0.094 & 0.094 & 0.094 lb/A) postemergence on June 7 and June 24. Sethoxydim at 0.19 lb/A + COC at 1.25% v/v + ammonium sulfate at 2.5 lb/A were applied July 1. (Desmedipham & phenmedipham & ethofumesate) + clopyralid at (0.15 & 0.15 & 0.15 lb/A) + 0.19 lb/A were applied on July 12, 1996. Fungicide applications (triphenyltin) were applied on 0.2 lb/A on three dates: July 22, July 31 and August 15. All herbicide treatments were applied at 20 gpa at 30 psi with 8002 flat fan nozzle tips spaced 15 inches apart on the boom.

Table 1. Rainfall and temperature data for Lamberton, MN. January, 1995 through September 1996

	Rainfall			Temperature					
				Year					
	Year		35 Year	1995		1996		35 Year Avg.	
Month	1995	1996	Average	Max	Min	Max	Min	Max	Min
January	0.00	1.90	0.63	26	6	16	-3	22	3
February	0.18	0.12	0.57	33	8	26	10	28	9
March	3.32	1.19	1.60	42	21	35	16	39	21
April	4.45	0.35	2.82	49	30	53	29	57	36
May	4.18	4.07	3.20	66	43	63	45	72	46
June	1.70	5.76	4.54	82	57	81	58	81	56
July	6.93	5.57	3.90	84	58	82	58	84	60
August	3.36	4.66	3.02	84	60	81	55	82	57
September	2.19	2.18	3.22	72	44	71	46	73	48
October	2.42	-	2.10	58	36	-	-	61	37
November	0.77	-	1.22	34	17	-	-	42	24
December	0.55	-	0.67	28	10	-	-	27	9
Total/Avg.	**30.55**	**-**	**27.49**	**56**	**33**	**-**	**-**	**56**	**34**

Both rates of Raptor and Pursuit caused significant soybean injury at both sites (chlorosis and stunting) when evaluated on June 26 and July 6. (Aciflurofen & bentazon) caused more soybean injury (leaf burning) than was observed for the other treatments. When evaluated on July 26, no injury was observed with either Raptor or Pursuit but some injury was still observed with the (aciflurofen & bentazon) treated check. Soybean maturity was not affected much by any treatment. Soybean yields at the high pH site averaged 9.9 bu/A higher than the low pH site. The Pursuit treatment at the low pH site yielded more than the (aciflurofen & bentazon) check and at the high pH site the (aciflurofen & bentazon) treatment yielded significantly less than the Raptor and Pursuit treatments.

Raptor at 0.032 lb/A (near the anticipated label rate) at the low pH site caused more than 50% sugarbeet injury (stunting, stand reduction) through the July 8 ratings. In mid-August significant injury was still observed. This treatment on the high pH site caused very little injury. The 0.063 lb/A rate of Raptor caused significantly more sugarbeet injury at both sites (especially at the low pH site) than the 0.032 lb/A rate. There was low levels of sugarbeet injury at the high pH site with the 0.063 lb/A rate of Raptor. Pursuit resulted in almost complete loss of the sugarbeets at the low pH site; injury at the high pH site ranged from 30% on June 26 to 18% on August 15. Pursuit tended to reduce sugarbeet stands at the high pH site but the differences were generally not significant compared to the check. Compared to the check, Raptor generally did not reduce sugarbeet stands at either site, although at the low pH site stands tended to be reduced. Sugarbeet yields and recoverable sugar was not affected by the anticipated labeled rate of Raptor at either site. The high rate of Raptor (approximately a 2X rate) reduced recoverable sugar yields by 40 and 9% at the low and high pH sites, respectively. Pursuit reduced recoverable sugar yields by 98 and 21% at the low and high pH sites, respectively. Soil pH plays a major role in determining the potential for carryover of Raptor and Pursuit to sugarbeets. Raptor is much less likely to cause sugarbeet injury the year following application than Pursuit at both high and low soil pH values. More research needs to be conducted to determine the soil pH levels that are critical for carryover of these herbicides.

Table 2. The effects of Raptor and Pursuit applied postemergence to soybeans on injury and yield of soybeans at Lamberton, MN in 1995

Low pH Site		Injury				
Treatment	Rate	06/26	07/06	0726	Maturity	Yield
	(lb/A)	----- (%) -----			(9/1=1)	(bu/A)
Raptor	0.032	14	14	0	14	39.2
Raptor	0.063	15	9	0	16	36.5
Pursuit	0.063	11	11	0	15	39.9
Check		25	16	4	15	37.0
LSD (0.10)		6	9	2	1	2.7

High pH Site		Injury				
Treatment	Rate	06/26	07/06	0726	Maturity	Yield
	(lb/A)	----- (%) -----			(9/1=1)	(bu/A)
Raptor	0.032	14	11	1	14	47.6
Raptor	0.063	16	11	0	14	45.9
Pursuit	0.063	14	9	0	14	47.4
Check		31	23	5	15	43.4
LSD (0.10)		5	4	1	NS	2.3

All treatments were applied with a tank mixture of COC at 1.25% + 28%N
COC = crop oil concentrate, Class Additive 17%; and 28%N = an aqueous solution of urea and ammonium nitrate. Yield adjusted to 13.0% moisture.

Table 3. Effects of Raptor and Pursuit applied postemergence to soybeans in 1995 on sugarbeet performance in 1996 at Lamberton, MN

Low pH site Treatment	Rate	Injury				Plant Population			Yield	Sugar	LTM	Recov Sugar
		06/26	07/08	07/23	08/15	06/14	06/26	07/08				
	(lb/A)	%				(plants/A)			(tons/A)	(%)	(%)	(lb/A)
Raptor	0.032	55	53	48	38	22820	23689	23037	13.46	12.0	1.42	2856
Raptor	0.063	79	77	70	58	26515	26732	21299	11.16	11.6	1.41	2260
Pursuit	0.063	98	99	99	99	2608	1739	652	0.39	11.9	1.41	83
Check		0	0	0	0	29992	32600	33252	17.26	12.2	1.32	3769
LSD (0.10)		**18**	**19**	**20**	**24**	**9394**	**10100**	**8181**	**4.24**	**0.5**	**0.09**	**946**

High pH site Treatment	Rate	Injury				Plant Population			Yield	Sugar	LTM	Recov Sugar
		06/26	07/08	07/23	08/15	06/14	06/26	07/08				
	(lb/A)	%				(plants/A)			(tons/A)	(%)	(%)	(lb/A)
Raptor	0.032	7	2	3	2	20212	24559	24124	20.22	11.9	1.46	4219
Raptor	0.063	12	8	4	2	24993	26949	26949	18.80	12.0	4.35	3964
Pursuit	0.063	30	26	19	18	18908	19777	19777	16.50	12.0	1.36	3433
Check		0	0	0	0	19995	24559	24559	20.15	12.2	1.36	4354
LSD (0.10)		**13**	**12**	**10**	**11**	**5838**	**6269**	**7317**	**3.05**	**0.6**	**0.08**	**688**

T/A of washed sugarbeets
LTM = sugar lost to molasses
Recoverable sugar = recoverable sugar calculated as T/A *(% sugar - % LTM) *20

EFFECT OF PAT AND TACHIGAREN ON APHANOMYCES ROOT ROT OF SUGARBEET

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Objective:

To evaluate PAT and Tachigaren, singly and in combination, for control of *Aphanomyces cochlioides* on sugarbeet.

