1990 Research Report

SMBSC

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Southern Minnesota Beet Sugar Company
SMBSC

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Agricultural Research
SMSC, 1990

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Introduction

The 1990 growing season was highlighted by three very significant events (1) planting tolerance was approved at 98-114% of stock acres in anticipation of the continued drought (2) late spring frosts on May 1 and 2 which caused 40% of the total acres to be replanted and (3) precipitation of 100-150% of normal, much of which fell during June and July.

In total, over 40,000 acres had to be replanted. Even though the replanting was accomplished by mid to late May, the net effects caused a shortening of the growing season as evidenced by the relatively lower yields and sugar content.

The increased precipitation made nitrogen available throughout the growing season, and permitted good utilization by the sugarbeet plant.

The quantity and frequency of the rainfall provided adequate to excessive moisture over most of the areas. It was not necessary for the beet plant to develop a deep feeder root system, and in cases of excess soil moisture actually stunted root development.

The partitioning of photosynthate by the plant was also affected by the rainfall patterns. As a result, the plants developed a very large proportion of tops (leaves and petioles) to root weight. Many growers commented that it was difficult to remove the large amount of tops.

The 1990 season also introduced a change in the method of calculating the beet payment. At the 1989 annual meeting. the growers approved the loss to molasses concept which in addition to percent sugar combines the level of impurities to determine the value of the beets.

A total of 78,781 acres was harvested with an average yield of 17.9 tons/acre, 15.63% sugar and 1.34% loss to molasses. Sugarbeets were planted most often following corn as indicated in the following table:

Previous Crop	No. Acres	Percent
Corn	49,632	63.1
Small grains	11,266	14.3
Soybeans	5,436	6.9
Idle Acres	945	1.2
Peas	642	0.8
Mixed	10,860	13.7
Totals	78,781	100.00

A total of 251,000 tons (17.7%) was harvested during pre-pile with an average sugar of 13.8% and 1.38% loss to molasses.

As the number of acres to harvest increases, it becomes increasingly important for growers to plan their fertility program for early harvesting of approximately 15-18% of the crop. This cannot be accomplished solely with varieties and high plant populations and no consideration given to fertility requirements. For example, average expected tonnage in early September has been 16-18 tons/acre and increasing to 20-21 tons/acre in October. Growers should consider the early harvest program and determine in May the fertility requirements of the beet crop to be harvested in September, which means a shortened growing season, and fewer tons; thus, less nitrogen required to produce the crop and maintain high sugar/purity levels.

This "dual" fertility program usually must be determined prior to planting . For 1991, growers can expect an early September harvest if yields are near normal. If the yields are below normal, then harvest can be delayed to allow the crop more time to develop and mature. The early harvest period can succeed only if growers are able to supply the factory with relatively high quality beets.

The results summarized in this report were from trials conducted at SMSC. Local weather patterns may have caused a revision in the original objectives of the tests. The results should be interpreted based on number of years and locations involved in the mean values; more observations included in the averages increases the reliability of the data. Increasing the number of locations over years provides more environmental conditions for the tests; thus, increasing the scope of inferences that can be made on the conclusions.

Research Summary

1. <u>Variety Evaluation.</u> Nineteen varieties were approved for planting during 1991 growing season including one test market variety and one special use variety. Five new varieties have been added to the approved list and 10 of the 19 approved varieties are less than 2 years old to the SMSC growing area.

2. <u>Date of Harvest Summary.</u> A summary of data from 1988 to 1990 indicate that there are differences among the 9 varieties tested in ability to accumulate relatively high levels of sugar early in the growing season. Several factors including variety must be considered in making comparison between fields for early harvest.

3. <u>Post Emergence Herbicides Over Soil Applied Herbicides.</u> Twenty different herbicides and combinations were evaluated for general weed control. Roneet tended to give the best foxtail control among all the preplant and preemergence herbicides. Poast applied as a postemergence application for foxtail control over Roneet did not increase foxtail control.

4. <u>Simulated Spray Drift.</u> Twenty-two herbicide treatments consisting of Harmony Extra, Pinnacle, Pursuit, Accent, 2,4-D, Basagran, Banvel and Betanex were evaluated for phytotoxicity to suarbeets. Sugarbeets were injured regardless of treatment. Harmony Extra tended to give the greatest degree of sugarbeet injury. Pinnacle and Pursuit also gave a high degree of sugarbeet injury compared to the other herbicide treatments.

5. <u>Velvetleaf and Common Sunflower Control.</u> Common sunflower control was achieved only when Stinger was included in the treatment. Betanex and Stinger aplied as a mixture tended to give the best control of velvetleaf. Further research is needed to obtain adequate control of velvetleaf.

6. <u>Giant Ragweed Control.</u> Stinger alone or in combination with Betamix was needed for control of giant ragweed. Stinger applied in the first half of a split application with Betamix instead of the second half of the split application tended to give greater control of giant ragweed.

7. <u>Common Cocklebur Control.</u> Stinger applied alone or with Betamix or Betanex gave control of common cocklebur. Stinger with Betanex gave greater control of common cocklebur than when stinger was applied with Betamix.

8. <u>Common Sunflower control.</u> Common sunflower control two weeks after application was inadequate. However, four weeks after application all treatments except Betamix applied alone gave control of common sunflower.

9. Disease index summary. A Cercospora model was again used to determine relative activity of the leaf spot spores at three locations throughout the SMSC growing area. Hourly temperature and relative humidity readings were used to calculate infection potential. Accurate measurement of conditions favorable for leaf spot spore germination and infection will enable growers to apply fungicide when spores are most active.

10. 1990 Harvester Comparison. Harvester performance data was collected for all growers that use the same type of harvester in their farming operation. The harvester data is presented combined over four and six row harvesters. Averages are shown for % first dirt, % tare and total dirt. Ranges for % tare and total dirt are also included. The harvestor data is also separated by receiving station for comparison.

11. Weather Data for 1990. The growing season for 1990 started relatively dry but average or above average precipitation was recieved throughout the growing season. The presence of moisture along with average or above average temperature and relative humidities contributed to development of Cercospera leaf spot.

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PLANNED RESEARCH 1991

The planning of research involves looking toward the future and deciding what will have to be known to keep in business five, ten, twenty or more years down the road. Since most research needs more than one year to collect enough data to come to a solid conclusion, research needs to focus on perceived problems of the future. However, the perennial problems of the past must not be forgotten. Sugarbeet quality, root rot, weed control and fertility will continue to be high on the list of priority research.

Southern Minnesota Sugar growing area has experienced wet and dry growing seasons in the recent past. This brings about many problems pertaining to the growing of sugarbeets and the pests that effect them. Sugarbeet root aphid was a major problem in 1989, a dry growing season, but a minor problem in 1990, a relatively wet growing season. Even though sugarbeet root aphid was a minor pest in 1990, intensive research will continue. Tolerant or resistant varieties and use of insecticides will be investigated in 1991 to determine if the effect of the sugarbeet root aphid on sugarbeets can be limited or eliminated through such practices. Investigation of host and life cycle of sugarbeet root aphid will be conducted.

The search to maintain or improve the quality of the sugarbeet will be continued in 1991. Fertility management will be evaluated to minimize loss to molasses (LTM) and maximize the technological value of the sugarbeets. The variability in the climatic condition over the past few years has made paramount the importance of determining a fertility program that would be effective regardless of climatic conditions. Management of fertility in relation to fertility testing will also be investigated.

The ability to obtain early high recoverable sugar without significant loss in yield is paramount to achieve the highest return possible to the grower. Early high recoverable sugar will become increasingly important as the acreage increases and it becomes more probable that the harvest campaign starts early.

Effectiveness and persistence of herbicide will be evaluated in 1991. Herbicides as well as tank mix combinations, new formulations and addition of additives influencing effective rates will be evaluated. Specific problem weed species will be evaluated to determine the best program to achieve control or eradication of these specific weeds. Small grain, soybean and corn herbicides will be evaluated for their effect short term and long term effect on sugarbeets.

Cercospora leaf spot will be evaluated for tri-phenyl tin tolerance. Three remote weather stations will again monitor temperature and relative humidity for the leaf spot model.

Root rot evaluations by variety and seed treatment will be continued. The use of small grain residues will be evaluated for the reduction of root rot. Some treatments for root rot reduction previously thought not to be economically feasible will be evaluated.

Some of these research projects will be conducted solely by SMSC; other projects including fertility, disease and root aphid trials will be conducted in cooperation with university scientists. Specific treatments and additional projects may be included in response to the growing season and environmental conditions.

Variety Evaluation

Ninteen varieties were approved for planting during growing season. One test market variety, KW 1119 and one speacial use variety ACH 176 (Aphanomyces Resistant) were also approved.

The approved varieties for SMSC since 1980 are listed in table 1. Maribo Ultramono remains as the veteran of the list, approved for the ninth consecutuve year and 10 out of the last 11 years. Two other varieties, Maribo 403 and KW 3265, have appeared on the list for the last 5 years. Six of the remaining 16 varieties have been approved for the last 3 to 4 years and 10 of the 16 remaining varieties are less than 2 years old to the SMSC area.

A comparison of the average sugar/acre, sugar/ton, tons/acre, percent surgar and leaf spot rating for the last 11 years for all approved varieties are listed in Table 2. These data and the dominance of new verieties on the approved list indicates a dedication to variety improvement.

The original seed issued to SMSC growers in 1990 was over 141,000 lbs. and replant seed amounted to almost 71,000 lbs. Majority of the replant seed was issued to the eastern area growers. The pounds of seed issued for the prévious years is listed in Table 3.

Tables 4-5 list the 3 year performance of the 19 approved varieties and Tables 6-7 list the 2 year performance of the 19 approved varieties plus the test market variety.

Coded trial results for all varieties evaluated for the past three years are listed in Tables 8-13.

The most popular varieties planted in 1989 were:

Hilleshog 5135	Maribo 875
Beta 6625	KW 3145
KW 3265	KW 1014
ACH 198	

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties Since 1980

Table 1.

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

1984	1985	1986	1987
ACH 30	ACH 30	ACH 30	ACH 164
ACH 145	ACH 145	ACH 146	Beta 1230
ACH 154	ACH 154	ACH 164	Beta 5494
Beta 1230	Beta 1230	Beta 1230	Beta 6294
BJ Monofort	BJ Monofort	Beta 6264	BJ Monofort
Mono-Hy R1	Mono-Hy R1	BJ Monofort	BJ 1310
Mono-Hy M7	Mono-Hy M7	BJ 1310	KW 1132
KW 3394	KW 1132	Mono-Hy M7	KW 3265
Maribo Ultramono	KW 3394	KW 1132	KW 3394
	Maribo Ultramono	KW 3394	Hilleshog 4046
	Maribo 401	KW 3265	Hilleshog 5090
		Maribo Ultramono	Hilleshog 5135
		Maribo 401	Maribo Ultramono
		Maribo 403	Maribo 403
			Mono-Hy M7
			Mono-Hy R103
			Mono-Hy R117
			Mitsui Monohikari

SOUTHERN MINNESOTA SUGAR COOPERATIVE

List of Approved Varieties Since 1980

Table 1. Continued

1988	1988 Cont.	1989	1989 Cont.
ACH 164	Hilleshog 5135	ACH 164	KW 3265
ACH 178	Hilleshog 8277	ACH 180	KW 3394
ACH 180	KW 1014	ACH 181	Maribo 403
ACH 181	KW 1132	ACH 198	Maribo 411
Beta 1230	KW 3145	Beta 3614	Maribo Ultramono
Beta 3614	KW 6264	Beta 6269	Mitsui Monohikari
Beta 3265	KW 3394	Beta 6625	Mono-Hy R-103
Beta 6625	Maribo 403	Hilleshog 4046	
BJ 1310	Maribo 411	Hilleshog 5090	
BJ Monofort	Maribo Ultramono	Hilleshog 5135	
Hilleshog 4046	Mitsui Monohikari	KW 1014	
Hilleshog 5090	Mono-Hy R-103	KW 3145	

1990	1990 Cont.	1991	1991 Cont.
ACH 180	KW 1014	ACH 194	Hilleshog 5090
ACH 181	KW 3145	ACH 196	Hilleshog 5135
ACH 196	KW 3265	ACH 198	KW 2398
ACH 198	KW 3394	Beta 1238	KW 3145
ACH 194	Maribo 403	Beta 2988	KW 3265
Beta 3614	Maribo 411	Beta 5657	Maribo 403
Beta 6269	Maribo 875	Beta 6269	Maribo 875
Beta 6625	Maribo Ultramono	Beta 6625	Maribo Ultramono
Hilleshog 4046	Mitsui Monohikari	BJ 1330	Seedex Monohikari
Hilleshog 5090		Hilleshog 2401	
Hilleshog 5135			
HM 2410			

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

Year	No. of Approved	Recoverable Sugar/Acre Mean of Approved	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	6724	264.5	25.7	15.40	4.43	2.18
1982 (79-80-81)	12	6282	262.6	23.9	15.50	4.31	2.17
1983 (80-81-82)	9	7053	261.9	26.9	15.60	4.84	2.37
1984 (81-82-83)	9	6823	253.1	26.9	15.30	4.80	2.5
1985 (82-83-84)	11	7682	269.7	28.6	15.90	4.87	2.64
1986 (83-84-85)	14	7837	280.9	27.9	16.10	4.80	2.41
1987 (84-85-86)	18	7764	300.4	25.9	16.70	4.68	1.68
1988 (85-86-87)	24	8884	308.7	28.7	16.95	4.93	1.51
1989 (86-87-88)	19	8689	318.6	27.2	17.40	4.70	1.47
1990 (87-88-89)	21	9078	307.8	29.4	17.10	4.87	1.71
1991 (88-89-90)	19	7554	294.1	25.7	16.39	4.56	1.59

Table 3. Seed usage for SMSC, 1987-90

Year	Original Issue (Lbs.)	Replant (Lbs.)	Total Lbs.
1987	117,000	2,540	119,540
1988	123,630	73,500	197,130
1989	131,150	19,250	150,400
1990	141,370	70,680	212,050

SOUTHERN MINNESOTA SUGAR COOPERATIVE
LIST OF APPROVED VARIETIES FOR 1991

Table 4. Three year performance summary from coded trials conducted at SMSC, 1988-1990

Variety	Rec. S/A	Rec. S/T	Leaf Spot **	Tons/ Acre	Percent Sugar	Percent LTM	Seed Vig **	% Field Emerg.
ACH 194	7585	300.4	4.54	25.20	16.62	1.60	1.62	69
ACH 196	7414	298.9	4.64	24.66	16.57	1.63	1.73	
ACH 198	7642	292.0	4.04	26.11	16.28	1.67	1.63	
Beta 1238	7764	297.2	4.80	26.24	16.40	1.54	1.91	
Beta 2938	7674	297.1	4.74	25.86	16.38	1.53	1.69	
Beta 5657	7608	293.1	4.16	25.89	16.20	1.56	1.93	
Beta 6269	7451	293.8	4.46	25.32	16.30	1.61	1.97	72
Beta 6625	7409	300.5	4.70	24.63	16.55	1.52	1.95	71
BJ 1330	7321	294.1	4.58	24.84	16.34	1.64	1.46	
Hilleshog 2401	7450	293.3	4.64	25.30	16.28	1.62	1.73	
Hilleshog 5090	7582	287.6	4.77	26.33	15.98	1.60	1.73	71
Hilleshog 5135	7653	296.7	4.76	25.70	16.44	1.61	1.75	69
KW 2398	7830	298.4	4.62	26.26	16.46	1.54	1.78	
KW 3145	7820	287.6	4.63	27.19	15.98	1.59	2.12	67
KW 3265	7590	286.2	4.64	26.53	15.90	1.59	1.76	70
Maribo 403	7367	289.8	4.52	25.39	16.15	1.67	1.51	74
Maribo 875	7583	293.4	4.58	25.85	16.32	1.65	1.46	72
Maribo Ultramono	7339	291.4	4.62	25.09	16.22	1.65	1.52	78
Seedex Monohikari	7445	296.6	4.11	24.93	16.24	1.42	2.75	75
Mean	7554	294.1	4.56	25.65	16.30	1.59	1.79	72

** Lower numbers indicate better resistance and vigor

SOUTHERN MINNESOTA SUGAR COOPERATIVE
LIST OF APPROVED VARIETIES FOR 1991

Table 5. Three year performance summary (% of approved) from coded trials conducted at SMSC. 1988-1990