Materials and Methods:

Pelleted sugarbeet seed of ACH 205 and Beta 3580, both with partial resistance to *A. cochlioides*, were treated with PAT, Tachigaren (45 g/kg seed), or PAT + Tachigaren (45 g/kg seed). This seed also had been treated with Apron and Thiram (to prevent infection by *Pythium* and *Rhizoctonia*) at recommended rates. Controls consisted of seed treated with Apron and Thiram.

Soil naturally infested with *A. cochlioides* was collected from three fields (located at Buffalo Lake, MN; Georgetown, MN; and Hillsboro, ND). It was passed through a 0.25-inch mesh screen, thoroughly mixed, and stored in a cool and dry room until planted. Then, 375 cc of soil were placed in a plastic pot (11 x 11 x 11 cm) and gently packed. Twenty-five sugarbeet seeds were equidistantly placed on the soil surface with an air-seeder and then covered with 225 cc of soil. Soil was moistened with 50 ml of tap water per pot. Seed of both varieties (ACH 205 and Beta 3580) and seed treatments (control, PAT, Tachigaren, PAT + Tachigaren) were planted in each of the three soils. There were eight replicates of each variety and seed treatment for the Buffalo Lake and Hillsboro soils and seven replicates for the Georgetown soil. Pots were arranged in a randomized block design for each soil source. To favor Aphanomyces root rot, soil was kept moist and greenhouse temperatures ranged from 19 to 31° C.

Data were collected on stand (at emergence and then twice weekly for 3 wk). A select number of dying seedlings were assayed in the laboratory for confirmation of infection by *A. cochlioides*. At 4 wk after planting, surviving seedlings were evaluated for disease and then a root rot index (RRI) was calculated (0-100 scale, 0 = healthy, 100 = all seedlings dead).

Data for each soil source were statistically analyzed separately. Analyses of variance were computed with SAS statistical analysis software (SAS Institute, Cary, NC). When needed, transformations were used to stabilize variances. Treatment means were compared with Fisher's protected least significant difference (LSD, $P = 0.05$).

Results and Discussion:

At 1 wk after planting, stand was excellent for Beta 3580 across all seed treatments in the three soils whereas stands of ACH 205 varied with seed treatment and soil source (Fig. 1). In the Georgetown soil (Fig. 1B), there were no significant (P = 0.05) reductions in stands of ACH 205 compared to Beta 3580, except when seed of ACH 205 had been treated with PAT + Tachigaren. In soil from Buffalo Lake (Fig. 1A) and Hillsboro (Fig. 1C), there were significant (P = 0.05) reductions in stands of ACH 205 across all seed treatments compared to Beta 3580, especially when seed of ACH 205 had been treated with PAT + Tachigaren.

At 2, 3, and 4 wk after planting, Aphanomyces root rot severely reduced stands of plants from PAT-treated seed and the controls of ACH 205 and Beta 3580 in the three soils (Fig. 1). For these treatments, most stand loss occurred within the first to second week after planting; by the third week after planting, stands were negligible. Low stand counts, or the absence of plants, by 4 wk after planting accounted for extremely high root rot indices for PAT-treated seed and the controls of both varieties (Table 1).

Seed treated with Tachigaren or PAT + Tachigaren delayed stand loss until 3 wk after planting; by 4 wk after planting, these seed treatments still resulted in higher stands compared to the control or to PAT alone (Fig. 1). Beta 3580 usually had significantly (P = 0.05) greater stands than ACH 205 at 2, 3, and 4 wk after planting in the three soils when seed had been treated with Tachigaren or PAT + Tachigaren (Fig. 1). This trend may be accounted for, in part, by the lower initial stands of ACH 205, regardless of seed treatment. At 4 wk after planting in the Georgetown soil (Fig. 1B), stands were the same for ACH 205 treated with Tachigaren or PAT + Tachigaren, but throughout the experiment in the other two soils (Fig. 1A, C), stands were significantly (P = 0.05) greater for ACH 205 treated with Tachigaren compared to PAT + Tachigaren. At 4 wk after planting in the Buffalo Lake (Fig. 1A) and Georgetown (Fig. 1B) soils, stands were the same for Beta 3580 treated with Tachigaren or PAT + Tachigaren but in the Hillsboro soil (Fig. 1C), stands were significantly (P = 0.05) greater for Beta 3580 treated with Tachigaren than for PAT + Tachigaren.

Root rot index values (Table 1) corresponded to stands 4 wk after planting (Fig. 1). Aphanomyces root rot was severe because of high soil populations of *A. cochlioides* and optimal conditions (moisture and temperature) for disease. Despite heavy disease pressure, plants from Tachigaren-treated seed (with or without PAT) maintained good stands until 3 wk after planting, a time when the fungicide is nearly completely decomposed. If root rot indices of plants from Tachigaren-treated seed had been made at 3 wk after planting or earlier, they likely would have been lower than those obtained at 4 wk after planting (Table 1), when the fungicide no longer was present.

The lower stands of ACH 205 throughout the experiment, in comparison to Beta 3580, may be attributed to the seed lot rather than to performance of ACH 205 in the presence of Aphanomyces root rot. Based on previous experience of the authors, and

in coded variety trials reported in the annual Minnesota-North Dakota Sugarbeet Research and Extension Reports, ACH 205 germinates well and is one of the best varieties available for withstanding Aphanomyces root rot.

Conclusions:

1. Seed treatment with Tachigaren, with or without PAT, delayed stand loss caused by *A. cochlioides* for 3 wk after planting and resulted in the greatest plant stands compared to the control or seed treatment with PAT alone.

2. Seed treatment with PAT did not provide additional benefits over Tachigaren alone.

3. Seed treatment with PAT + Tachigaren significantly reduced initial emergence of ACH 205, but not Beta 3580, in two of three soils.

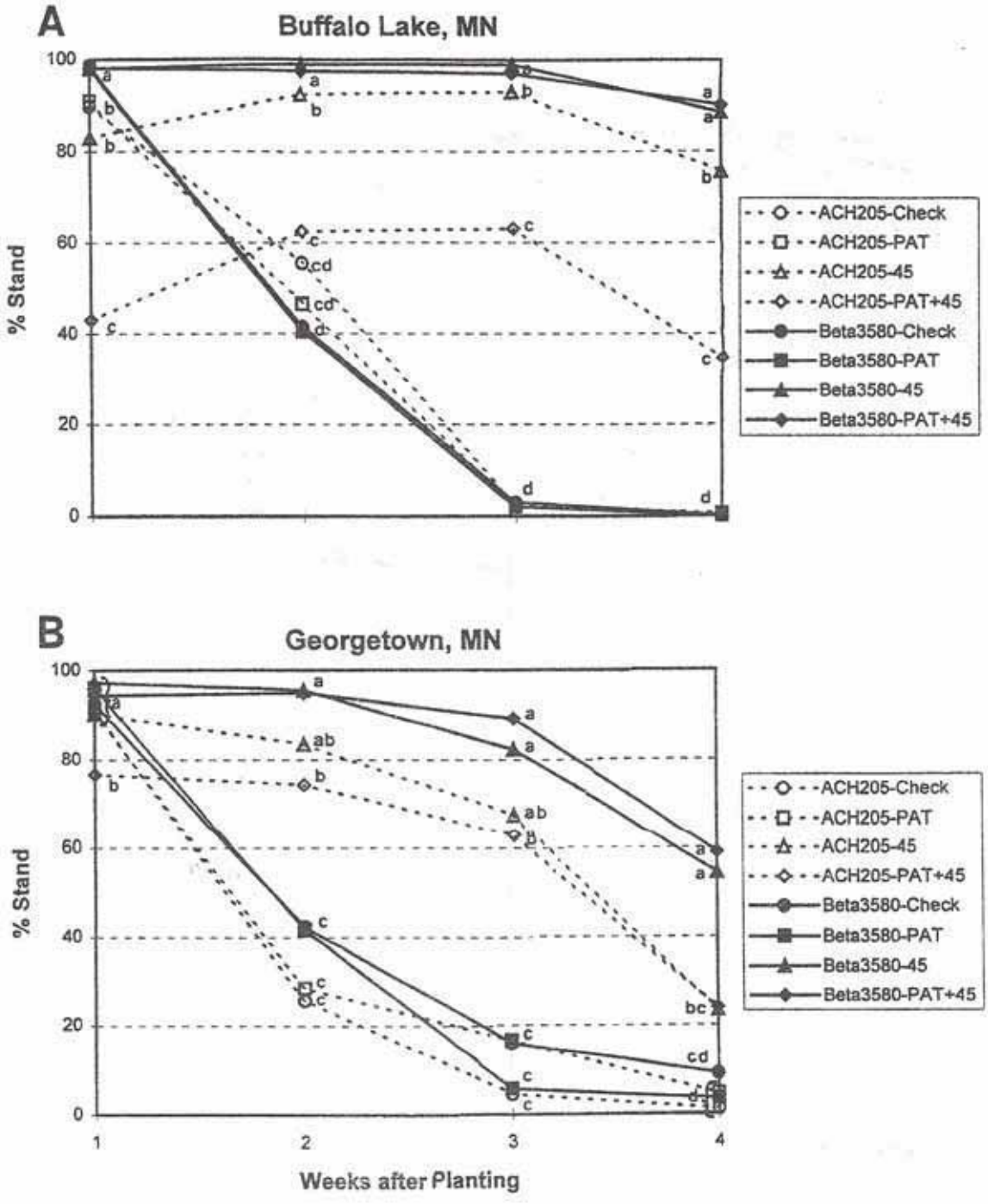
4. Stands of ACH 205 tended to be lower than Beta 3580, regardless of seed treatment.

Table 1. Root rot indices of 4-wk-old sugarbeet seedlings of two varieties where seed had been treated with PAT, Tachigaren (45 g/kg seed), or PAT + Tachigaren (45 g/kg seed). Seeds were planted into soil naturally infested with *Aphanomyces cochlioides* collected from three locations.

Variety	Seed Treatment[y]	Root rot index[z]		
		Buffalo Lake	Georgetown	Hillsboro
ACH 205	Control	100 a	99 a	99 a
ACH 205	PAT	100 a	97 ab	100 a
ACH 205	Tachigaren	39 c	84 cd	67 c
ACH 205	PAT + Tachigaren	56 b	82 d	85 b
Beta 3580	Control	100 a	94 bc	99 a
Beta 3580	PAT	100 a	98 ab	100 a
Beta 3580	Tachigaren	39 c	62 e	44 d
Beta 3580	PAT + Tachigaren	34 c	59 e	54 d

[y] All seed pretreated with Apron and Thiram at recommended rates.

[z] Each root rot index value (0-100 scale, 0=plants healthy, 100=plants dead) based on 25 seeds per pot, replicated eight times in the Buffalo Lake and Hillsboro soils and seven times in the Georgetown soil. For each column, values followed by the same letter are not significantly different, $P = 0.05$, Fisher's protected least significant difference (LSD). Values provided are nontransformed but mean separations are based on transformed data.


A
Buffalo Lake, MN
% Stand
100
80
60
40
20
0
ACH205-Check
ACH205-PAT
ACH205-45
ACH205-PAT+45
Beta3580-Check
Beta3580-PAT
Beta3580-45
Beta3580-PAT+45
B
Georgetown, MN
% Stand
Weeks after Planting
1
2
3
4

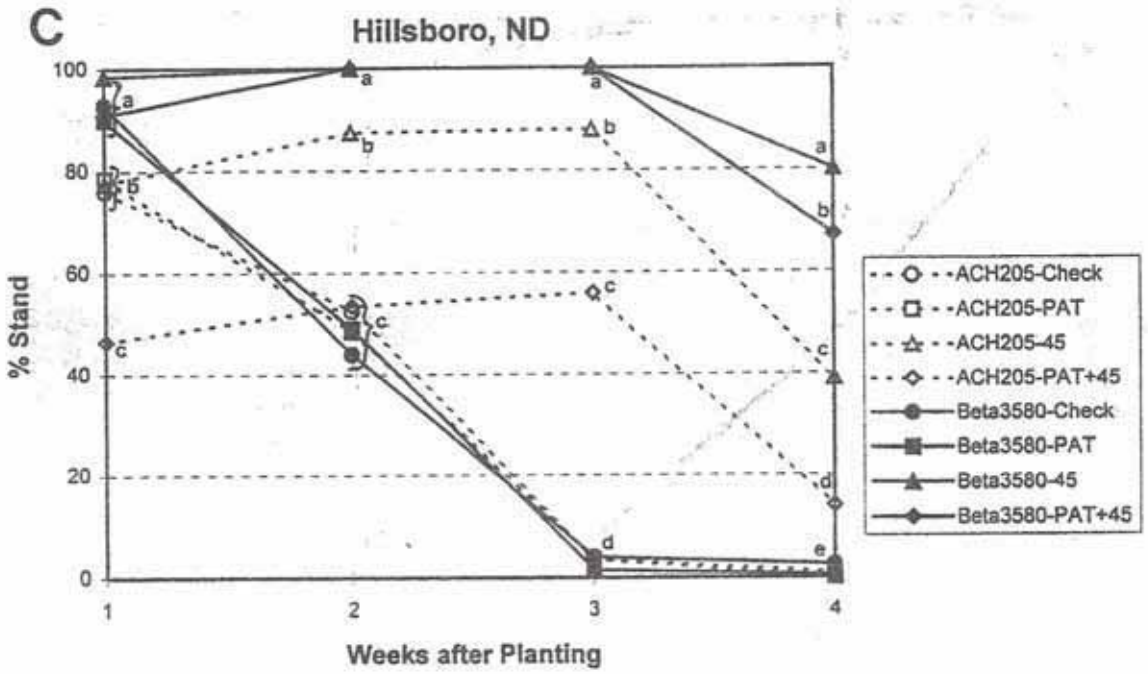


Fig. 1. Changes in percent stand of two varieties of pelleted sugarbeet seed treated with PAT, Tachigaren (45 g/kg seed), or PAT + Tachigaren (45 g/kg seed) and planted into soil naturally infested with *Aphanomyces cochlioides.* Soil was collected from **A)** Buffalo Lake, MN, **B)** Georgetown, MN, and **C)** Hillsboro, ND. All seed also was pretreated with Apron and Thiram, at recommended rates, including the control. For each location and week after planting, values followed by the same letter are not significantly different, $P = 0.05$, Fisher's protected least significant difference (LSD). Values provided are nontransformed but mean separations are based on transformed data.