Variety	Rec. S/A	Rec. S/T	Leaf Spot**	Tons/ Acre	Percent Sugar	Percent LTM	Seed Vig**	% Field Emerg.	Est. Grower $/Ton
ACH 191	100.4	102.1	99.7	98.3	102.0	100.5	90.5	96.3	103.3
ACH 195	98.1	101.6	101.9	96.1	101.7	102.4	96.7	0.0	102.5
ACH 193	101.2	99.3	88.7	101.8	99.9	104.9	91.1	0.0	99.0
Beta 1233	102.8	101.1	105.4	102.3	100.6	95.8	105.7	0.0	101.6
Beta 2983	101.6	101.0	104.1	100.8	100.5	96.1	94.4	0.0	101.5
Beta 5557	100.7	99.7	91.3	100.9	99.4	98.0	107.9	0.0	99.3
Beta 6269	98.6	99.9	97.9	98.7	100.0	101.2	110.1	100.5	99.9
Beta 6525	93.1	102.2	103.2	96.0	101.6	95.5	109.0	99.1	103.4
BJ 1330	96.9	100.0	100.5	96.8	100.3	103.0	81.6	0.0	100.0
Hilleshog 2401	98.6	99.7	101.9	98.6	99.9	101.8	96.7	0.0	99.5
Hilleshog 5090	100.4	97.8	104.7	102.7	93.1	100.5	96.7	99.1	96.6
Hilleshog 5135	101.3	100.9	104.5	100.2	100.9	101.2	97.8	96.3	101.3
KW 2398	103.7	101.5	101.4	102.4	101.0	96.8	99.5	0.0	102.2
KW 3145	103.5	97.8	101.6	105.0	93.1	99.9	118.5	93.5	96.7
KW 3265	100.5	97.3	101.9	103.4	97.6	99.9	98.4	97.7	95.9
Maribo 403	97.5	98.5	99.2	99.0	99.1	104.9	84.4	103.3	97.7
Maribo 875	100.4	99.8	100.5	100.8	100.2	103.7	81.6	100.5	99.7
Maribo Ultramono	97.2	99.1	101.4	97.8	99.5	103.7	84.9	103.9	98.6
Seedex Monohikari	98.6	100.8	90.2	97.2	99.7	89.2	153.7	104.7	101.2

** Lower numbers indicate better resistance and vigor

SOUTHERN MINNSOTA SUGAR COOPERATIVE
TEST MARKET VARIETIES FOR 1991

Table 6. Two year performance summary from coded trials conducted at SMSC, 1989-1990

Variety	Action	Rec. S/A	Rec. S/T	Leaf Spot**	Tons/ Acre	Percent Sugar	Percent LTM	Seed Vig**	% Field Emerg.
Approved Varieties for 1991									
ACH 194		7130	284.8	4.56	24.90	15.82	1.58	1.72	69
ACH 196		6942	282.7	4.51	24.41	15.73	1.60	1.53	71
ACH 193		7113	275.8	4.18	25.67	15.49	1.70	1.47	73
Beta 6269		7044	278.1	4.57	25.21	15.50	1.59	1.93	71
Beta 6625		6953	283.5	4.88	24.43	15.71	1.53	1.78	72
KW 3145		7442	273.7	4.67	27.13	15.26	1.57	2.00	68
KW 3265		7090	269.8	4.71	26.19	15.07	1.62	1.65	72
Maribo 403		6807	274.2	4.71	24.76	15.36	1.65	1.56	73
Maribo 875		7112	278.0	4.70	25.47	15.53	1.63	1.31	75
Maribo Ultramano		6814	272.4	4.65	24.89	15.27	1.65	1.53	76
Seedex Monohikari		6865	281.8	4.14	24.16	15.50	1.41	2.72	72
Hilleshog 5090		7025	269.6	4.91	26.01	15.11	1.64	1.69	71
Hilleshog 5135		7153	278.9	4.76	25.47	15.55	1.61	1.87	69
Hilleshog 2401		7025	276.5	4.78	25.26	15.42	1.59	1.78	73
Beta 1238		7353	278.4	4.90	26.43	15.43	1.51	1.95	
Beta 2988		7202	279.3	4.71	26.87	15.47	1.50	1.58	
Beta 5657		6969	276.1	4.34	25.19	15.34	1.54	2.15	
BJ 1330		6856	277.2	4.70	24.61	15.49	1.63	1.43	
KW 2398		7318	280.7	4.65	25.97	15.56	1.52	1.80	
Mean of Approved		7064	277.4	4.63	25.42	15.45	1.58	1.76	72
KW 1119	Test Market	7272	293.4	4.89	24.73	16.21	1.54	1.93	

Table 7. Two year performance summary (% of approved) from coded trials conducted at SMSC, 1989-1990

Variety	Action	Rec. S/A	Rec. S/T	Leaf Spot **	Tons/ Acre	Percent Sugar	Percent LTM	Seed Vig **	% Field Emerg.	Est. Grower $/Ton
Approved Varieties for 1991										
ACH 194		100.9	102.7	98.4	97.9	102.4	93.8	97.7	95.1	104.20
ACH 195		98.3	101.9	97.3	96.0	101.8	101.1	86.9	93.9	102.95
ACH 198		100.7	99.4	90.2	101.0	100.2	107.4	83.5		99.08
Beta 5269		99.7	100.2	98.6	99.2	100.3	100.5	109.6		100.45
Beta 6525		98.4	102.2	105.3	96.1	101.7	96.7	101.1	100.3	103.52
KW 3145		105.4	98.6	100.8	105.7	93.8	99.2	113.6	94.7	97.95
KW 3265		100.4	97.2	101.7	103.0	97.5	102.4	93.7	100.3	95.22
Maribo 403		96.4	98.8	101.7	97.4	99.4	104.3	88.6	101.7	98.17
Maribo 875		100.7	100.2	101.4	100.2	100.5	103.0	74.4	104.5	100.34
Maribo Ultramano		96.5	98.2	100.4	97.9	98.8	104.3	86.9	105.9	97.15
Seedex Monohikari		97.2	101.6	89.4	95.0	100.3	89.1	154.5	100.3	102.50
Hilleshog 5090		99.5	97.2	106.0	102.3	97.8	103.6	96.0	98.9	95.44
Hilleshog 5135		101.3	100.5	102.7	100.2	100.6	101.7	106.2	96.1	100.79
Hilleshog 2401		99.5	99.7	103.2	99.4	99.8	100.5	101.1	101.7	99.54
Beta 1238		104.1	100.3	105.8	104.0	99.9	95.4	110.8		100.56
Beta 2988		102.0	100.7	101.7	105.7	100.1	94.8	89.7		101.13
Beta 5657		98.7	99.5	93.7	99.1	99.3	97.3	122.1		99.20
BJ 1330		97.1	99.9	101.4	96.8	100.2	103.0	81.2		99.83
KW 2398		103.6	101.2	100.4	102.2	100.7	96.0	102.2		101.93
Mean of Approved		7054.0	277.4	4.6	25.4	15.5	1.6	1.8	72.0	
KW 1119	Test Market	102.9	105.7	105.5	97.3	104.9	97.3	109.6		109.03

Table 8

Three Year Performance Summary of 1990 SMSC Commercial Coded Entries (Three Locations)

	---Rec. / Ton---					---Rec. / Acre---					--Loss to Molasses--				
Description	1988	1989	1990	3 Yr Mean	3 Yr % Mean	1988	1989	1990	3 Yr Mean	3 Yr % Mean	1988	1989	1990	3 Yr Mean	3 Yr % Mean
ACH 181	320.5	256.7	270.7	282.6	96.5	9001	7195	6577	7591	100.3	1.71	1.79	1.65	1.72	107.1
ACH 192	330.7	267.3	278.7	292.2	99.8	8682	7198	6790	7557	99.8	1.60	1.64	1.64	1.63	101.5
ACH 194	331.7	277.9	291.7	300.4	102.6	8434	7371	6890	7585	100.2	1.64	1.65	1.52	1.60	100.1
ACH 196	331.1	276.0	289.5	298.9	102.0	8359	7355	6529	7414	98.0	1.68	1.63	1.57	1.63	101.5
ACH 198	324.5	273.6	278.0	292.0	99.7	8698	7601	6626	7642	101.0	1.61	1.73	1.68	1.67	104.4
ACH 895118(Rhiz Spec)			259.4					5321					1.65		
Beta 1238	334.9	268.3	288.5	297.2	101.5	8586	7684	7022	7764	102.6	1.59	1.55	1.48	1.54	96.1
Beta 2983	332.5	273.4	285.3	297.1	101.4	8618	7579	6826	7674	101.4	1.57	1.55	1.46	1.53	95.3
Beta 4689(Rhiz Spec)		251.4	266.6				6935	5075				1.73	1.64		
Beta 5657	327.0	265.5	286.7	293.1	100.0	8887	7303	6635	7608	100.5	1.58	1.62	1.47	1.56	97.1
Beta 6269	325.0	275.2	281.1	293.8	100.3	8265	7411	6678	7451	98.5	1.65	1.64	1.54	1.61	100.5
Beta 6625	334.5	279.9	287.2	300.5	102.6	8319	7317	6590	7409	97.9	1.50	1.62	1.45	1.52	95.1
Bush Johnson 1320	327.4	270.7	278.8	292.3	99.8	8214	7326	6739	7426	98.1	1.60	1.64	1.57	1.60	100.1
Bush Johnson 1330	327.7	273.9	280.6	294.1	100.4	8250	7125	6588	7321	96.7	1.65	1.65	1.61	1.64	102.1
HM 2401	326.8	272.2	280.9	293.3	100.1	8299	7447	6603	7450	98.4	1.68	1.63	1.56	1.62	101.3
HM LSR88(LS Rhiz Spec)		254.3	255.2				7505	6499				1.63	1.66		
HM RH-1(Rhiz Spec)			253.7					5284					1.66		
Hilleshog 5090	323.7	260.7	278.5	287.6	98.2	8697	7372	6678	7582	100.2	1.53	1.71	1.57	1.60	100.1
Hilleshog 5135	332.2	278.0	279.9	296.7	101.3	8654	7585	6721	7653	101.1	1.61	1.62	1.60	1.61	100.5
KW 1119		285.8	301.0				7656	6889				1.62	1.47		
KW 1745	323.3	267.2	274.8	288.4	98.5	9122	7579	6876	7859	103.8	1.59	1.65	1.60	1.61	100.7
KW 2398	333.8	275.8	285.6	298.4	101.9	8852	7896	6741	7830	103.5	1.57	1.58	1.46	1.54	95.9
KW 3145	315.5	265.5	281.9	287.6	98.2	8574	7621	7264	7820	103.3	1.63	1.65	1.50	1.59	99.4
KW 3265	318.9	265.5	274.1	286.2	97.7	8588	7589	6592	7590	100.3	1.61	1.64	1.53	1.59	99.4
Maribo 403	320.8	265.2	283.3	289.8	98.9	8486	7128	6487	7367	97.3	1.69	1.74	1.57	1.67	104.0
Maribo 865	320.5	265.4	274.8	286.9	97.9	8987	7396	6639	7674	101.4	1.68	1.69	1.60	1.66	103.4
Maribo 875	324.0	272.4	283.7	293.4	100.1	8523	7501	6724	7583	100.2	1.69	1.70	1.56	1.65	103.0
Maribo 894		269.2	282.3				7568	6850				1.49	1.42		
Maribo Ultramono	329.3	268.5	276.3	291.4	99.5	8389	7268	6360	7339	97.0	1.65	1.71	1.60	1.65	103.2
Mitsui Monohikari	326.1	277.9	285.7	296.6	101.2	8604	7704	6027	7445	98.4	1.43	1.44	1.38	1.42	88.4
Mean	326.8	269.8	279.2	292.9	100.0	8590	7436	6537	7568	100.0	1.61	1.64	1.56	1.60	100.0

Table 9

Three Year Performance Summary of 1990 SMSC Commercial Coded Entries (Three Locations)

Description	—Sugar Content (%)— 1988	1989	1990	3 Yr Mean	3 Yr % Mean	—Root Yield (T/A)— 1988	1989	1990	3 Yr Mean	3 Yr % Mean	—Seedling Vigor— 1988	1989	1990	3 Yr Mean	3 Yr % Mean	—Field Emerg (%)— 1988	1989	1990	3 Yr Mean	3 Yr % Mean
ACH 181	17.74	14.63	15.19	15.85	97.6	28.20	27.86	24.21	26.76	103.7	2.10	1.75	2.06	1.97	109.3	72.5	67.4	67.0	68.97	96.7
ACH 192	18.13	14.99	15.57	16.23	99.9	26.47	26.79	24.33	25.86	100.3	1.67	1.36	1.44	1.49	82.7			70.1		
ACH 194	18.22	15.55	16.10	16.62	102.3	25.78	26.32	23.49	25.20	97.7	1.41	1.69	1.75	1.62	89.7	69.9	66.6	70.7	69.07	96.8
ACH 196	18.24	15.43	16.04	16.57	102.0	25.16	26.38	22.44	24.66	95.6	2.13	1.31	1.75	1.73	96.0		71.7	71.3		
ACH 198	17.84	15.41	15.58	16.28	100.2	26.97	27.61	23.74	26.11	101.2	1.94	1.19	1.75	1.63	90.3		72.6	74.5		
ACH 895118(Rhiz Spec)			14.62					20.35					2.19					68.7		
Beta 1238	18.33	14.97	15.90	16.40	100.9	25.87	28.53	24.33	26.24	101.7	1.81	1.53	2.38	1.91	105.8			61.3		
Beta 2988	18.19	15.23	15.72	16.38	100.8	26.15	27.59	23.83	25.86	100.2	1.89	1.42	1.75	1.69	93.6			75.6		
Beta 4689(Rhiz Spec)		14.30	14.96				27.47	18.90				1.13	2.44				76.9	60.5		
Beta 5657	17.92	14.89	15.80	16.20	99.7	27.28	27.32	23.07	25.89	100.4	1.48	1.17	3.13	1.93	106.9			43.7		
Beta 6269	17.90	15.40	15.60	16.30	100.3	25.55	26.81	23.61	25.32	98.2	2.04	1.56	2.31	1.97	109.3	74.8	72.1	69.9	72.27	101.3
Beta 6625	18.22	15.61	15.81	16.55	101.8	25.02	26.04	22.83	24.63	95.5	2.29	1.63	1.94	1.95	108.4	71.0	73.9	69.6	71.50	100.2
Bush Johnson 1320	17.96	15.17	15.51	16.21	99.8	25.06	26.96	24.09	25.37	98.3	2.39	1.85	2.25	2.16	120.0			62.5		
Bush Johnson 1330	18.03	15.35	15.64	16.34	100.6	25.31	25.79	23.43	24.84	96.3	1.53	1.42	1.44	1.46	81.2			73.9		
HM 2401	18.01	15.24	15.60	16.28	100.2	25.39	27.11	23.41	25.30	98.1	1.61	1.44	2.13	1.73	95.8		69.0	76.9		
HM LSR88(LS Rhiz Spec)		14.34	14.42				29.24	25.37				1.60	2.88					48.4		
HM RH-1(Rhiz Spec)			14.34					20.64					2.06					70.8		
Hilleshog 5090	17.71	14.74	15.49	15.98	98.4	26.95	28.15	23.88	26.33	102.1	1.81	1.44	1.94	1.73	96.0	71.9	70.1	71.6	71.20	99.8
Hilleshog 5135	18.22	15.52	15.59	16.44	101.2	26.17	27.07	23.87	25.70	99.6	1.50	1.56	2.19	1.75	97.1	68.9	68.2	70.7	69.27	97.1
KW 1119		15.91	16.52				26.65	22.81				1.48	2.38					57.9		
KW 1745	17.75	15.01	15.34	16.03	98.7	28.43	28.15	24.89	27.16	105.3	2.61	1.38	2.19	2.06	114.3	61.9	73.2	68.8	67.97	95.3
KW 2398	18.25	15.38	15.74	16.46	101.3	26.84	28.43	23.52	26.26	101.8	1.72	1.17	2.44	1.78	98.6			70.0		
KW 3145	17.41	14.93	15.60	15.98	98.4	27.30	28.55	25.71	27.19	105.4	2.35	1.38	2.63	2.12	117.6	66.2	70.1	66.2	67.50	94.6
KW 3265	17.55	14.91	15.23	15.90	97.8	27.20	28.39	24.00	26.53	102.8	1.96	1.31	2.00	1.76	97.5	67.4	70.1	74.1	70.53	98.9
Maribo 403	17.73	15.00	15.73	16.15	99.4	26.64	26.72	22.81	25.39	98.4	1.42	1.56	1.56	1.51	84.0	74.6	73.3	73.6	73.83	103.5
Maribo 865	17.70	14.96	15.34	16.00	98.5	28.20	27.64	24.11	26.65	103.3	1.67	1.31	1.81	1.60	88.6	71.2	72.8	70.6	71.53	100.3
Maribo 875	17.89	15.32	15.75	16.32	100.4	26.60	27.37	23.58	25.85	100.2	1.76	1.06	1.56	1.46	81.0	66.9	74.9	75.2	72.33	101.4
Maribo 894		14.96	15.54				27.92	24.17				1.36	1.63					67.8		
Maribo Ultramono	18.11	15.14	15.41	16.22	99.8	25.47	26.90	22.89	25.09	97.2	1.49	1.31	1.75	1.52	84.1	81.4	75.5	76.2	77.70	108.9
Mitsui Monohikari	17.73	15.33	15.67	16.24	100.0	26.46	27.36	20.97	24.93	96.6	2.80	2.88	2.56	2.75	152.4	79.8	73.2	71.9	74.97	105.1
Mean	17.95	15.13	15.51	16.25	100.0	26.44	27.40	23.31	25.80	100.0	1.89	1.47	2.08	1.80	100.0	71.3	71.8	68.3	71.33	100.0

* 1990 vigor from 2 locations. 1989 emergence and vigor from 2 locations. 1988 emergence and vigor from 2 locations.

+ Lower numbers indicate better vigor.

Table 10

COMBINED ANALYSIS
1990 SO MINNESOTA SEMI COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

31 Entries 23 repsXlocs 3 tests combined 2 Rows/Plot 2 Samples/Row

Entry	Code	Rec/T lbs		Rec/A lbs		Loss to Mol.		Sugar %		Yield T/A	
ACH 194 (Check#1)	183	288.2	102	7205	104	1.56	104	15.97	102	24.99	103
ACH 204	175	277.3	98	6518	94	1.50	100	15.37	98	23.52	97
ACH 301	163	287.7	101	6974	101	1.56	103	15.94	102	24.25	100
ACH 890126	182	290.7	102	6946	100	1.56	103	16.09	102	23.83	98
ACH 895205	185	276.5	97	6998	101	1.49	99	15.31	97	25.27	104
ACH 895212	158	285.7	101	7072	102	1.43	95	15.71	100	24.72	102
Beta 1990	179	289.7	102	6867	99	1.52	101	16.00	102	23.62	97
Beta 2010	159	286.0	101	7332	106	1.48	98	15.78	100	25.65	105
Beta 3440	166	275.5	97	7064	102	1.60	106	15.37	98	25.68	105
Beta 6010	170	282.4	99	7006	101	1.46	97	15.58	99	24.76	102
HM 2413	165	284.1	100	6369	92	1.48	98	15.69	100	22.41	92
HM 2415	172	284.0	100	6691	97	1.57	104	15.77	100	23.53	97
Hilleshog 5135 (Check#2)	162	282.6	100	6750	98	1.56	104	15.69	100	23.84	98
Hilleshog 7003	178	284.4	100	6928	100	1.51	100	15.73	100	24.33	100
Hilleshog 7005	176	286.9	101	6947	100	1.51	101	15.86	101	24.18	99
Hilleshog 7501	173	274.3	97	6284	91	1.54	102	15.26	97	22.86	94
Hilleshog 7502	184	285.1	100	6567	95	1.51	100	15.76	100	23.01	94
KW 1800	156	287.2	101	7439	108	1.52	101	15.88	101	25.94	107
KW 2249	157	285.7	101	7418	107	1.48	98	15.76	100	25.98	107
KW 3265 (Check#3)	181	274.7	97	6920	100	1.51	100	15.25	97	25.18	103
KW 3580	155	281.4	99	7338	106	1.44	95	15.51	99	26.07	107
KW 6770	177	297.1	105	7210	104	1.39	92	16.25	103	24.29	100
Maribo 884	164	290.5	102	6627	96	1.56	104	16.09	102	22.80	94
Maribo 892	180	273.2	96	6704	97	1.47	98	15.13	96	24.56	101
Maribo 899	171	279.1	98	6902	100	1.57	104	15.52	99	24.71	101
Maribo 905	160	278.8	98	6630	96	1.60	106	15.54	99	23.77	98
Maribo 906	174	290.2	102	6497	94	1.56	104	16.07	102	22.33	92
Maribo Ultramono (Check#4)	167	279.6	98	6718	97	1.61	107	15.59	99	24.03	99
Seedex SX1003	169	284.1	100	6490	94	1.35	89	15.55	99	22.81	94
Van der Have H66140	161	292.2	103	7291	105	1.42	94	16.03	102	24.93	102
Van der Have Suprafort C	168	287.8	101	7806	113	1.38	92	15.77	100	27.09	111

	Rec/T lbs	Rec/A lbs	Loss to Mol.	Sugar %	Yield T/A
General Mean	283.95	6919.51	1.51	15.70	24.35
Coeff. of Var. (%)	2.89	6.94	5.51	2.35	6.59
Variety Mean Square	799.96	2833137.87	0.10	1.84	31.85
Error Mean Square B	67.29	234605.01	0.01	0.14	2.62
F Value	11.89**	12.08**	14.03**	13.44**	12.14**
L.S.D. (.05)	4.67	275.95	0.05	0.21	0.92
L.S.D. (.01)	5.87	346.36	0.06	0.26	1.16

* significant at 5% ** significant at 1% ns not significant

Second column for each trait is percent of check.
General Mean used as check.

Table 11

COMBINED ANALYSIS
1990 SO MINNESOTA SEMI COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Entry	Code	Na ppm		K ppm		Am.N ppm		Gross/A lbs	
ACH 194 (Check#1)	183	564	109	1751	103	539	103	7992	104
ACH 204	175	512	99	1733	102	517	99	7238	94
ACH 301	163	615	119	1719	101	521	99	7736	101
ACH 890126	182	486	94	1714	101	571	109	7693	100
ACH 895205	185	451	87	1706	100	531	101	7756	101
ACH 895212	158	445	86	1672	98	497	95	7786	102
Beta 1990	179	342	66	1659	97	608	116	7590	99
Beta 2010	159	473	92	1718	101	515	98	8101	106
Beta 3440	166	544	105	1752	103	574	109	7894	103
Beta 6010	170	508	99	1699	100	491	94	7733	101
HM 2413	165	489	95	1731	102	508	97	7039	92
HM 2415	172	481	93	1761	103	571	109	7436	97
Hilleshog 5135 (Check#2)	162	582	113	1743	102	532	101	7502	98
Hilleshog 7003	178	418	81	1731	102	558	106	7671	100
Hilleshog 7005	176	490	95	1749	103	528	101	7686	100
Hilleshog 7501	173	545	106	1817	107	512	98	6998	91
Hilleshog 7502	184	469	91	1723	101	537	102	7267	95
KW 1800	156	514	100	1725	101	529	101	8236	108
KW 2249	157	520	101	1697	100	502	96	8197	107
KW 3265 (Check#3)	181	594	115	1681	99	507	97	7689	100
KW 3580	155	579	112	1566	92	483	92	8095	106
KW 6770	177	420	81	1651	97	485	93	7894	103
Maribo 884	164	495	96	1817	107	545	104	7344	96
Maribo 892	180	614	119	1599	94	489	93	7438	97
Maribo 899	171	627	122	1681	99	536	102	7683	100
Maribo 905	160	639	124	1767	104	535	102	7400	97
Maribo 906	174	520	101	1783	105	544	104	7199	94
Maribo Ultramono (Check#4)	167	627	122	1750	103	553	105	7499	98
Seedex SX1003	169	451	87	1521	89	473	90	7108	93
Van der Have H66140	161	468	91	1580	93	506	97	8006	105
Van der Have Suprafort C	168	511	99	1585	93	460	88	8561	112

	Na ppm	K ppm	Am.N ppm	Gross/A lbs
General Mean	515.86	1702.58	524.48	7660.22
Coeff. of Var. (%)	15.69	4.80	9.23	6.80
Variety Mean Square	119169.67	116741.19	24415.75	3203534.93
Error Mean Square b	6759.86	6687.31	2347.23	270118.19
F Value	17.63**	17.46**	10.40**	11.60**
L.S.D. (.05)	46.84	46.59	27.60	299.37
L.S.D. (.01)	58.79	58.48	34.65	375.76

* significant at 5% ** significant at 1% ns not sig

Second column for each trait is percent of check.
General Mean used as check.

Table 12

056-05-07-08 COMBINED ANALYSIS
1990 SO MINNESOTA SEMI COMMERCIAL CODED TEST
AMERICAN CRYSTAL SUGAR COMPANY RESEARCH CENTER

Entry	Code	Bolters %	Vigor	
ACH 194 (Check#1)	183	0.000	1.56	80
ACH 204	175	0.000	1.31	67
ACH 301	163	0.000	1.19	61
ACH 890126	182	0.000	1.94	99
ACH 895205	185	0.000	1.81	93
ACH 895212	158	0.000	1.50	77
Beta 1990	179	0.000	1.63	83
Beta 2010	159	0.000	1.50	77
Beta 3440	166	0.000	1.63	83
Beta 6010	170	0.000	1.75	90
HM 2413	165	0.000	1.69	87
HM 2415	172	0.000	2.44	125
Hilleshog 5135 (Check#2)	162	0.000	2.13	109
Hilleshog 7003	178	0.000	2.94	151
Hilleshog 7005	176	0.000	2.38	122
Hilleshog 7501	173	0.000	1.81	93
Hilleshog 7502	184	0.000	2.56	131
KW 1800	156	0.000	2.00	103
KW 2249	157	0.000	1.63	83
KW 3265 (Check#3)	181	0.000	2.13	109
KW 3580	155	0.000	2.75	141
KW 6770	177	0.000	1.69	87
Maribo 884	164	0.000	1.75	90
Maribo 892	180	0.779	1.69	87
Maribo 899	171	0.000	1.31	67
Maribo 905	160	0.000	2.13	109
Maribo 906	174	0.000	2.06	106
Maribo Ultramono (Check#4)	167	0.000	1.50	77
Seedex SX1003	169	0.000	2.63	135
Van der Have H66140	161	0.082	2.50	128
Van der Have Suprafort C	168	0.000	2.94	151

	Bolters %	Vigor
General Mean	0.03	1.95
Coeff. of Var. (%)	743.46	27.59
Variety Mean Square	0.48	3.76
Error Mean Square #	0.05	0.29
F Value	9.20**	12.90**
L.S.D. (.05)	0.13	0.37
L.S.D. (.01)	0.16	0.47

* significant at 5% ** significant at 1% ns not

Second column for each trait is percent of check.
General Mean used as check.
Vigor data collected from 2 locations.

Table 13

1990 Cercospora Leaf Spot Ratings for Coded Test Entries
Betaseed Nursery - Shakopee, MN

Description	Code	Average Rating at Each Date * 8/24	8/28	8/31	9/4	9/7	9/11	9/14	1990 Mean	2 Yr Mean	3 Yr Mean	3 Yr % Mean	1989	1988
ACH 180	22	2.75	3.00	3.25	4.25	5.00	6.00	6.25	4.36	4.47	4.30	94.5	4.59	3.95
ACH 181	10	2.25	3.00	3.00	4.25	5.00	5.50	5.75	4.11	4.28	4.14	91.0	4.46	3.85
ACH 184 (Rhiz spec)	4	2.00	2.25	3.00	3.50	4.00	5.00	5.00	3.54					
ACH 192	25	2.50	3.25	3.25	4.00	5.25	6.25	6.25	4.39	4.39	4.51	99.1	4.38	4.75
ACH 194	32	2.50	3.25	3.25	4.25	5.50	6.25	6.75	4.54	4.56	4.54	99.7	4.58	4.50
ACH 196	35	2.75	3.00	3.00	4.25	5.00	6.25	6.50	4.39	4.51	4.64	102.0	4.63	4.90
ACH 198	61	2.25	2.75	3.00	3.75	4.50	5.00	5.50	3.82	4.18	4.04	88.7	4.54	3.75
ACH 204	96	3.00	3.25	3.50	5.25	6.00	6.75	7.00	4.96					
ACH 301	108	3.00	3.50	3.50	5.25	6.00	6.75	6.75	4.96					
ACH 870332	119	2.50	3.00	3.25	4.75	5.00	6.25	7.00	4.54					
ACH 870760	154	2.75	3.00	3.00	4.25	5.25	6.25	6.50	4.43					
ACH 890126	118	2.50	3.00	3.00	4.00	4.75	5.25	5.75	4.04					
ACH 890285	126	2.75	3.25	3.25	4.75	5.00	6.25	6.75	4.57					
ACH 895118 (Rhiz spec)	62	2.00	2.25	3.00	3.00	4.00	4.25	4.25	3.25					
ACH 895205	185	2.25	3.00	3.00	3.50	3.75	4.75	5.25	3.64					
ACH 895212	158	2.50	2.75	3.00	3.75	4.50	5.75	6.00	4.04					
Beta 1238	29	2.75	3.00	3.50	5.00	5.75	6.50	6.75	4.75	4.90	4.80	105.4	5.04	4.60
Beta 1990	91	2.50	3.00	3.00	4.00	5.00	5.75	5.75	4.14					
Beta 2010	121	2.25	2.75	3.25	4.25	5.25	6.25	6.25	4.32					
Beta 2988	6	2.50	3.00	3.00	4.25	5.50	6.25	6.75	4.46	4.71	4.74	104.2	4.96	4.80
Beta 3440	92	2.75	3.50	3.75	5.25	6.00	6.75	7.25	5.04					
Beta 4609 (Rhiz spec)	87	2.00	2.00	2.75	3.00	3.50	3.75	4.75	3.11	3.60			4.09	
Beta 5657	77	2.50	3.00	3.00	4.00	5.00	6.00	6.00	4.21	4.34	4.16	91.4	4.46	3.80
Beta 6010	105	2.50	3.00	3.00	4.00	5.00	6.25	6.75	4.36					
Beta 6209	13	2.25	3.00	3.00	4.50	5.25	6.00	6.75	4.39	4.57	4.46	98.1	4.75	4.25
Beta 6625	20	3.25	3.50	3.75	5.00	5.75	6.75	6.75	4.96	4.88	4.70	103.3	4.79	4.35
Bush Johnson 1320	23	2.25	3.00	3.25	5.00	5.75	6.50	7.00	4.68	4.80	4.65	102.2	4.92	4.35
Bush Johnson 1330	26	3.00	3.00	3.50	5.00	5.75	6.75	7.00	4.86	4.70	4.58	100.7	4.54	4.35
Bush Johnson 1337	111	2.75	3.00	3.25	4.50	5.25	6.25	6.75	4.54	4.81			5.09	
Bush Johnson 1340	115	2.75	3.25	3.50	5.00	5.75	6.50	6.75	4.79	4.60			4.42	
Bush Johnson 1342	109	3.25	3.75	4.25	5.25	6.25	6.75	7.25	5.25					
HM 2401	15	2.75	3.00	3.00	4.75	5.50	6.50	6.75	4.61	4.78	4.64	101.9	4.96	4.35
HM 2402	2	2.25	2.75	3.00	3.75	4.75	5.00	6.00	3.93	4.01	4.31	94.6	4.09	4.90
HM 2409	137	2.50	3.00	3.25	5.00	5.50	6.00	6.75	4.57	4.68			4.79	
HM 2410	89	2.75	2.75	3.25	4.25	5.00	6.25	6.25	4.36					
HM 2412	124	3.00	3.00	3.00	4.00	5.00	6.00	6.00	4.29					
HM 2413	125	2.50	2.75	3.00	4.00	4.50	5.25	5.50	3.93					
HM 2415	172	2.00	2.50	3.00	3.75	4.00	5.00	5.25	3.64					
HM LSR88 (LS-Rhiz spec)	78	2.00	3.00	3.00	3.50	4.00	4.75	5.50	3.68	4.09			4.50	
HM RH-1 (Rhiz spec)	3	2.00	3.00	3.00	3.75	4.25	5.00	5.25	3.75					
Hilleshog 5090	21	3.00	3.50	3.75	4.75	5.75	6.50	6.50	4.82	4.91	4.77	104.9	5.00	4.50
Hilleshog 5135	31	2.50	3.00	3.50	4.75	5.25	6.50	7.00	4.64	4.76	4.76	104.6	4.88	4.75
Hilleshog 7001	122	2.75	3.00	3.00	4.75	5.50	6.50	6.50	4.57					
Hilleshog 7003	98	2.25	3.00	3.00	3.50	4.25	5.75	5.75	3.93					
Hilleshog 7005	140	2.75	3.25	3.50	4.75	5.25	6.25	6.75	4.64					
Hilleshog 7501	101	2.75	3.00	3.00	4.25	5.50	6.25	6.50	4.46					
Hilleshog 7502	134	3.00	3.50	4.25	5.00	6.00	7.00	7.25	5.14					