PERFORMANCE OF TACHIGAREN AS A SUGARBEET SEED TREATMENT IN 1996 FIELD TRIALS

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Aphanomyces cochlioides (= *A. cochlioides*) is a water mold that causes damping-off of sugarbeet seedlings when soil conditions are warm and wet. The fungus also causes root rot of older and mature roots when warm, wet soil conditions occur at any time during the remainder of the growing season. Although *A. cochlioides* is a common problem in southern Minnesota and in the southern portion of the Red River Valley, it also occurs sporadically in fields in the northern portion of the Valley.

Recommendations for control of Aphanomyces damping-off include selection of varieties with partial resistance, seed treatment with the fungicide Tachigaren, and early planting when soils are cool (so conditions favorable for disease are avoided during stand establishment). Tachigaren is a recent option in control of *Aphanomyces* in the United States. It was registered for use on pelleted sugarbeet seed in the fall of 1995 and was first available for commercial sugarbeet production in the 1996 field season. Tachigaren has been used as a seed treatment in other sugarbeet-growing regions of the world, but many questions remain regarding the appropriate rate of fungicide needed to control Aphanomyces damping-off in Minnesota and North Dakota.

OBJECTIVES

The objectives of this trial were to determine the effect of three rates of Tachigaren seed treatment on 1) control of Aphanomyces damping-off and 2) sugar yield in fields heavily infested with *Aphanomyces cochlioides*.

MATERIALS AND METHODS

Medium-size seed of ACH 205, KW 3580, and KW 2398 (each with partial resistance to *A. cochlioides*) was pelleted and then treated with Tachigaren 70 WP at 45, 75, or 90 g per 100,000 seed. Control seed was not treated with Tachigaren. All seed planted in these trials had been pretreated with standard rates of the fungicides Apron + Thiram to protect against other damping-off pathogens (*Phoma betae*, *Pythium* spp. and *Rhizoctonia solani*).

Plots were established in producers' fields located near Hillsboro, ND and near Georgetown, Clara City, and Buffalo Lake, MN where root rot index values (0-100 scale, 0=healthy, 100=all plants dead) averaged 99, 92, 99, and 99, respectively. Seed of ACH 205 and KW 3580 was sown in the plots at Hillsboro and Georgetown and seed of ACH 205 and KW 2398 was sown at Clara City and Buffalo Lake because these specialty varieties are recommended for these geographic areas. Seed of each variety (treated with the 0, 45, 75, or 90 g rates of Tachigaren) was planted to stand (4.5 to 5 1/4 inches between seeds) in four-row plots at Hillsboro and six-row plots at the other three locations. Rows were 22 inches apart and 25 to 30 feet long, depending upon the location. There were two planting dates per location to increase the odds of encountering the warm, wet soil conditions necessary for activity of *A. cochlioides*. Plots at Hillsboro were planted on May 13 and May 28; Georgetown on May 25 and June 10; and Clara City and Buffalo Lake on May 21 and June 11. Plots were arranged in a randomized complete block design of six replicates for each planting date. Herbicides, insecticides, fertilizer, and fungicides to control cercospora leaf spot were applied as appropriate for each location.

Table 1. Stand and yield attained from seed of two sugarbeet varieties that were not treated with Tachigaren (0=control) compared to treatment with Tachigaren 70 WP at 45, 75, or 90 g/100,000 seed. Seed was sown in a field near Clara City, MN that was naturally infested with *Aphanomyces cochlioides*.

Treatment[y]	No. plants/50 ft row ~15 DAP	No. plants/50 ft row 35 DAP	Yield T/A	Yield % Sugar	Yield lb/A
Clara City, MN - planted May 21, 1996					
Seed treatment					
0 = control	39 c	59	19.7 b	16.6	6144
45 g Tachigaren	47 bc	56	22.2 ab	16.5	6843
75 g Tachigaren	59 a	58	23.7 a	16.9	7410
90 g Tachigaren	54 ab	61	21.0 ab	16.8	6612
P-value[z]	0.0002	NS	0.06	NS	NS
Variety					
ACH 205	55 a	61	21.5	16.7	6741
KW 2398	44 b	56	21.8	16.7	6763
P-value[z]	0.0005	NS	NS	NS	NS

[y] All seed was pelleted and also treated with standard rates of Apron + Thiram (to control seedling pathogens other than *A. cochlioides).*

[z] NS = Not significant; in columns where significant differences are noted, values followed by the same letter are not significantly different (*P*=0.05).

Stand counts were taken on the two middle rows of each plot at about 15 to 21 days after planting and again about 35 days after planting. Plots at Hillsboro were harvested on October 9, Georgetown on October 10, Clara City on September 18, and Buffalo Lake on September 23. Yield and quality data were based on the two middle rows of each plot.

RESULTS

For all locations, fields were cold and wet at the first planting date and warm and dry at the second planting date. These soil conditions were unfavorable for development of *Aphanomyces* damping-off, so no disease or only low levels of damping-off occurred, depending upon the location. As the season progressed, root rot occurred infrequently and sporadically in some plots.

There rarely were interactions between seed treatment and variety for the variables measured. Therefore, only main effects (seed treatment and variety) will be presented.

At 15 to 21 days after planting, seed treatments resulted in significant differences ($P \geq 0.05$) in stand for the first planting date at Clara City (Table 1; the second planting date was abandoned because of problems in space-planting), for the second planting date at Buffalo Lake (Table 2) and both planting dates at Hillsboro (Table 3). There were no differences in stand among seed

treatments for the first planting date at Buffalo Lake (Table 2) or for either planting date at Georgetown (Table 4). When seed treatments significantly affected stand, however, the results varied. For instance, at Clara City there were significant increases in stand when seed had been treated with Tachigaren at 75 and 90 g compared to the control (no Tachigaren) (Table 1). For the second planting date at Buffalo Lake (Table 2) and for the first planting date at Hillsboro (Table 3), stands were the same and significantly greater when seed had not been treated with Tachigaren or had been treated at the 45 g rate, compared to the 75 and 90 g rates. For the second planting date at Hillsboro, the 45 g rate of Tachigaren resulted in a significantly greater stand compared to the control and the 90 g rate of Tachigaren (Table 3).

By about 35 days after planting, there no longer were differences in stand among seed treatments for any of the planting dates or locations except for the second planting at Buffalo Lake. In that case, stands were highest when seed had not been treated with Tachigaren or had been treated with the 45 g rate of Tachigaren compared to lower stands attained when seed had been treated with the 75 or 90 g rate of Tachigaren (Table 2).