Table 13 (cont.) 1990 Cercospora Leaf Spot Ratings for Coded Test Entries

Betaseed Nursery - Shakopee, MN

Description	Code	Average Rating at Each Date * 8/24	8/28	8/31	9/4	9/7	9/11	9/14	1990 Mean	2 Yr Mean	3 Yr Mean	3 Yr % Mean	1989	1988
Hilleshog 8277	12	3.00	3.75	4.00	5.50	6.25	7.25	7.50	5.32	5.04	5.16	113.3	4.75	5.40
Hilleshog 8351	36	3.00	3.25	3.75	4.50	5.25	6.50	6.75	4.71	4.80	4.81	105.8	4.88	4.85
Holly 88N173-02	90	3.00	3.00	3.25	4.75	5.00	6.00	6.50	4.50					
Holly 88N175-02	88	2.25	3.00	3.50	4.75	5.00	6.00	6.25	4.39					
KW 1119	5	3.00	3.50	3.50	5.00	6.00	6.75	7.50	5.04	4.89			4.75	
KW 1745	1	2.75	3.25	3.50	5.00	6.00	6.25	7.00	4.82	4.77	4.59	101.0	4.71	4.25
KW 1800	113	3.00	3.00	3.25	4.75	5.25	6.25	6.75	4.61					
KW 2249	42	3.00	3.25	3.75	5.00	5.75	7.00	7.00	4.96	4.94			4.92	
KW 2398	11	2.75	3.00	3.25	5.00	5.25	6.50	7.00	4.68	4.65	4.62	101.5	4.63	4.55
KW 3145	75	2.75	3.25	3.75	5.00	5.50	6.25	6.50	4.71	4.67	4.63	101.8	4.63	4.55
KW 3265	16	2.50	3.25	3.50	5.00	5.50	6.25	6.75	4.68	4.71	4.64	102.0	4.75	4.50
KW 3580	102	2.50	3.25	3.25	4.25	5.25	6.00	6.25	4.39					
KW 6770	116	2.50	3.25	3.25	4.75	5.50	6.25	6.75	4.61					
Maribo 403	27	2.25	3.00	3.00	4.50	5.00	6.00	6.25	4.29	4.71	4.52	99.4	5.13	4.15
Maribo 410	19	2.75	3.00	3.50	4.75	5.50	6.00	6.25	4.54	4.50	4.42	97.0	4.46	4.25
Maribo 862	7	2.75	3.25	3.75	4.75	5.25	6.25	6.25	4.61	4.64	4.59	100.9	4.67	4.50
Maribo 865	38	2.50	3.00	3.00	4.00	5.00	6.00	6.25	4.25	4.52	4.48	98.5	4.79	4.40
Maribo 875	49	2.75	3.50	3.50	5.00	5.75	6.50	6.75	4.82	4.70	4.58	100.7	4.58	4.35
Maribo 884	93	2.50	3.00	3.00	4.75	5.50	6.25	6.25	4.46	4.77	4.60	101.0	5.08	4.25
Maribo 892	110	3.00	3.00	3.50	4.50	5.75	6.50	6.50	4.68					
Maribo 894	65	2.75	3.00	3.50	5.00	6.00	6.75	6.75	4.82	4.83			4.83	
Maribo 897	39	3.25	4.00	3.50	5.25	6.00	6.50	6.75	5.04	4.85			4.67	
Maribo 899	171	2.50	3.50	3.50	4.75	5.50	6.00	6.00	4.54	4.62			4.71	
Maribo 904	117	2.50	3.50	3.25	4.75	5.75	6.25	6.75	4.68					
Maribo 905	94	2.75	3.00	3.75	4.50	5.75	6.75	6.75	4.75					
Maribo 906	130	2.50	3.00	3.00	4.75	5.00	6.25	6.50	4.43					
Maribo Ultramono	24	2.75	3.00	3.25	4.25	5.25	6.25	6.25	4.43	4.65	4.62	101.5	4.88	4.55
Mitsui Monohikari	8	2.25	2.50	3.00	4.00	5.00	5.75	6.00	4.07	4.14	4.11	90.3	4.21	4.05
Seedex SX0802	28	2.25	2.75	3.00	3.75	5.25	6.25	6.25	4.21	4.15	4.45	97.8	4.08	5.05
Seedex SX0803	103	3.00	3.25	3.50	4.75	5.25	6.00	6.50	4.61					
Seedex SX0902	139	2.25	3.00	3.00	3.75	4.25	5.25	5.50	3.86					
Seedex SX1 (SX-0801)	17	2.50	2.75	3.00	4.00	5.00	5.50	6.00	4.11	4.24	4.20	92.2	4.38	4.10
Seedex SX1003	109	2.25	3.00	3.00	4.50	5.00	5.75	6.75	4.32					
Van der Have H66110	9	2.75	3.25	3.50	4.75	5.75	6.25	6.50	4.68	4.86	4.84	106.4	5.05	4.80
Van der Have H66140	30	2.75	3.25	3.75	5.00	5.75	6.25	6.75	4.79	4.87			4.96	
Van der Have H66156	120	3.00	3.00	3.75	5.00	6.00	6.75	6.75	4.89					
Van der Have H6692	18	2.50	3.25	3.50	5.00	5.50	6.25	7.00	4.71	4.75	4.68	103.0	4.79	4.55
Van der Have Puressa II	14	2.75	3.50	4.00	4.75	5.75	6.25	6.50	4.79	4.67	4.53	99.5	4.55	4.25
Van der Have Supralort C	168	2.25	3.00	3.00	3.75	4.25	5.00	5.25	3.79					
Seedex SX-0901													4.50	4.45
Exp Mean		2.61	3.08	3.30	4.48	5.24	6.00	6.39	4.45	4.61	4.55	100.0	4.06	

Date of Harvest Summary

Objectives

Evaluate nine sugarbeet varieties for relative root yields and quality characteristics harvested early (mid prepile) mid (beginning full harvest) and late (late in full harvest).

Experimental Procedures

Trials were planted at three locations in 1988, eight locations in 1989, and seven locations in 1990. Two locations were harvested in 1988, six in 1989 and 1990.

The nine varieties that were planted in the seven 1990 trials were:

ACH 198	Beta 6625
Maribo 865	Hilleshog 2401
Maribo 875	Hilleshog 5135
KW 2398	Monohikari
KW 3265	

The varieties KW 2398, Maribo 865 and 875 have only 1990 data. Varieties ACH 198 and Hilleshog 2401 have only 1989 and 1990 data.

The experimental units consisted of four row plots 30 ft. in length with six replications in 1988. The variety trials in 1989 and 1990 consisted of two row strip trials planted and maintained with the cooperators equipment. All trials were thinned to a final population of 120-140 plants per 100 ft. of row. Standard production practices were conducted for weed and disease control.

The dates of harvest were split into three intervals early, mid and late harvest. The dates of harvest were September 22, 18, and 14 for early harvest; October, 6, 3, 10 for mid harvest; and October 25, 16, 24 for late harvest in 1988, 1989, and 1990, respectively. In all six replications per variety per date were hand harvested for quantity and quality analysis.

Results and discussion

The growing season started with a near depleted supply of moisture. However, adequate or in most cases more than adequate precipitation was received throughout the growing season. This stunted growth along with a cool spring that slowed growth and caused a large number of acres to be replanted. These factors caused the crop to be approximately two weeks behind the average crop.

The varieties reacted differently when comparing separate locations at each harvesting interval (data not shown). The variability of variety among locations at each harvesting had no pattern when considering all factors (such as environment and field type) to indicate a reason for the variability. This variability can be explained by the tightness of data to the means and the variability among varieties around that mean. This explains the large amount of non-significance among the data. However, there were some significant and practical differences when locations were combined. Thus, data will be discussed and averaged over locations; this will present the best probability for each variety ranking regardless of location.

Variety performance data for early, mid-harvest, and late harvest dates are presented in tables 1, 2, 3, 4 and 5. The average percent sugar increase of 2.68% was the second largest in four years (1986-1990) and equal to that achieved in 1986 (Table 1). The average increase in root yield was 2.73 ton per acre, 1.9 ton per acre below the average increase over the past four years (Table 2). Loss to molasses remained fairly constant only increasing slightly at .01 percent (Table 5).

Average deviation from the mean for each variety tested in 1990 is presented in figure 1, 2, 3, 4 and 5 for sugar percent, tons/acre (T/A), sugar/ton (S/T), recoverable sugar/acre (RSA), and loss to molasses (LTM). Data combined for 1988-1990 are presented in figures 6, 7, 8, and 9. The varieties tend to respond differently at the various harvest intervals in 1990. When considering sugar percent compared to the mean ACH 198, Beta 6625 and Monohikari would be best harvested early. Varieties Maribo 865, and 875, KW 2398 and 3265 would be best harvested late. The two Hilleshog varieties 5135 and 2401 did not vary from the mean to a great degree but tended to give a higher sugar percent at the later harvest interval.

Most of the varieties gave the typical result of higher tons/acre at the mid to late harvest interval. However, data for Maribo 865 and KW 2398 indicated an early harvest would be best. Varieties Maribo 875 and Hilleshog 2401 did not vary to a great degree from early to late harvest and data ACH 198 and Monohikari indicated a mid harvest would be best. The remaining varieties KW 3265, Hilleshog 5135, and Beta 6625 would be best harvested late.

Loss to molasses (LTM) is a factor calculated using three components of the sugarbeet, sodium (Na), potassium (K), and harmful amino nitrogen (HAN). The LTM usually declines throughout the harvesting interval; thus, LTM usually is higher at early harvest than at mid or late harvest. However, the varieties did vary in the response to the harvest interval. The varieties that the LTM was lowest at early harvest was Maribo 865 and 875, KW 2398 and 3265, Beta 6625, and Monohikari; thus, these varieties would be best harvested early when considering LTM. Varieties ACH 198, Hilleshog 2401 and 5135 gave their highest LTM early and lowest LTM late and therefore would have been best harvested late.

Sugar per acre (sugar/acre) is a factor dependent on sugar percent, LTM (these two factors determine sugar/ton) and tons/acre. That point in which a particular variety obtains the highest sugar/acre compared to the mean is when a grower should harvest that particular variety. This author knows that this is difficult to do, but data obtained in such trials as this one can be used as a management tool. Varieties Maribo 865 and 875 obtained their highest sugar compared to the mean at the early harvest interval. Mid harvest varieties would be KW 2398, ACH 198 and Monohikari. Three varieties KW 3265, Hilleshog 5135 and Beta 6625 should be harvested late when comparing this data to the mean. Two varieties could be harvested at any harvest interval, Hilleshog 2401 and even though indicated as a mid harvest variety, KW 2398 gives among the highest sugar/acre regardless of harvest interval.

Only four varieties have been in the date of harvest for three or more years, KW 3265, Hilleshog 5135, Beta 6625 and Monohikari. From these data Hilleshog 5135 and Beta 6625 would best be harvested early and KW 3265 and Monohikari would best be harvested late for high sugar percent. Beta 6625, KW 3265 and Hilleshog 5135 gave higher tons/acre at late harvest and Monohikari gave higher tons/acre at early harvest in comparison to the mean. Varieties KW 3265 and Hilleshog 5135 gave higher sugar/acre at early harvest and Beta 6625 and Monohikari gave higher sugar/acre at late harvest when compared to the mean. Remember sugar/acre is the result of all other factors.

The decision of when to harvest is not as easy as choosing the particular variety for a particular field although it can aid in this decision. Factors such as those listed below can effect the end result.

1) Plant population.

2) General plant growth and development throughout the growing season.

3) Plant stress caused by excess/deficient water, hail, insects, temperature, disease, weeds, etc.

4) Relative soil fertility.

5) Relative planting dates, emergence dates, speed of plant growth, etc.

6) Relative ability for plants to respond to the environment and continue rapid growth.

Consideration of the above factors as well as the varieties can aid the grower in producing the highest quality product at any given harvest interval.

Table 1. Three year performance of 1990 varieties harvested early, mid-harvest, and late for sugar content.

	Sugar Content %									
Variety	Early 1990	Mid 1990	Late 1990	Change E->L	Early 2yr Mean 89-90	Late 2yr Mean 89-90	Early 3yr Mean 88-90	Late 3yr Mean 88-90	Early 3yr %Mean 89-90	Late 3yr %Mean 89-90
Maribo 865	13.03	15.33	15.53	2.50						
Maribo 875	13.17	15.44	15.74	2.57						
KW 2398	13.18	15.57	15.90	2.72						
ACH 198	13.19	15.84	16.03	2.84	14.44	16.89				
Hilleshog 2401	13.26	15.52	15.95	2.69	14.65	16.99				
KW 3265	12.79	15.33	15.77	2.98	14.39	16.38	14.01	16.78	98.29	99.10
Hilleshog 5135	13.16	15.67	16.11	2.95	14.50	16.73	14.22	17.04	99.80	100.64
Beta 6625	13.43	15.97	15.50	2.07	14.67	16.69	14.52	16.85	101.90	99.54
Monohikari	13.16	15.62	16.00	2.84	14.46	16.66	14.25	17.05	100.01	100.72
Mean	13.15	15.59	15.84	2.68	14.51	16.72	14.25	16.93	100.00	100.00
*LSD(0.05)	0.32	NS	NS							

* 0.05 significance level

1988 Data from Renville and Bird Island.

1989 Data from Hector, Bird Island, Danube, Renville, Clara City, and Maynard

1990 Data from Hector, Renville, Sacred Heart, Maynard, and Clara City.

Table 2. Three year performance of 1990 varieties harvested early, mid-harvest, and late for root yield.

Variety	Early 1990	Mid 1990	Late 1990	Change E->L	Early 2yr Mean 89-90	Late 2yr Mean 89-90	Early 3yr Mean 88-90	Late 3yr Mean 88-90	Early 3yr %Mean 89-90	Late 3yr %Mean 89-90
	Root Yield Tons									
Maribo 865	20.69	22.43	22.21	1.52						
Maribo 875	21.16	22.61	23.96	2.80						
KW 2398	21.83	24.14	23.79	1.96						
ACH 198	19.61	22.95	21.43	1.82	20.91	23.25				
Hilleshog 2401	20.51	22.36	23.32	2.81	21.65	25.07				
KW 3265	20.85	21.69	25.02	4.17	22.56	26.80	21.24	25.07	103.09	104.11
Hilleshog 5135	20.44	22.05	23.86	3.42	21.88	25.41	20.33	24.73	98.67	102.68
Beta 6625	17.99	19.61	23.80	5.81	20.76	24.44	19.80	23.68	96.12	98.34
Monohikari	19.76	22.25	20.01	0.25	22.65	23.61	21.04	22.85	102.12	94.87
Mean	20.32	22.23	23.04	2.73	21.73	24.76	20.60	24.08	100.00	100.00
*LSD(0.05)	NS	NS	NS							

* 0.05 significance level

1988 Data from Renville and Bird Island.

1989 Data from Hector, Bird Island, Danube, Renville, Clara City, and Maynard

1990 Data from Hector, Renville, Sacred Heart, Maynard, and Clara City.

Table 3. Three year performance of 1990 varieties harvested early, mid-harvest, and late for recoverable sugar/ton.

	Recoverable Sugar/Ton Lbs									
Variety	Early 1990	Mid 1990	Late 1990	Change E->L	Early 2yr Mean 89-90	Late 2yr Mean 89-90	Early 3yr Mean 88-90	Late 3yr Mean 88-90	Early 3yr %Mear 89-90	Late 3yr %Mean 89-90
Maribo 865	233	278	278	45						
Maribo 875	236	281	287	51						
KW 2398	238	284	292	54						
ACH 198	236	290	290	54	263	310				
Hilleshog 2401	237	283	292	55	267	313				
KW 3265	230	281	290	60	263	300	255	309	98	98
Hilleshog 5135	236	287	296	60	264	307	256	314	99	100
Beta 6625	244	295	294	50	269	312	265	317	102	101
Monohikari	240	289	295	55	267	308	262	317	101	101
Mean	237	285	290	54	265	308	259	314	100	100
*LSD(0.05)	NS	NS	NS							

* 0.05 significance level

1988 Data from Renville and Bird Island.

1989 Data from Hector, Bird Island, Danube, Renville, Clara City, and Maynard

1990 Data from Hector, Renville, Sacred Heart, Maynard, and Clara City.

Table 4. Three year performance of 1990 varieties harvested early, mid-harvest, and late for sugar/acre.

					Sugar/Acre Lbs					
Variety	Early 1990	Mid 1990	Late 1990	Change E->L	Early 2yr Mean 89-90	Late 2yr Mean 89-90	Early 3yr Mean 88-90	Late 3yr Mean 88-90	Early 3yr %Mean 89-90	Late 3yr %Mean 89-90
Maribo 865	4835	6216	6222	1387						
Maribo 875	5010	6341	6848	1838						
KW 2398	5178	6843	6930	1752						
ACH 198	4603	6645	6397	1794	5500	7305				
Hilleshog 2401	4867	6346	6803	1936	5819	7886				
KW 3265	4766	6058	7247	2481	5923	8039	5406	7717	101	102
Hilleshog 5135	4811	6322	7060	2249	5799	7808	5309	7768	99	102
Beta 6625	4372	5778	6736	2364	5641	7490	5276	7345	98	97
Monohikari	4732	6419	6168	1436	6102	7504	5471	7546	102	99
Mean	4797	6330	6712	1716	5797	7672	5365	7594	100	100
*LSD(0.05)	NS	NS	NS							

* 0.05 significance level
1988 Data from Renville and Bird Island.
1989 Data from Hector, Bird Island, Danube, Renville, Clara City, and Maynard
1990 Data from Hector, Renville, Sacred Heart, Maynard, and Clara City.

Table 5. Three year performance of 1990 varieties harvested early, mid-harvest, and late for loss to molasses (LTM).

Variety	Early 1990	Mid 1990	Late 1990	Change E->L	Early %Mean	Mid %Mean	Late %Mean	**Total %Mean
	LTM %							
Maribo 865	1.37	1.42	1.43	0.06	104	108	108	107
Maribo 875	1.38	1.39	1.36	-0.02	105	106	102	104
KW 2398	1.29	1.33	1.31	0.02	98	102	98	99
Hilleshog 2401	1.39	1.35	1.35	-0.04	105	103	102	103
ACH 198	1.39	1.33	1.34	-0.05	105	102	101	103
KW 3265	1.27	1.26	1.29	0.02	96	96	97	96
Hilleshog 5135	1.36	1.34	1.31	-0.05	103	102	98	101
Beta 6625	1.24	1.23	1.30	0.06	94	94	98	95
Monohikari	1.18	1.17	1.26	0.08	89	89	95	91
Mean	1.32	1.31	1.33	0.01				
*LSD(0.05)	0.07	0.09	NS					

* 0.05 significance level

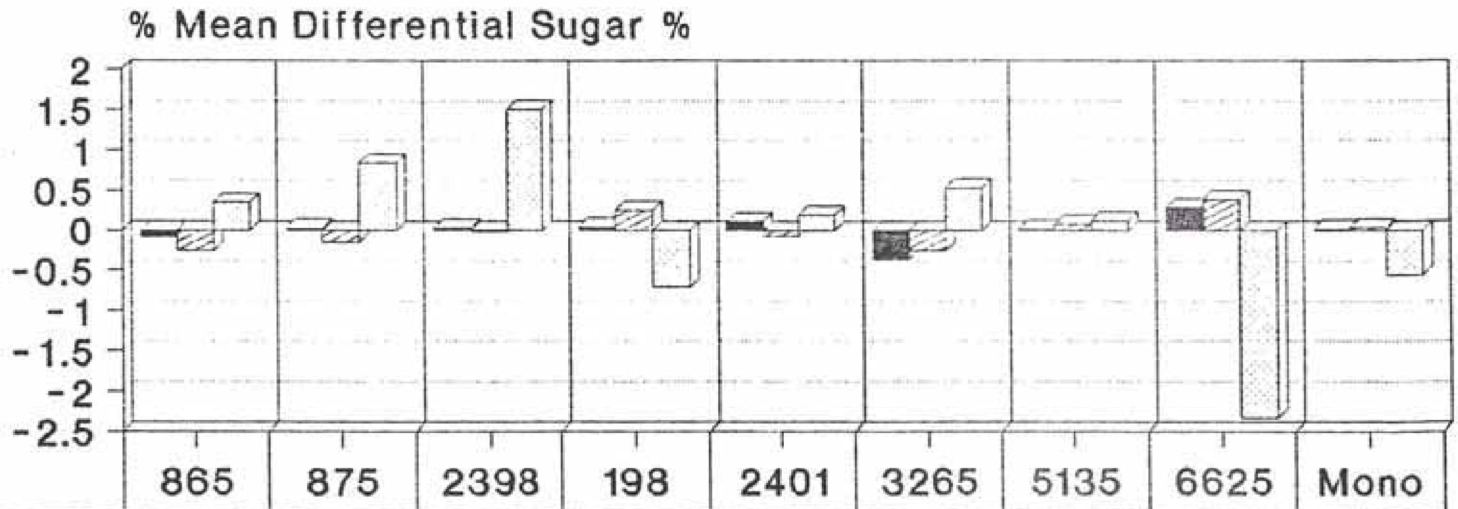
** An average of the three harvest intervals, early, mid-harvest, and late.

1988 Data from Renville and Bird Island.

1989 Data from Hector, Bird Island, Danube, Renville, Clara City, and Maynard

1990 Data from Hector, Renville, Sacred Heart, Maynard, and Clara City.

Deviation From Mean for Sugar
Combined Data for 1990



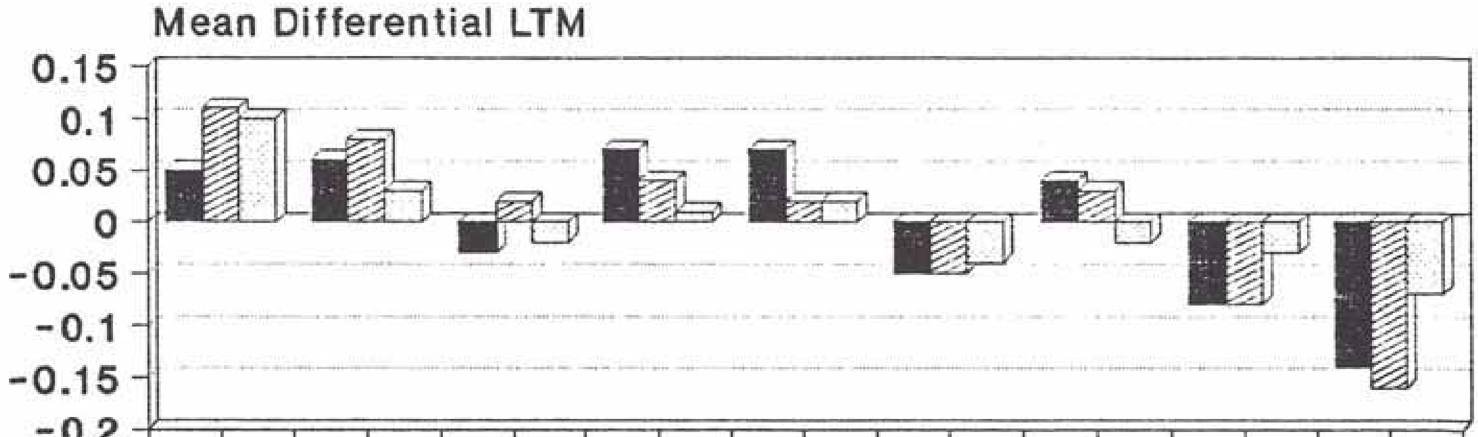
	865	875	2398	198	2401	3265	5135	6625	Mono
Early	-0.08	0.02	0.03	0.04	0.11	-0.36	0.01	0.28	0.01
Mid	-0.26	-0.15	-0.02	0.25	-0.07	-0.26	0.08	0.38	0.03
Late	0.35	0.84	1.51	-0.71	0.19	0.53	0.12	-2.33	-0.56

Variety

Early   Mid   Late

Figure 1. The average deviation from the mean for % sugar in 1990.

Deviation From Mean for LTM
Combined Data for 1990



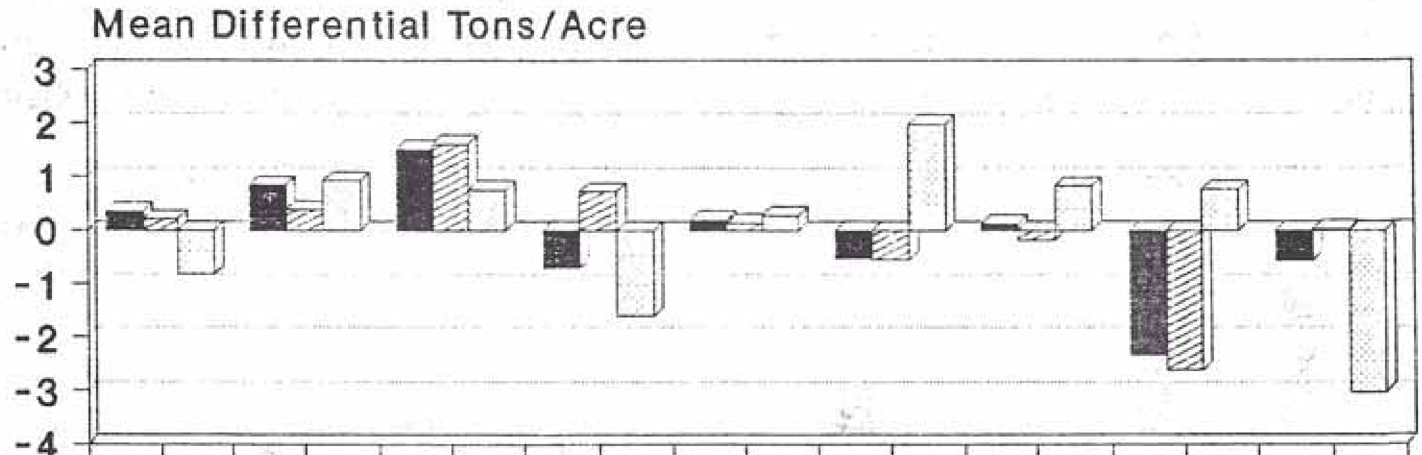
	865	875	2398	198	2401	3265	5135	6625	Mono
Early	0.05	0.06	-0.03	0.07	0.07	-0.05	0.04	-0.08	-0.14
Mid	0.11	0.08	0.02	0.04	0.02	-0.05	0.03	-0.08	-0.16
Late	0.1	0.03	-0.02	0.01	0.02	-0.04	-0.02	-0.03	-0.07

Variety

Early Mid Late

Figure 2. The average deviation from the mean for % sugar in 1990.

Deviation From Mean for tons/acre
Combined Data for 1990



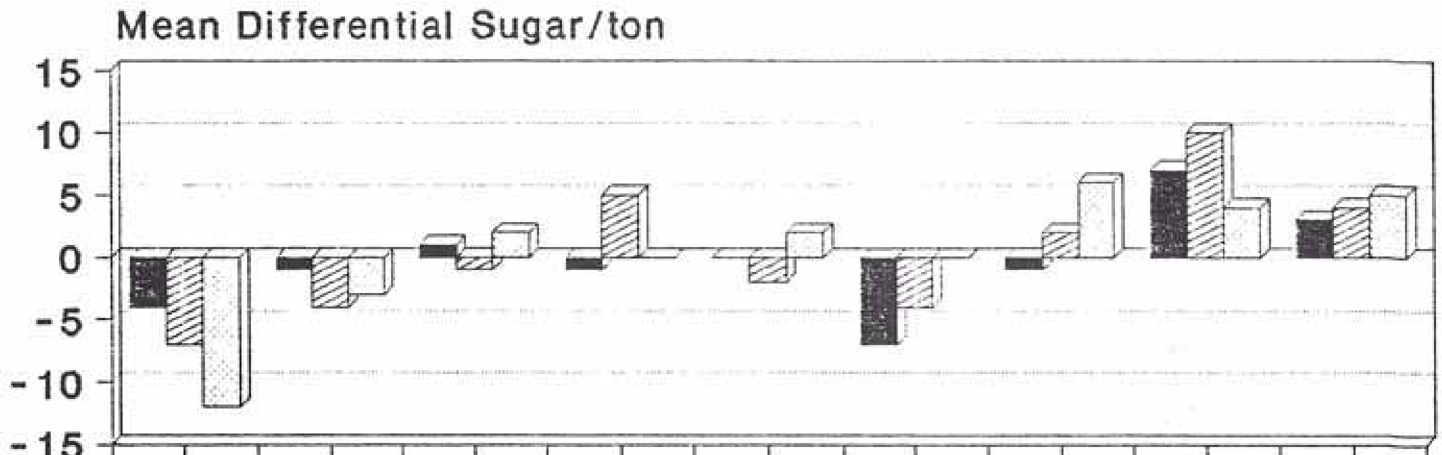
	865	875	2398	198	2401	3265	5135	6625	Mono
Early	0.35	0.84	1.51	-0.71	0.19	-0.53	0.12	-2.33	-0.56
Mid	0.2	0.38	1.61	0.72	0.13	-0.54	-0.18	-2.62	0.02
Late	-0.83	0.92	0.75	-1.61	0.28	1.98	0.82	0.76	-3.03

Variety

Early Mid Late

Figure 3. The average deviation from the mean for tons/acre in 1990.

Deviation From Mean for Sugar/Ton
Combined Data for 1990



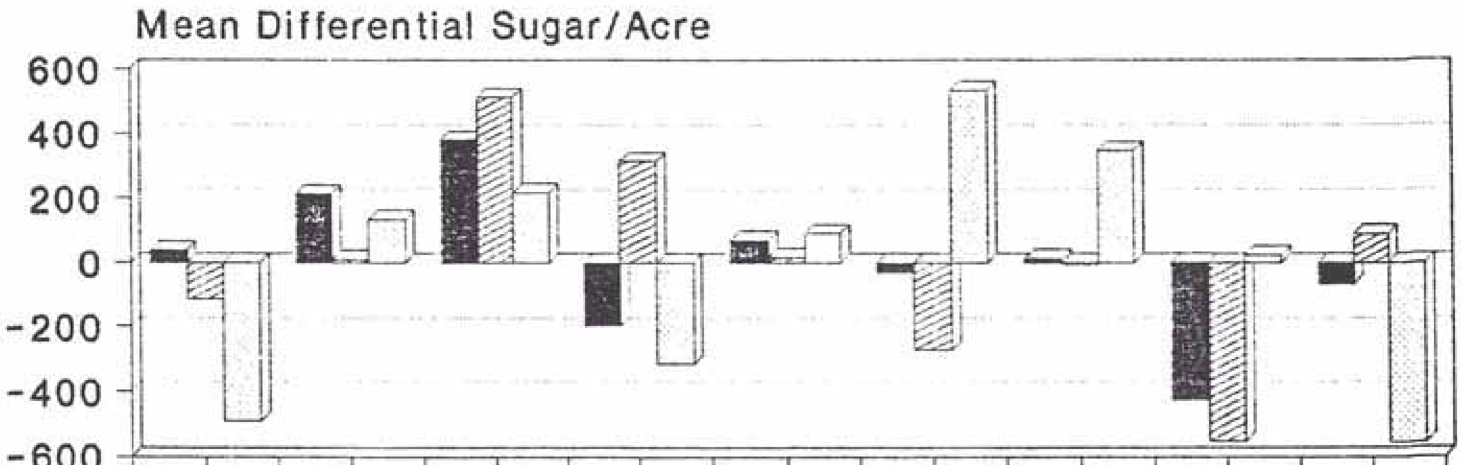
	865	875	2398	198	2401	3265	5135	6625	Mono
Early	-4	-1	1	-1	0	-7	-1	7	3
Mid	-7	-4	-1	5	-2	-4	2	10	4
Late	-12	-3	2	0	2	0	6	4	5

Variety

Early Mid Late

Figure 4. The average deviation from the mean for recoverable sugar per ton in 1990.