Yields were higher for the first planting date than for the second planting date across all seed treatments (Tables 2-4). In some cases, seed treatment with Tachigaren resulted in increased yields. At Clara City, the early season increase in stand when seed was treated with 75 g of Tachigaren carried over to harvest and resulted in a significant ($P = 0.06$) increase in tons of beets per acre compared to the control; the 75 g rate also tended to result in the highest percentage of sugar and pounds of recoverable sugar per acre. Although there were no differences in stand among seed treatments for the first planting date at Buffalo Lake, there was a significant increase in yield (tons of beets per acre and pounds of recoverable sugar per acre) when seed had been treated with 75 g of Tachigaren compared to the 45 and 90 g rates and the control (Table 2). For the second planting date at Buffalo Lake, the only significant yield difference noted was an increase in percent sugar when Tachigaren had been applied to seed at the 45 g rate (Table 2). For the second planting date at Georgetown there had been no differences in early season stand among seed treatments, but despite low yields, there was a significant ($P = 0.03$) increase in tons of beets per acre and a significant ($P = 0.02$) increase in pounds of sugar per acre when seed had been treated with 75 g of Tachigaren compared to the control (Table 4). Seed treatment with Tachigaren did not result in any differences in yield compared to the control for the first planting date at Georgetown (Table 4) or for either planting date at Hillsboro (Table 3).

When stands of the two varieties are compared at 15 to 21 days after planting there was a significantly ($P \geq 0.05$) higher stand of ACH 205 than KW 2398 at Clara City (Table 1) and the second planting date at Buffalo Lake (Table 2); there were no differences between these varieties for the first planting date at Buffalo Lake (Table 2). There were significantly greater stands of KW 3580 than ACH 205 for both planting dates at Hillsboro (Table 3), but there were no differences in stand between these varieties for either planting date at Georgetown (Table 4). By 35 days after planting there were no significant differences between varieties except for the second planting date at Buffalo Lake where ACH 205 resulted in a higher stand than KW 2398 (Table 2) and for both planting dates at Hillsboro (Table 3) where KW 3580 resulted in a higher stand than ACH 205 (Table 3).

Yields of ACH 205 and KW 2398 were not significantly different at Clara City (Table 1) or for both planting dates at Buffalo Lake (Table 2). For both planting dates at Hillsboro, percent sugar was significantly ($P=0.0001$) greater for KW 3580 than for ACH 205 but tons of beets per acre and pounds of recoverable sugar per acre were not significantly different (Table 3). At Georgetown, there were significant ($P=0.0002$) increases in tons of beets per acre of ACH 205 over KW 3580 for the first planting date, but there were no differences in yield between varieties for the second planting date; percent sugar was significantly ($P=0.0001$) higher for KW 3580 than for ACH 205 for both planting dates; and there were no significant differences in pounds of recoverable sugar per acre of ACH 205 or KW 3580 for either planting date (Table 4).

Table 2. Stand and yield attained from seed of two sugarbeet varieties that were not treated with Tachigaren (0=control) compared to treatment with Tachigaren 70 WP at 45, 75, or 90 g/100,000 seed. Seed was sown on two planting dates in a field near Buffalo Lake, MN that was naturally infested with *Aphanomyces cochlioides*.

Treatment[y]	No. plants/50 ft row ~15 DAP	No. plants/50 ft row 35 DAP	Yield T/A	Yield % Sugar	Yield lb/A
Buffalo Lake, MN - planted May 21, 1996					
Seed treatment					
0 = control	47	75	17.0 b	16.1	5081 b
45 g Tachigaren	37	70	18.6 b	16.3	5579 b
75 g Tachigaren	45	81	21.0 a	16.3	6291 a
90 g Tachigaren	38	69	18.8 ab	16.5	5700 ab
P-value[z]	NS	NS	0.02	NS	0.01
Variety					
ACH 205	42	73	19.0	16.5	5795
KW 2398	41	75	18.7	16.1	5530
P-value[z]	NS	NS	NS	NS	NS
Buffalo Lake, MN - planted June 11, 1996					
Seed treatment					
0 = control	84 a	72 a	19.1	14.1 b	4686
45 g Tachigaren	72 ab	69 a	18.4	15.1 a	4913
75 g Tachigaren	62 b	60 ab	18.3	14.5 ab	4666
90 g Tachigaren	43 c	50 b	17.5	14.4 b	4466
P-value[z]	0.0002	0.04	NS	0.02	NS
Variety					
ACH 205	72 a	72 a	18.2	14.3	4598
KW 2398	58 b	53 b	18.5	14.7	4768
P-value[z]	0.02	0.002	NS	NS	NS

[y] All seed was pelleted and also treated with standard rates of Apron + Thiram (to control seedling pathogens other than *A. cochlioides*).

[z] NS = Not significant; in columns where significant differences are noted, values followed by the same letter are not significantly different (*P*=0.05).

Table 3. Stand and yield attained from seed of two sugarbeet varieties that were not treated with Tachigaren (0=control) compared to treatment with Tachigaren 70 WP at 45, 75, or 90 g/100,000 seed. Seed was sown on two planting dates in a field near Hillsboro, ND that was naturally infested with *Aphanomyces cochlioides*.

Treatment[y]	No. plants/ 60 ft row ~21 DAP	35 DAP	Yield T/A	% Sugar	lb/A
Hillsboro, ND - planted May 13, 1996					
Seed treatment					
0 = control	88 a	85	13.4	18.2	4586
45 g Tachigaren	86 a	88	14.5	17.9	4787
75 g Tachigaren	79 b	82	12.8	18.0	4313
90 g Tachigaren	74 b	82	11.9	17.6	3886
P-value[z]	0.0002	NS	NS	NS	NS
Variety					
ACH 205	75 b	82 b	14.1	17.5 b	4614
KW 3580	88 a	87 a	12.1	18.4 a	4172
P-value[z]	0.0001	0.03	NS	0.0001	NS
Hillsboro, ND - planted May 28, 1996					
Seed treatment					
0 = control	90 b	95	6.6	17.9	2227
45 g Tachigaren	102 a	100	8.3	17.7	2704
75 g Tachigaren	95 ab	98	8.4	18.0	2804
90 g Tachigaren	89 b	90	9.2	17.8	3046
P-value[z]	0.02	NS	NS	NS	NS
Variety					
ACH 205	84 b	92 b	7.6	17.4 b	2462
KW 3580	103 a	99 a	8.6	18.3 a	2929
P-value[z]	0.0001	0.009	NS	0.0001	NS

[y] All seed was pelleted and also treated with standard rates of Apron + Thiram (to control seedling pathogens other than *A. cochlioides).*

[z] NS = Not significant; in columns where significant differences are noted, values followed by the same letter are not significantly different (*P*=0.05).

Table 4. Stand and yield attained from seed of two sugarbeet varieties that were not treated with Tachigaren (0=control) compared to treatment with Tachigaren 70 WP at 45, 75, or 90 g/100,000 seed. Seed was sown on two planting dates in a field near Georgetown, MN that was naturally infested with *Aphanomyces cochlioides*.