Deviation From Mean for Sugar/Acre
Combined Data for 1990



	865	875	2398	198	2401	3265	5135	6625	Mono
Early	38	213	381	-194	70	-31	14	-425	-65
Mid	-114	11	513	315	16	-272	-8	-552	89
Late	-490	136	218	-315	91	535	348	24	-554

Variety

Early   Mid   Late

Figure 5. The average deviation from the mean for recoverable sugar per acre in 1990.

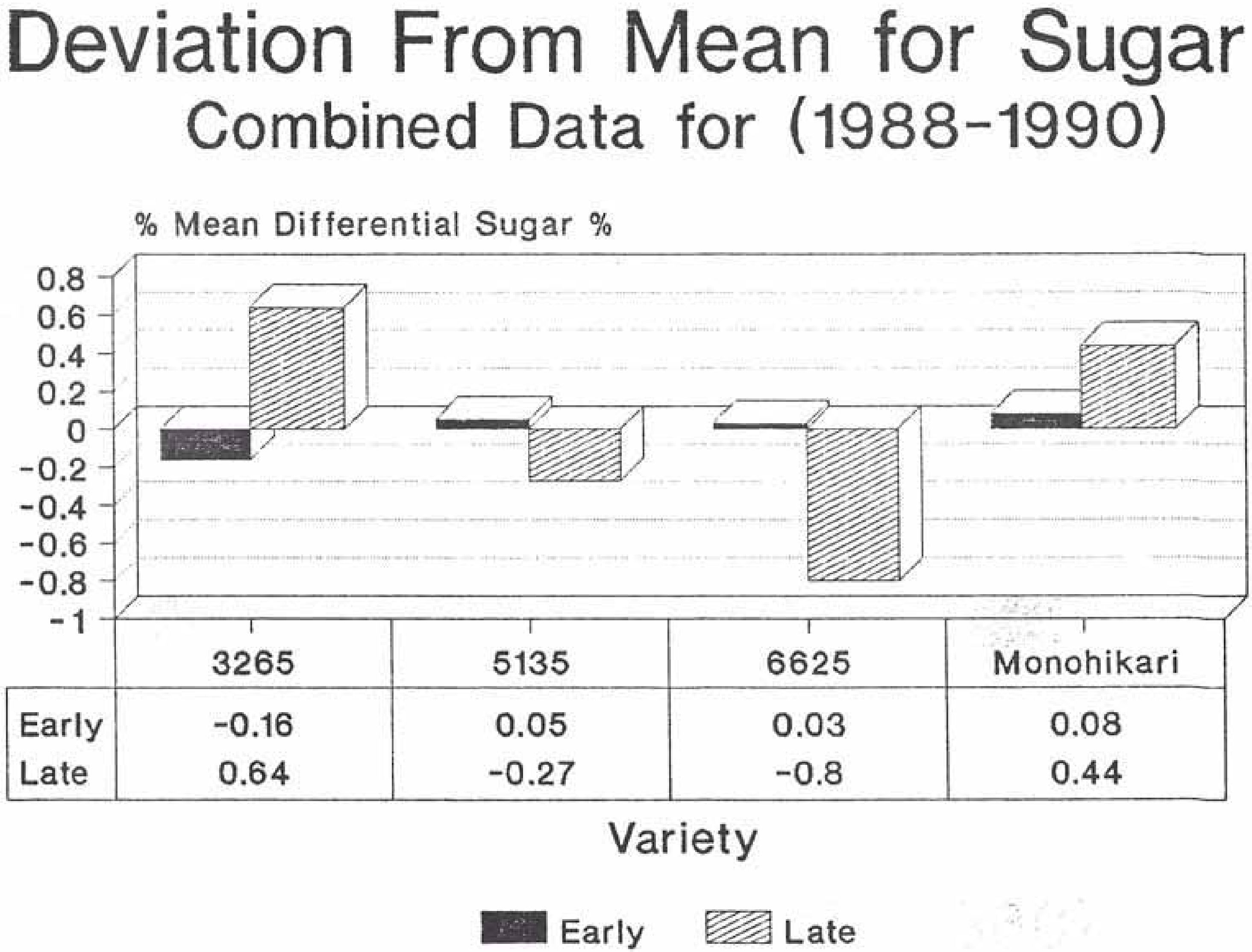
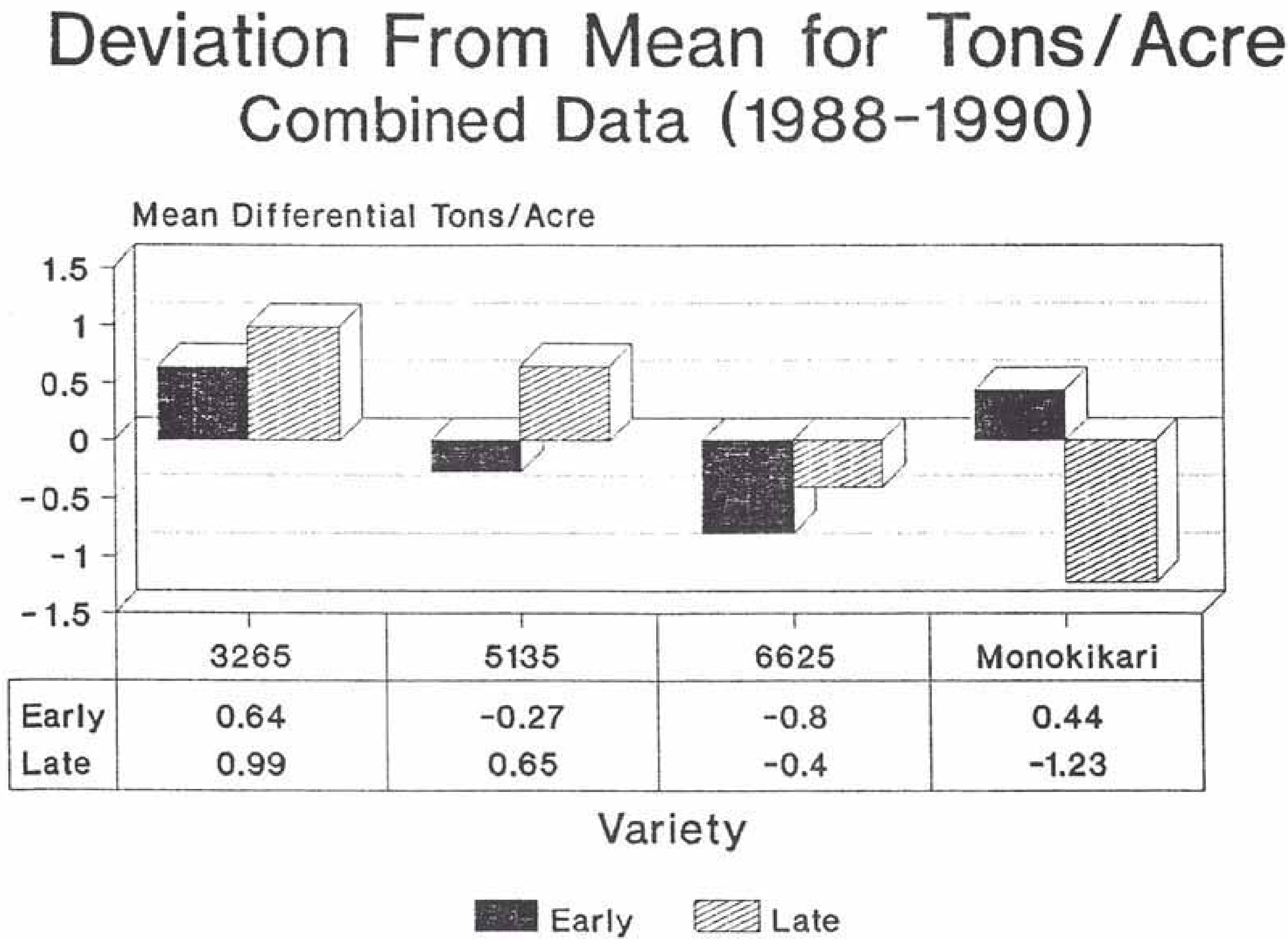


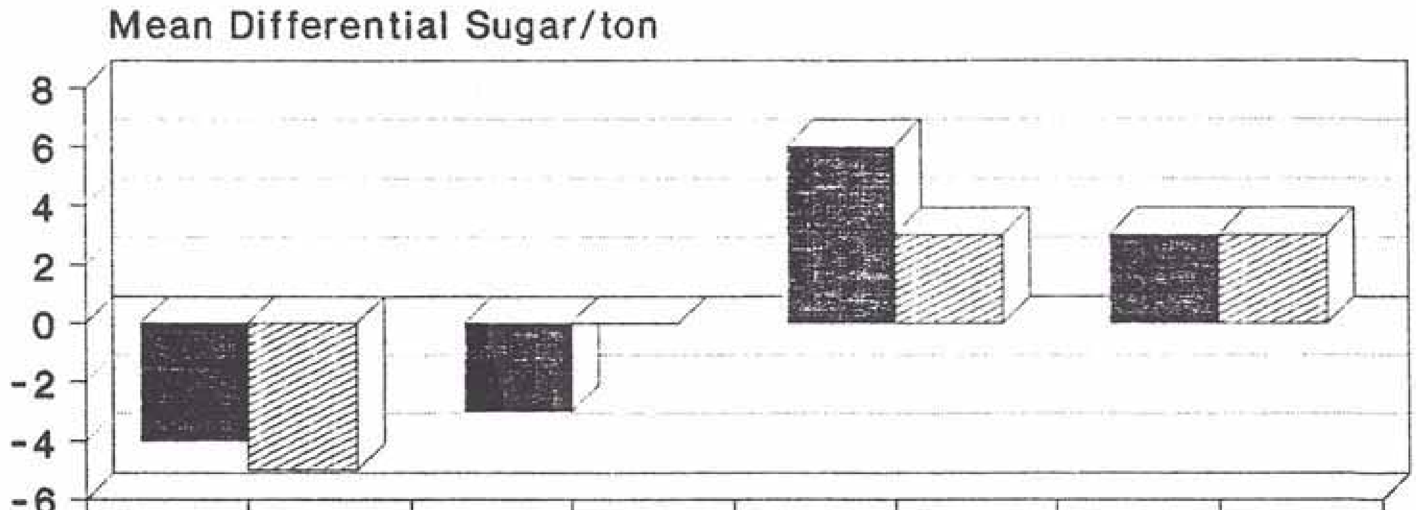
Figure 6. The average deviation of the % of the mean for % sugar combined data 1988 - 1990.



	3265	5135	6625	Monokikari
Early	0.64	-0.27	-0.8	0.44
Late	0.99	0.65	-0.4	-1.23

Figure 7. The average deviation for the % of the mean for tons/acre combined data 1988-1990.

Deviation From Mean for Sugar/Ton
Combined Data (1988-1990)



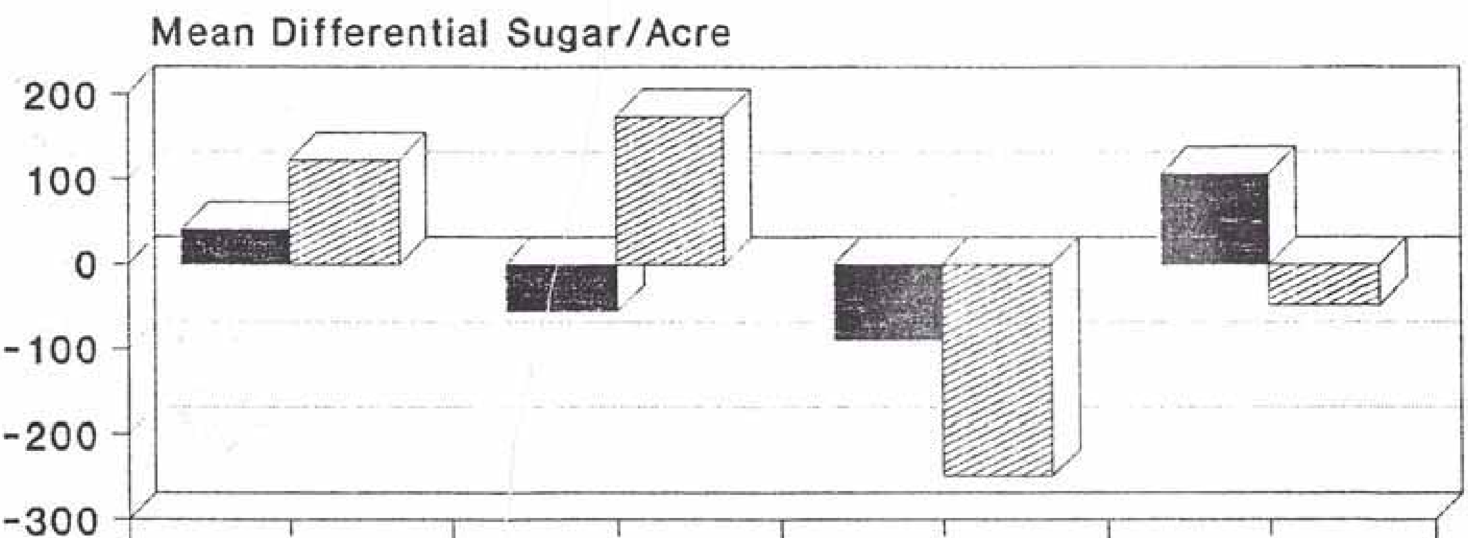
	3265	5135	6625	Monohikari
Early	-4	-3	6	3
Late	-5	0	3	3

Variety

Early Late

Figure 8. The average deviation of the % of the mean for recoverable sugar/ton combined data 1988-1990.

Deviation From Mean for Sugar/Acre
Combined Data (1988-1990)



	3265	5135	6625	Monokikari
Early	41	-56	-89	106
Late	123	174	-249	-48

Variety

Early Late

Figure 9. The average deviation of the % of the mean for recoverable sugar/acre combined data 1988-1990.

Varieties Evaluated for Root Aphid Tolerance

Objectives

Evaluate six sugarbeet varieties for resistance to sugarbeet root aphid.

Experimental Procedures

Trials were planted at thirteen locations in 1990 and four locations were harvested. The six varieties were as follows:

Hilleshog 2402	Hilleshog TX18
Hilleshog 1803	Hilleshog LSR88
Hilleshog E4	Monohikari

The varieties were harvested and evaluated for % sugar, tons per acre, sugar per ton and sugar per acre.

The variety trials consisted of two row strip trials planted and maintained with the cooperators equipment. All trials were thinned to a final population of 120-140 plants per 100 ft. of row. Standard production practices were conducted for weed and disease control.

In all six replications per variety were hand harvested for quantity and quality analysis.

Results and discussion

This research was a result of the devastating damage from the infestation of sugarbeet root aphid. The moisture received throughout the 1990 growing season lessened any type of severe sugarbeet root aphid investation. Thus, the testing of these varieties for tolerance to sugarbeet root aphid was not attainable.

However, performance of these six varieties was stil evaluated. These data presented in figures 1-4 indicated how these varieties will perform under the lack of sugarbeet root aphid presence.

All data was non-significant regardless of location so data is averaged over all location. The percent sugar ranged from 15.7 to 15.95. Hilleshog 1803 gave the lowest loss to molasses.

There was a range of approximately four tons from the highest to the lowest yielding variety. The sugar per ton did not vary a great degree with only 8 pounds per ton between the low and high. Sugar per acre had a direct relationship to tons per acre as the variety ranking was the same for both tons per acre and sugar per acre. This close relationship between tons per acre and sugar per acre is due to the lack of difference for sugar per ton among varieties.

Monohikari is usually among the highest for sugar per acre and the lowest for loss to molasses. However, in these data Monohikari was the lowest in sugar per acre and highest in loss to molasses. Thus, these data indicate that the varieties tested for tolerance to sugarbeet root aphid would perform as good as many of the SMSC approved varieties. However, this is only one year's data and therefore is not conclusive. Futher research will be required to demonstrate variety tolerance to sugarbeet root aphid and to further evaluate tested varieties for quality and quantity.

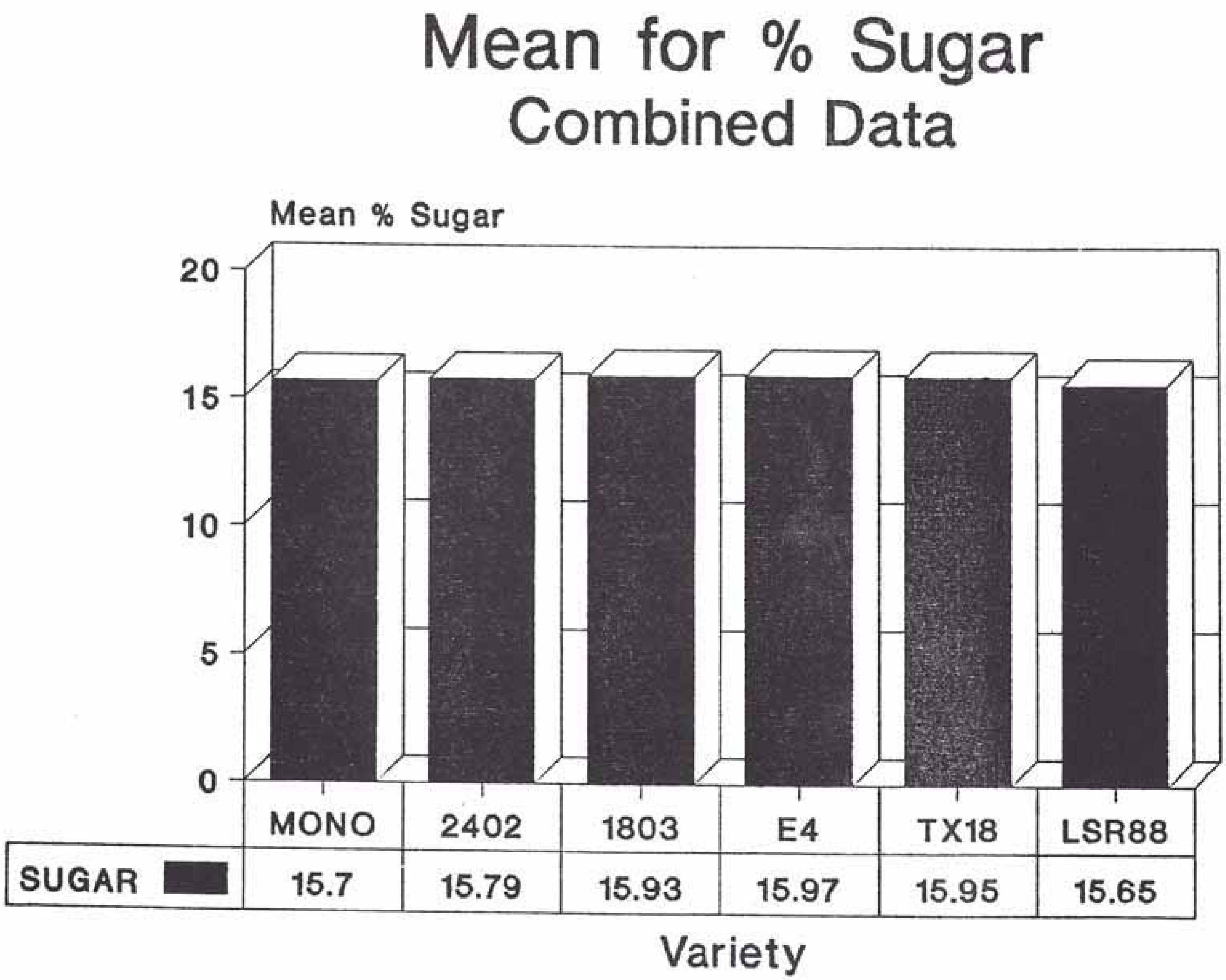


Figure 1. The means for % sugar averaged over four locations.

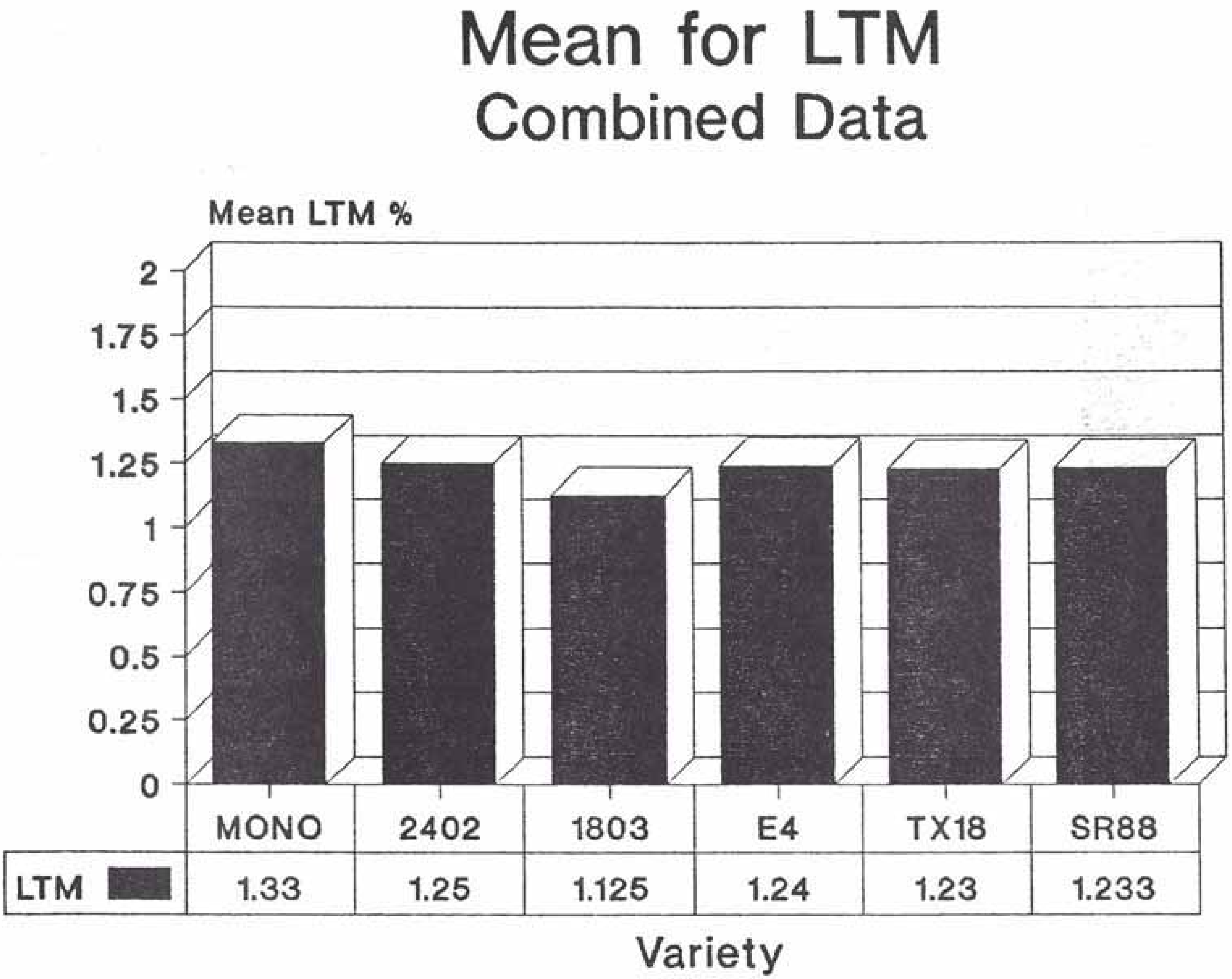


Figure 2. The means for loss to molasses averaged over four locations.

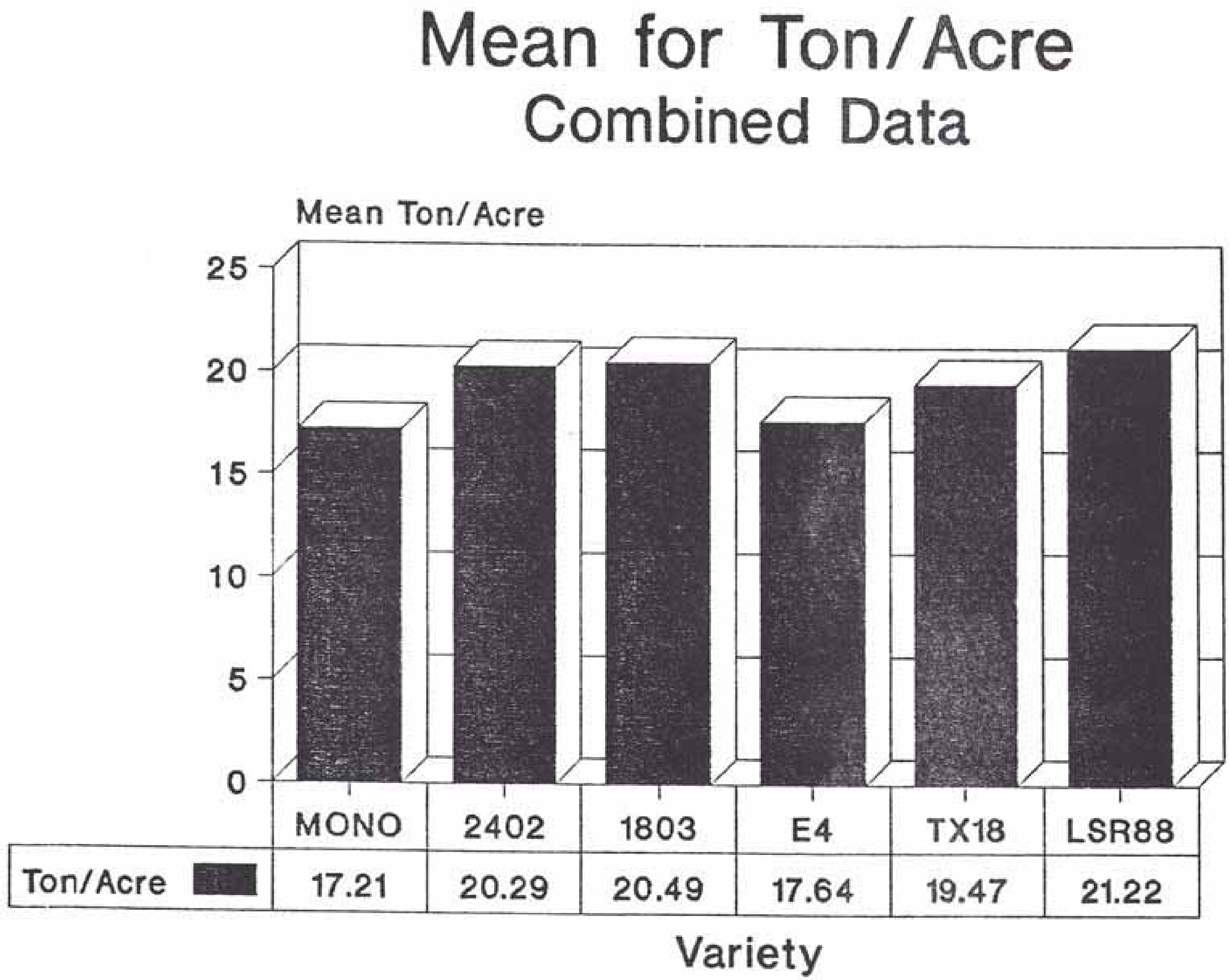


Figure 3. The means for tons per acre averaged over four locations.

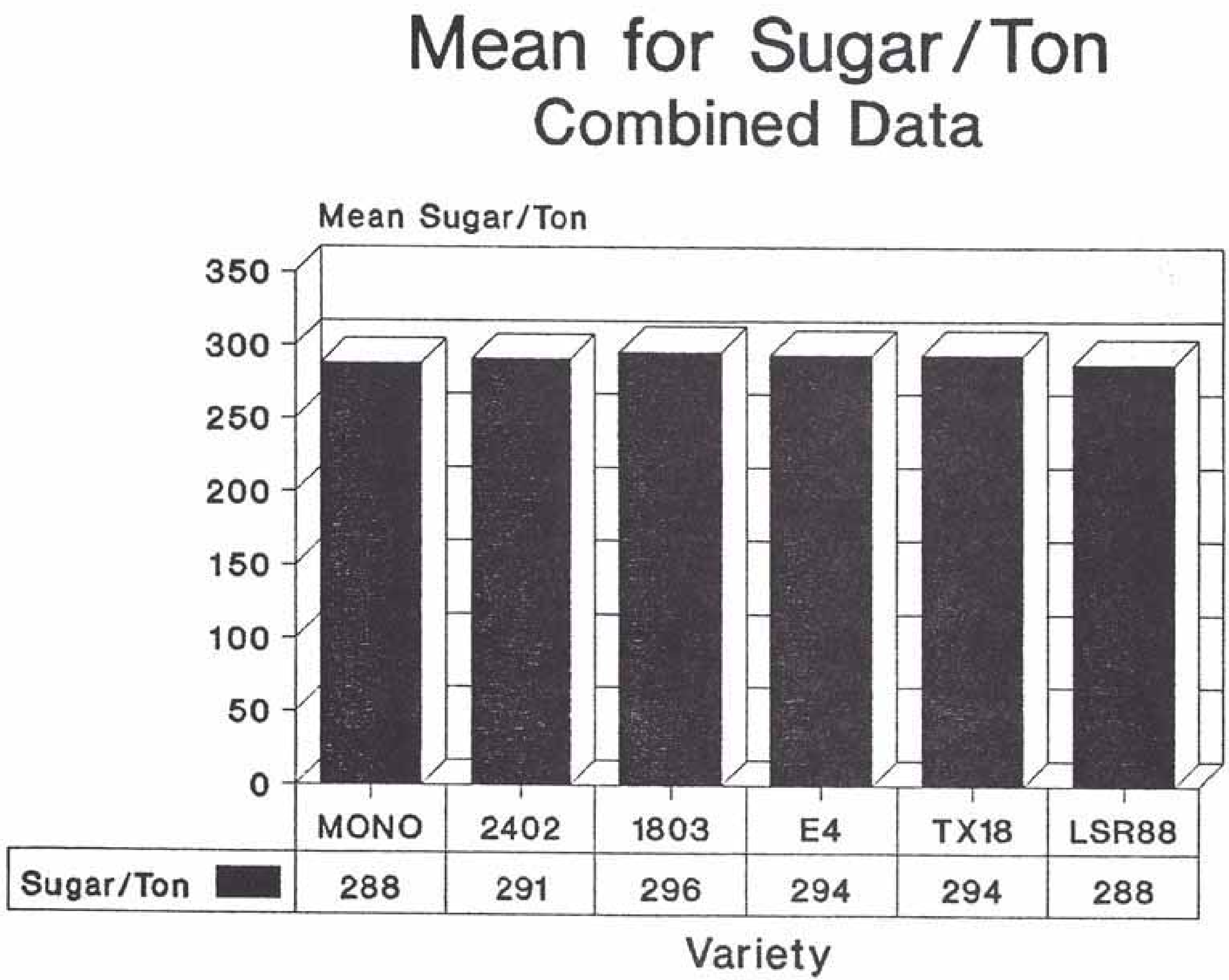
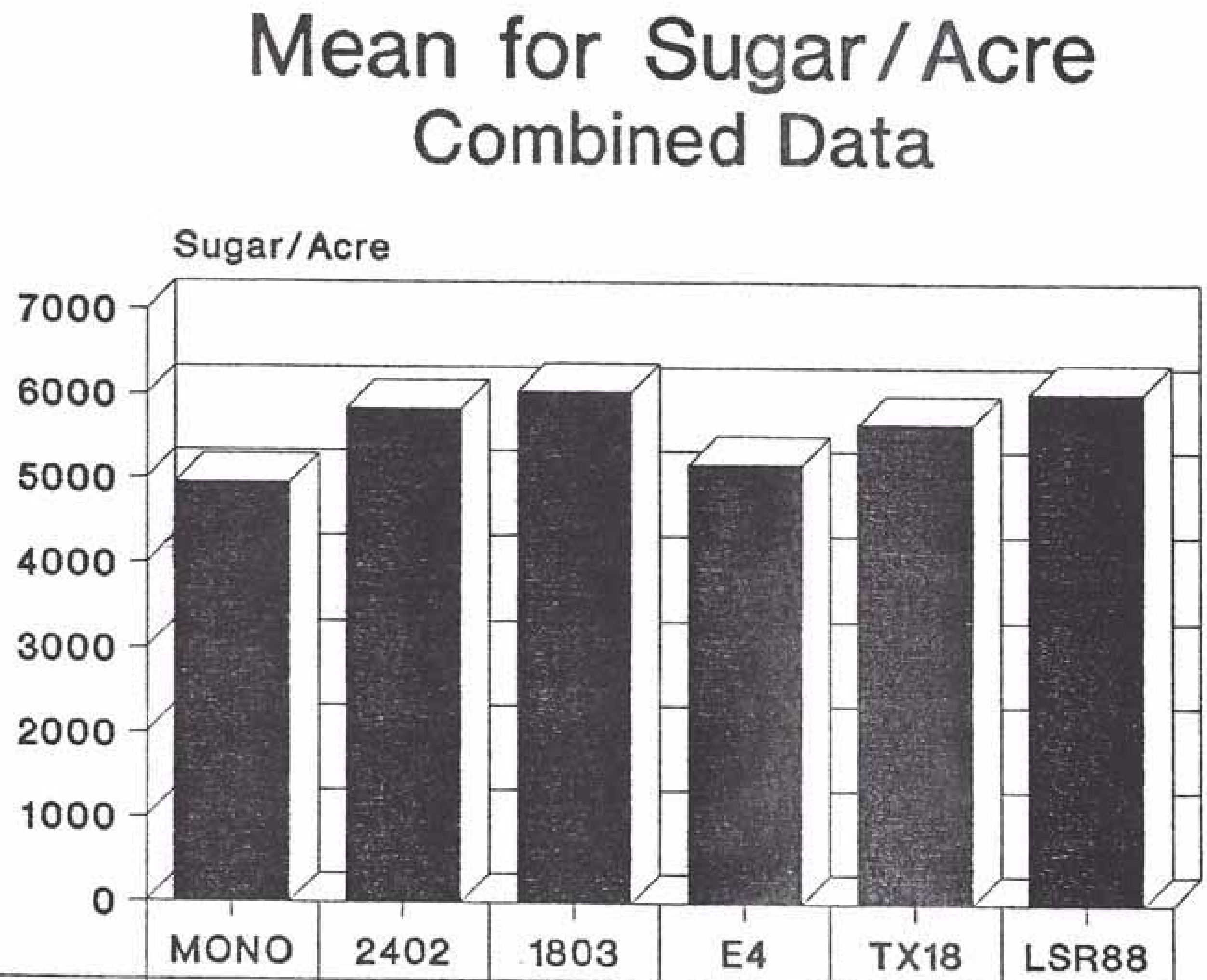