Treatment[y]	No. plants/50 ft row ~17 DAP	No. plants/50 ft row 32 DAP	Yield T/A	Yield % Sugar	Yield lb/A
Georgetown, MN - planted May 25, 1996					
Seed treatment					
0 = control	71	63	16.7	15.8	4600
45 g Tachigaren	73	70	16.9	16.0	4750
75 g Tachigaren	66	64	17.4	16.0	4887
90 g Tachigaren	64	61	16.5	15.9	4639
P-value[z]	NS	NS	NS	NS	NS
Variety					
ACH 205	68	65	18.6 a	15.3 b	4972 a
KW 3580	69	64	15.2 b	16.5 a	4465 a
P-value[z]	NS	NS	0.0002	0.0001	NS
Georgetown, MN - planted June 10, 1996					
Seed treatment					
0 = control	20	53	9.6 b	13.4	2153 b
45 g Tachigaren	16	62	10.8 ab	13.3	2470 ab
75 g Tachigaren	25	61	13.2 a	13.6	3070 a
90 g Tachigaren	12	50	8.7 b	13.0	1987 b
P-value[z]	NS	NS	0.03	NS	0.02
Variety					
ACH 205	19	55	10.5	12.6 b	2281
KW 3580	18	57	10.6	14.1 a	2558
P-value[z]	NS	NS	NS	0.0001	NS

[y] All seed was pelleted and also treated with standard rates of Apron + Thiram (to control seedling pathogens other than *A. cochlioides).*

[z] NS = Not significant; in columns where significant differences are noted, values followed by the same letter are not significantly different (*P*=0.05).

DISCUSSION

The 1996 season did not provide favorable weather for adequate evaluation on effectiveness of Tachigaren in controlling Aphanomyces damping-off. Soil must be warm and wet to stimulate activity of *Aphanomyces cochlioides* and these conditions were uncommon in the fields where the research plots were established. In fact, the cold, wet weather that delayed planting until mid to late May is similar to conditions encountered in most years by late April or early May. After the plots for the first planting date were sown, temperatures increased and soils dried out over the next month (which coincides with the 3-4 week period after planting when Tachigaren is active as it decomposes). After the first planting date in Clara City, however, there apparently was a "narrow window of opportunity" for *A. cochlioides* to be active, as evidenced by increased stands when seed was treated with Tachigaren. There was no similar evidence of *Aphanomyces* activity in plots at the other locations. Data from the first planting date at Hillsboro suggests that not only was *A. cochlioides* inactive, but that Tachigaren seed treatment at the 75 and 90 g rates was detrimental to sugarbeet seed germination. When this plot was planted, frost was present at the 8-inch depth; the stress of cold soil temperatures in combination with high rates of Tachigaren may have been harmful to seed germination.

Soils were warm and somewhat dry during and after the second planting date and thus, were unfavorable for damping-off caused by *A. cochlioides*. When such disease pressure was lacking (e.g., the Buffalo Lake site), stands were best in the control and when seed had been treated with 45 g of Tachigaren compared to stands when seed had been treated with 75 or 90 g of Tachigaren. Dry soil conditions, combined with high rates of Tachigaren, may have been harmful to seed germination. At Georgetown, soil was extremely dry so stands were very low for the first stand count, but a subsequent heavy rainfall resulted in a "flush" of additional plants by about 5 weeks after planting. However, the rainfall apparently arrived too late to influence the performance of Tachigaren seed treatment.

When seed treatment with Tachigaren, particularly the 75 g rate, resulted in increased stands at Clara City at 2 weeks after planting (but not at 5 weeks after planting), there was a "carry over" effect in increased yield (tons of beets per acre). For the second planting date at Georgetown there was no benefit in stand from seed treatment with Tachigaren, yet there was a significant increase in yield when seed had been treated with the 75 g rate. In these trials, limited activity of *A. cochlioides* may have occurred during the month after planting and the fungus caused slight damage to sugarbeet roots. Since decomposition of Tachigaren is favored by wet, warm soil conditions, there likely was a slower than normal breakdown of Tachigaren in the cool and/or dry soils encountered in 1996. This situation may have resulted in sufficient activity from the 75 g rate of Tachigaren (but not the 45 g rate) to suppress infection by *A. cochlioides*. Decomposition of the 90 g rate of Tachigaren could have suppressed activity of *A. cochlioides*, but any benefits may have been negated by the earlier detrimental effects of this high rate of fungicide on seed germination and/or growth of sugarbeet.

Since Tachigaren is active in soil for about one month after planting, plants with partial resistance to Aphanomyces root rot are recommended to provided continuing protection against the disease for the remainder of the season. Some late season root rot did occur in the research plots, although sporadically, and low yields are mostly attributable to late planting and to competition with weeds. Both varieties in these trials have partial resistance to *Aphanomyces*. It is likely that susceptible varieties would have responded more favorably than resistant varieties to seed treatment with Tachigaren when planted into soil infested with *A. cochlioides*. Additional research is needed to determine if sugarbeet varieties vary in sensitivity to Tachigaren seed treatment and to ascertain how Tachigaren-treated seed performs in different soil types, environmental conditions, and levels of disease pressure from *A. cochlioides*.

CONCLUSIONS

1. The 1996 season did not provide favorable weather conditions to adequately evaluate effectiveness of Tachigaren seed treatment for control of Aphanomyces damping-off.

2. Under conditions of low or no disease pressure from *A. cochlioides*, seedling stands sometimes were improved, unaffected, or reduced (90 g rate) by seed treatment with Tachigaren.

3. In three of seven field trials, the greatest yields were from seed that had been treated with 75 g of Tachigaren.

4. In four of seven field trials, seed treatment with Tachigaren had no effect on sugarbeet yield.

5. Further research is needed to assess effectiveness of Tachigaren rates on varieties that are susceptible and those that are partially resistant to Aphanomyces root rot. Evaluations should be made in fields that differ in soil types and levels of disease pressure from *A. cochlioides*.

ACKNOWLEDGEMENTS

We thank American Crystal Sugar Company and Betaseed for providing seed; Seed Systems for treating seed with fungicides; grower-cooperators for providing land and controlling Cercospora leafspot; laboratories at American Crystal Sugar Company (Moorhead and East Grand Forks) and the Southern Minnesota Beet Sugar Cooperative (Renville) for yield and quality analyses; Jeff Nielsen for statistical analyses of data; and the Sugarbeet Research and Education Board of Minnesota and North Dakota for funding provided in support of this research.

POSTEMERGENCE BROADLEAF HERBICIDES
REDWOOD FALLS, 1996

'Hilleshog 5135' sugarbeet was seeded May 17. The first herbicide application was 2:00 PM June 5 when the air temperature was 65F, relative humidity was 40%, wind was 0-5 mph, cloud cover was 65%, soil moisture was good, sugarbeet was in the cotyledon stage, giant foxtail was 0.25 to 1 inch tall and redroot pigweed was in the cotyledon stage to 0.25 inches tall. The second herbicide application was 1:30 PM June 12 when the air temperature was 73F, relative humidity was 55%, wind was 5-10 mph, cloud cover was 30%, soil moisture was good, sugarbeet was in the 2 leaf stage, giant foxtail was 0.5 to 2 inches tall and redroot pigweed was 0.25 to 1 inch tall. The third herbicide application was 3:00 PM June 19 when the air temperature was 85F, relative humidity was 90%, wind was 0-5 mph, cloud cover was 25%, soil moisture was good, sugarbeet was in the 4 leaf stage, giant foxtail was 0.5 to 4 inches tall and redroot pigweed was 0.5 to 3 inches tall. All treatments were applied in 8.5 gpa water at 40 psi through 8001 nozzles to the center four rows of six row plots. Giant foxtail and redroot pigweed control and sugarbeet injury were evaluated July 9.

Results and Discussion

Giant foxtail control was highest when treatments were applied three times instead of twice, but not significantly higher than all other treatments. However, the highest control of giant foxtail was achieved with Betamix Progress, Upbeet and Stinger mix applied three times at 66 percent which is not commercially acceptable control. Producers would want to apply a grass herbicide to provide greater control of giant foxtail. The application of Betanex at 1 pt. plus 1.5 pt. later gave good control of redroot pigweed at 93 percent at only two applications. Betanex at .75 pt. plus 1 pt. gave 97 percent control. Thus, the two above mentioned treatments gave similar control of redroot pigweed regardless of rates sprayed or times sprayed. Lower rates of Betanex did not always produce adequate control (85% >) of redroot pigweed. Betanex at .08 had to be applied with Upbeet and Stinger three times to give adequate control of redroot pigweed. Betanex applied three times with Upbeet alone gave adequate control of redroot pigweed. Redroot pigweed control was very good when Betanex was applied three times at .75 pt. the first time and 1 pt. the next two consecutive times. This was true with or without adding other products to the mix.

Betamix Progress did not give good control of redroot pigweed unless applied three times. The addition of Upbeet plus Stinger increased redroot pigweed control, but not significantly. The mixture of Betamix Progress and Betanex applied three times at low rates of .35 pt. + .5 pt., .55 pt. + .75 pt., and 55 pt. + .75 pt. gave 91 percent control of redroot pigweed. This was slightly higher than Betamix Progress applied a three times at .75 pt., 1 pt, and 1 pt., which gave 88 percent control. The Betanex plus Betamix Progress mixture would however, be slightly higher priced.

Postemergence Broadleaf Herbicides, Redwood Falls, 1996

Treatment	Rate**	Giant Foxtail	Redroot Pigweed
	lb/A	-- % Control --	
Betanex/Betanex	0.25/0.33	23	93
Betanex/Betanex/Betanex	0.16/0.25/0.25	36	97
Betamix Progress/Betamix Progress	0.19/0.25	16	51
Betamix Progress/Betamix Progress	0.25/0.33	20	50
Betamix Progress/	0.16		
Betamix Progress/	0.25		
Betamix Progress	0.25	60	88
Betamix Progress+Betanex/	0.125+0.125		
Betamix Progress+Betanex	0.165+0.165	26	58
Betamix Progress+Betanex/	0.08+0.08		
Betamix Progress+Betanex/	0.125+0.125		
Betamix Progress+Betanex	0.125+0.125	50	91
Betamix Progress+Betanex+H273/	0.08+0.08+0.16		
Betamix Progress+Betanex+H273/	0.125+0.125+0.25		
Betamix Progress+Betanex+H273	0.125+0.125+0.25	45	91
Betamix Progress+H273/	0.16+0.16		
Betamix Progress+H273/	0.25+0.25		
Betamix Progress+H273	0.25+0.25	40	76
Betamix Progress+Stinger/	0.16+0.06		
Betamix Progress+Stinger/	0.25+0.06		
Betamix Progress+Stinger	0.25+0.06	45	81
Betanex+H273/	0.16+0.16		
Betanex+H273/	0.25+0.25		
Betanex+H273	0.25+0.25	43	84
Betanex+Stinger/	0.16+0.06		
Betanex+Stinger/	0.25+0.06		
Betanex+Stinger	0.25+0.06	33	98
Betanex+Upbeet/	0.16+0.008		
Betanex+Upbeet/	0.16+0.008		
Betanex+Upbeet	0.16+0.008	35	89
Betanex+Upbeet/	0.08+0.004		
Betanex+Upbeet/	0.08+0.004		
Betanex+Upbeet	0.08+0.004	39	78
Betanex+Upbeet+MethOil/	0.16+0.08+1.5%		
Betanex+Upbeet+MethOil/	0.16+0.08+1.5%		
Betanex+Upbeet+MethOil	0.16+0.08+1.5%	68	89
Betanex+Upbeet+MethOil/	0.08+0.004+1.5%		
Betanex+Upbeet+MethOil/	0.08+0.004+1.5%		
Betanex+Upbeet+MethOil	0.08+0.004+1.5%	46	73
Betanex+Upbeet+Stinger/	0.16+0.01+0.06		
Betanex+Upbeet+Stinger/	0.25+0.01+0.06		
Betanex+Upbeet+Stinger	0.25+0.01+0.06	65	99

Treatment	Rate**	Giant Foxtail	Redroot Pigweed
	lb/A	-- % Control --	
Betanex+Upbeet+Stinger+MethOil/	0.08+0.004+0.06+1.5%		
Betanex+Upbeet+Stinger+MethOil/	0.08+0.004+0.06+1.5%		
Betanex+Upbeet+Stinger+MethOil	0.08+0.004+0.06+1.5%	63	86
Betamix Progress+Upbeet/	0.19+0.0156		
Betamix Progress+Upbeet	0.25+0.0156	34	50
Betamix Progress+Upbeet/	0.25+0.0156		
Betamix Progress+Upbeet	0.33+0.0156	38	60
Betamix Progress+Upbeet/	0.19+0.0117		
Betamix Progress+Upbeet	0.25+0.0117	25	63
Betamix Progress+Upbeet+Stinger/	0.16+0.01+0.06		
Betamix Progress+Upbeet+Stinger/	0.25+0.01+0.06		
Betamix Progress+Upbeet+Stinger	0.25+0.01+0.06	66	88
Upbeet+Stinger+MethOil/	0.0156+0.09+1%		
Upbeet+Stinger+MethOil	0.0156+0.09+1%	30	61
Upbeet+Stinger+MethOil/	0.0238+0.09+1%		
Upbeet+Stinger+MethOil	0.0238+0.09+1%	25	34
Betanex+H273+Upbeet+Stinger/	0.16+0.16+0.01+0.06		
Betanex+H273+Upbeet+Stinger/	0.25+0.25+0.01+0.06		
Betanex+H273+Upbeet+Stinger	0.25+0.25+0.01+0.06	63	93

C.V. %	23	16
LSD 5%	14	17
LSD 1%	18	23
# of Reps	4	4

* MethOil = Methylated seed oil from Terra

** Herbicide	Lb/Pt.
Betanex/Betamix	0.1625
Betamix/Progress	0.2250
H273	0.3750
Stinger	0.3750

** Herbicide	Lb/Oz.
Upbeet	0.0312

POSTEMERGENCE BROADLEAF HERBICIDES
OLIVIA, 1996

Experimental Procedure

'Van der Have 66140' sugarbeet was seeded May 24. The first herbicide application was 1:00 PM June 13 when the air temperature was 70F, relative humidity was 65%, wind was calm, cloud cover was 50%, soil moisture was good, sugarbeet was in the cotyledon to 2 leaf stage and common lambsquarters was in the cotyledon stage. The second herbicide application was 1:00 PM June 19 when the air temperature was 80F, relative humidity was 80%, wind velocity was 0-5 mph, cloud cover was 25%, soil moisture was good, sugarbeet was in the 2 to 4 leaf stage and common lambsquarters was in the cotyledon stage to 1 inch tall. The third herbicide application was 3:00 PM June 26 when the air temperature was 88F, relative humidity was 87%, wind was 10-15 mph, cloud cover was 20%, soil moisture was good, sugarbeet was in the 2 to 6 leaf stage and common lambsquarters was in the cotyledon stage to 3 inches tall. All treatments were applied in 8.5 gpa water at 40 psi through 8001 nozzles to the center four rows of six row plots. Sugarbeet injury and common lambsquarters control were evaluated July 8.

Results and Discussion

Sugarbeet injury was nonsignificant. Injury to sugarbeets was 14% with a three way mix of Betamix Progress, Upbeet and Stinger. This was the highest injury to sugarbeets obtained in this trial. However, the next highest was Betanex, Upbeet and Stinger at 11% injury. The higher sugarbeet injury tended to be obtained with treatments including a three way mix of Betanex or Betamix Progress, Upbeet and Stinger.

Common lambsquarters control was 95 percent or higher with 8 different treatments. Control of 95 percent or higher is considered commercially acceptable in this author's opinion. Therefore, there are an abundant amount of treatments for obtaining control of common lambsquarters. Seven of the eight treatments with 95 percent or better control of common lambsquarters were applied three times. Betanex applied three times gave a significantly higher control of common lambsquarters control at 96 percent compared to two applications of Betanex at 70 percent. However, not all comparisons of three vs. two applications gave significantly better common lambsquarters control. But, control of common lambsquarters with treatments with three applications vs. two applications was 16 to 26 percent higher.

The only treatment with two applications which gave common lambsquarter control of 97 percent was Betamix Progress plus Betanex. However, Betamix Progress applied alone three times gave 99 percent control of common lambsquarters. The later treatment would be less expensive when considering herbicide price only.

Postemergence Broadleaf Herbicides, Olivia, 1996

Treatment	Rate**	Sugarbeet Injury	Common Lambsquarters Control
	lb/A	%	%
Betanex/Betanex	0.25/0.33	0	70
Betanex/Betanex/Betanex	0.16/0.25/0.25	0	96
Betamix Progress/Betamix Progress	0.19/0.25	3	70
Betamix Progress/Betamix Progress	0.25/0.33	5	83
Betamix Progress/	0.16		
Betamix Progress/	0.25		
Betamix Progress	0.25	4	99
Betamix Progress+Betanex/	0.125+0.125		
Betamix Progress+Betanex	0.165+0.165	3	97
Betamix Progress+Betanex/	0.08+0.08		
Betamix Progress+Betanex/	0.125+0.125		
Betamix Progress+Betanex	0.125+0.125	10	99
Betamix Progress+Betanex+H273/	0.08+0.08+0.16		
Betamix Progress+Betanex+H273/	0.125+0.125+0.25		
Betamix Progress+Betanex+H273	0.125+0.125+0.25	1	83
Betamix Progress+H273/	0.16+0.16		
Betamix Progress+H273/	0.25+0.25		
Betamix Progress+H273	0.25+0.25	5	86
Betamix Progress+Stinger/	0.16+0.06		
Betamix Progress+Stinger/	0.25+0.06		
Betamix Progress+Stinger	0.25+0.06	10	91
Betanex+H273/	0.16+0.16		
Betanex+H273/	0.25+0.25		
Betanex+H273	0.25+0.25	3	95
Betanex+Stinger/	0.16+0.06		
Betanex+Stinger/	0.25+0.06		
Betanex+Stinger	0.25+0.06	3	97
Betanex+Upbeet/	0.16+0.008		
Betanex+Upbeet/	0.16+0.008		
Betanex+Upbeet	0.16+0.008	6	92
Betanex+Upbeet/	0.08+0.004		
Betanex+Upbeet/	0.08+0.004		
Betanex+Upbeet	0.08+0.004	3	73
Betanex+Upbeet+MethOil/	0.16+0.08+1.5%		
Betanex+Upbeet+MethOil/	0.16+0.08+1.5%		
Betanex+Upbeet+MethOil	0.16+0.08+1.5%	5	75
Betanex+Upbeet+MethOil/	0.08+0.004+1.5%		
Betanex+Upbeet+MethOil/	0.08+0.004+1.5%		
Betanex+Upbeet+MethOil	0.08+0.004+1.5%	0	79
Betanex+Upbeet+Stinger/	0.16+0.01+0.06		
Betanex+Upbeet+Stinger/	0.25+0.01+0.06		
Betanex+Upbeet+Stinger	0.25+0.01+0.06	11	92

Treatment	Rate**	Sugarbeet Injury	Common Lambsquarters Control
	lb/A	%	%
Betanex+Upbeet+Stinger+MethOil/	0.08+0.004+0.06+1.5%		
Betanex+Upbeet+Stinger+MethOil/	0.08+0.004+0.06+1.5%		
Betanex+Upbeet+Stinger+MethOil	0.08+0.004+0.06+1.5%	6	94
Betamix Progress+Upbeet/	0.19+0.0156		
Betamix Progress+Upbeet	0.25+0.0156	3	76
Betamix Progress+Upbeet/	0.25+0.0156		
Betamix Progress+Upbeet	0.33+0.0156	5	90
Betamix Progress+Upbeet/	0.19+0.0117		
Betamix Progress+Upbeet	0.25+0.0117	8	93
Betamix Progress+Upbeet+Stinger/	0.16+0.01+0.06		
Betamix Progress+Upbeet+Stinger/	0.25+0.01+0.06		
Betamix Progress+Upbeet+Stinger	0.25+0.01+0.06	14	100
Upbeet+Stinger+MethOil/	0.0156+0.09+1%		
Upbeet+Stinger+MethOil	0.0156+0.09+1%	0	35
Upbeet+Stinger+MethOil/	0.0238+0.09+1%		
Upbeet+Stinger+MethOil	0.0238+0.09+1%	4	49
Betanex+H273+Upbeet+Stinger/	0.16+0.16+0.01+0.06		
Betanex+H273+Upbeet+Stinger/	0.25+0.25+0.01+0.06		
Betanex+H273+Upbeet+Stinger	0.25+0.25+0.01+0.06	9	95

C.V. %	120	17
LSD 5%	8	20
LSD 1%	NS	26
# of Reps	4	4

* MethOil = Methylated seed oil from Terra

** Herbicide	Lb/Pt.
Betanex/Betamix	0.1625
Betamix/Progress	0.2250
H273	0.3750
Stinger	0.3750

** Herbicide	Lb/Oz.
Upbeet	0.0312