Figure 4. The means for sugar per ton averaged over four locations.



	MONO	2402	1803	E4	TX18	LSR88
Sugar/Acre	4956	5836	6049	5181	5672	6047

Figure 5. The means for sugar per acre averaged over four locations.

Post Emergence Herbicides Over Soil Applied Herbicide, Clara City, 1990

Objective

Evaluate preplant incorporated, preemergence and postemergence herbicides for general weed control.

Experimental Procedure

Preplant incorporated herbicides were applied 5:50 pm May 4 when the air temperature was 71F, soil temperature at six inches was 58F, relative humidity was 34%, wind was 5-10 mph, and soil moisture was good. Incorporation was with a rototiller set four inches deep. 'Maribo 862' sugarbeet was seeded 1.25 inches deep in 22 inch rows May 4. Preemergence treatments were applied May 4 after planting. All soil applied herbicides were applied in 17 gpa, water at 40 psi through 8002 nozzles to the center four rows of six row plots. The first postemergence herbicide application was 9:30 am May 29 when the air temperature was 60F, soil temperature at six inches was 59F, relative humidity was 69%, wind was 5 mph, soil moisture was good, and sugarbeets were in the 2 leaf stage. The second postemergence application was 11:00 am June 6 when the air temperature was 65F, soil temperature at six inches was 62F, relative humidity was 55%, wind was 8-10 mph, soil moisture was good, and sugarbeets were in the 4 leaf stage. The third postemergence application was 3:20 pm June 13 when the air temperature was 82F, soil temperature at six inches was 79F, relative humidity was 48%, wind was 10 mph, soil moisture was good, and sugarbeets were in the 6 leaf stage. All postemergence treatments were applied in 8.5 gpa water at 38 psi through 8001 nozzles to the center four rows of six row plots. Sugarbeet injury and foxtail control were evaluated June 22.

Results and Discussion

The difference between treatments for sugarbeet injury and foxtail control was nonsignificant. Sugarbeet injury tended to increase with the use of stinger at the higher rate (0.19 lb. ai/A) with Betanex or additives such as Dash and Foam Buster with Betanex. Injury to sugarbeets tended to increase when Stinger was added to Betanex applied on sugarbeets with preplant incorporated Eptam and Roneet. However, sugarbeet injury obtained early in the growing season may not be reflected in a yield loss.

Roneet alone tended to give better control of foxtail than Eptam alone. Antor alone and Nortron with no postemergence herbicide gave similar control of the foxtail. The best control of foxtail by a preplant incorporated or preemergence herbicide without a postemergence herbicide was Roneet. Roneet without postemergence herbicide tended to give as good or better control of the foxtail than any treatment with postemergence herbicide. The lack of difference between these treatments could be due to the lack of foxtail population. The larger the weed pressure the larger the difference will be in most cases.

When considering what combinations of herbicides would do the best job, a grower needs to consider the effectiveness of the herbicide combination plus the cost. For example, the data presented for this experiment indicates that the addition of one or more herbicides may increase foxtail control 1 to 15 percent. Depending on the foxtail population 1 percent control may be economically effective; however, 15 percent may not be economically effective depending on the foxtail population. Continued research will be conducted pertaining to the combination of preplant incorporated, preemergence, and postemergence herbicides since labeled mixtures, rates, and formulations are always changing.

Table 1. List of Treatments,crop injury and foxtail control from preplant incorporated, preemergence and postemergence herbicides.

Treatments*	Rate	Sugar Beet Injury	Fox Tail Contrl
	(lb ai/A)	(%)	(%)
Eptam (ppi)	2.5	6	87
Roneet (ppi)	4	1	93
Eptam+Roneet (ppi)	1.5+2.5	6	98
Antor (pre)	5	4	88
Nortron (pre)	3.5	6	89
Btnx/Btnx/Post+Dash	0.25/0.33/0.2+0.25G	7	99
Btnx/Btnx+Stngr/Post+Dash	0.25/0.33+0.09/0.2+0.25G	4	92
Btnx/Btnx+Stngr/Post+Dash	0.25/0.33+0.19/0.2+0.25G	13	99
Btnx+Stngr/Btnx+Stngr/Post+Dash	0.25+0.09/0.33+0.09/0.2+0.25G	4	82
Btnx/Btnx/Btnx+Post+Dash	0.25/0.33/0.5+0.2+0.25G	11	90
Btnx+Herb273/Btnx+Herb273/Post+Dash	0.25+0.25/0.33+0.25/0.2+0.25G	6	92
Btnx+FB/Btnx+FB/Post+Dash	0.25+0.0625G/0.33+0.0625G/0.2+0.25G	12	99
Eptm(ppi)/Btnx/Btnx/Post+Dash	2.5/0.16/0.25/0.2+0.25G	15	99
Ronet(ppi)/Btnx/Btnx/Post+Dash	4/0.16/0.25/0.2+0.25G	9	99
Eptm+Ronet(ppi)/Btnx/Btnx/Post+Btnx	1.5+2.5/0.16/0.25/0.2+0.25G	6	91
Antor(pre)/Btnx/Btnx/Post+Dash	5/0.16/0.25/0.2+0.25G	5	92
Nrtrn(pre)/Btnx/Btnx/Post+Dash	3.5/0.16/0.25/0.2+0.25G	6	99
Eptm+Ronet(ppi)/Btnx/Btnx+Stngr/Post+Dash	1.5+2.5/0.16/0.25+0.09/0.2+0.25G	10	93
Eptm+Ronet(ppi)/Btnx+Stngr/Btnx+Stngr /Post+Dash	1.5+2.5/.16+.09/.25+.09/.2+.25G	10	99
Eptm+Ronet(ppi)/Btnx/Btnx/Btnx+Post+Dash	1.5+2.5/0.16/0.25/0.33+0.2+0.25G	6	97
HIGH MEAN		15	99
LOW MEAN		1	82
EXP MEAN		7	94
C.V.%		79	12
LSD 5%		NS	NS
LSD 1%		NS	NS
# OF REPS		4	4

* Dash = Surfactant from BASF; FB = 'Foam Buster' antifoaming agent, Btnx = Betanex, Stngr = Stinger, Eptm = Eptam, Ntrn = Nortron, Post = Poast.
\+ = tankmix
/ = sequential treatment

Simulated Spray Drift, Renville, 1990

Objectives

To evaluate the potential crop injury due to herbicide drift.

Experimental Procedure

'Maribo 865' sugarbeet was seeded 1.25 inches deep in 22 inch rows May 4. Treatments were applied 4:30 pm July 6 when the air temperature was 83F, soil temperature at six inches was 78F, relative humidity was 54%, wind was 5-10 mph, soil moisture was good, and sugarbeets were in the 10 leaf stage. Each herbicide treatment was applied to an untreated block of sugarbeets and to a block treated with foliar applied Lorsban at 1 lb/A prior to herbicide application. Sugarbeet injury was evaluated July 18.

Results and Discussion

Sugarbeets were injured regardless of treatment. Sugarbeet injury and herbicide rate had a direct relationship, in that sugarbeet injury increased as herbicide rate increased.

The greatest sugarbeet injury resulted from the new herbicides such as Harmony, Harmony Extra and Pursuit. These herbicides are members of the Sulfonylurea (Harmony and Harmony Extra) and Imidazilinone (Pursuit) class of herbicides. These two classes of herbicides have caused great concern among the sugarbeet growing areas because of the high susceptibility of sugarbeets to these herbicides.

Pursuit caused the highest degree of injury at 94 percent at .01 lb. ai/A (one-sixth the labeled rate). Even at .005 lb. ai/A of pursuit (one twelfth the labeled rate) 86 percent sugarbeet injury occurred. Harmony and Harmony Extra injured sugarbeets 88 percent, respectively at .002 lb ai/A (one-eighth the labeled rate). Herbicides 2.4-D and Banvel gave 50 and 48 percent injury at one-fourth the respective labeled rates.

The data indicates that if Lorsban was applied immediately prior to the Sulfonylurea and Imidazilinone herbicide drift onto sugarbeets, a higher degree of crop injury could be expected. Sugarbeet injury from 24-D, Banvel, Basagran and Batanex was not increased by a prior treatment of Lorsban. Thus, subsequent treatments of Lorsban prior to either 24-D, Banvel, or Basagran drift would not warrant greater concern for crop injury than that crop injury that would already exist.

Betanex did not injure the sugarbeets regardless of treatment. Sugarbeet injury of 1% in all probable cases would not cause a reduction in yield.

Future research pertaining to herbicide drift will include yield checks throughout the growing season. Yield checks along with injury evaluation will provide a better understanding for how herbicide drift effects the sugarbeet.

Table 1. List of treatments and crop injury ratings from low levels of herbicide applications simulating drift in Renville MN.

Treatment*	Rate	Untreated Sugarbeet injury	Lorsban Sugarbeet injury
	(lb ai/A)	(%)	(%)
Untreated	0	0	0
Harmony Extra+X-77	0.002+0.25%	88	95
Harmony Extra+X-77	0.001+0.25%	28	83
Harmony Extra+X-77	0.0005+0.25%	45	63
Harmony Extra+X-77	0.00025+0.25%	9	25
Pinacle-60+X-77	0.002+0.25%	88	90
Pinacle-60+X-77	0.001+0.25%	74	81
Pinacle-60+X-77	0.0005+0.25%	43	40
Pinacle-60+X-77	0.00025+0.25%	6	16
Pursuit+X-77	0.01+0.25%	94	90
Pursuit+X-77	0.005+0.25%	86	89
Pursuit+X-77	0.001+0.25%	46	59
Pursuit+X-77	0.005+0.25%	10	6
Accent	0.02	35	46
Accent	0.01	13	23
Accent	0.005	13	6
Accent	0.0025	6	5
24-D	0.12	50	9
24-D	0.06	6	8
Basagran	0.25	13	11
Banvel	0.12	48	44
Banvel	0.06	9	21
Betanex	0.75	1	0
EXP MEAN		35	40
C.V. %		19	17
LSD 5%		10	10
# OF REPS		4	4

* X-77 = non-ionic surfactnat from Chevron Chemical Co.; + = tankmixed.

Velvetleaf and Common Sunflower Control
With Postemergence Herbicides

Objective

To evaluate velvetleaf and common sunflower control with postemergence herbicides and additives.

Experimental Procedures

This experiment was established in a commercial field seeded to 'Hilleshog 5135' sugarbeet May 15. The first herbicide application was applied 10:30 am June 5 when the air temperature was 62F, soil temperature at six inches was 55F, relative humidity was 85%, wind was 5 mph, soil moisture was good, sugarbeets were in the 4 leaf stage, velvetleaf was in the cotyledon to 4 leaf stage, and common sunflower was in the 4 leaf stage. The second herbicide application was 8:30 am June 8 when the wind was 5-10 mph, soil moisture was good, sugarbeets were in the 4 to 6 leaf stage, velvetleaf was in the 2 to 4 leaf stage, and common sunflower was in the 4 to 6 leaf stage. The third herbicide application was applied 4:30 p June 18 when the wind was 0-5 mph, soil moisture was good, sugarbeets were in the 6 to 8 leaf stage, velvetleaf was in the 4 to 6 leaf stage, and common sunflower was in the 6 to 8 leaf stage. Sugarbeet injury and velvetleaf control were evaluated June 21. Common sunflower was evaluated June 21 and July 2.

Results and Discussion

The only treatment that caused injury greater than the other treatments was a split application of Betanex with 0.25 lb ai/A and 0.33 lb ai/A applied at the first and second application respectively. The sugarbeet injury from this treatment was probably caused by the higher rate of Stinger 0.19 lb ai/A applied with the Betanex at 0.5 lb ai/A at the third application.

Stinger alone or with additives did not provide control of velvetleaf, and when herbicide 273 was added to Stinger only 41 percent velvetleaf control could be achieved. Regardless of the split application of Betanex or Betamix control of velvetleaf did not exceed 50 percent unless Stinger was added to the mixture. The highest degree of velvetleaf control at 79 percent was obtained with a three way split application of Betanex at 0.25, 0.33, and 0.5 lb ai/A respectively with 0.19 lb ai/A of Stinger applied with Betanex at the last application.

Betanex alone did not give control of common sunflower. Common sunflower control was achieved only when Stinger was included in the treatment. Stinger alone at .09 lb ai/A and 0.19 lb ai/A provided similar control of common sunflower, but better control than Stinger as a water soluble granule at 0.09 lb ai/A.

Common sunflower control with Stinger at .09 lb ai/A as a water soluble granule (Stinger-WSG) was dramatically increased, 74 to 93 percent control, when Betanex was included in two sequential applications. Stinger applied at 0.19 lb ai/A was required to obtain adequate, 94 percent, control when Stinger was added to only one of the sequential applications of Betanex. However, at the second and conclusive evaluation, all treatments that included Stinger in the water soluble liquid formulation gave common sunflower control equal or greater than 92 percent. Stinger at 0.09 lb ai/A gave similar common sunflower control as 0.19 lb ai/A of Stinger. However, Stinger in the water soluble granule formulation gave only 86 percent control of common sunflower. Additives or the addition of other postemergent herbicide was not needed to achieve common sunflower control greater than 95 percent.

Sugarbeet injury should not be a concern with these treatments when applied properly. Velvetleaf control was not adequate with the highest degree of control achieved being 79 percent. Further research is needed for velvetleaf control. Common sunflower control was adequate with Stinger at 0.09 lb ai/A and no additives of any type would be needed.

Table 1. List of treatments, crop injury, velvetleaf and common sunflower control from betanex and stinger.

				June 21	July 2
Treatment*	Rate	Sgbt inj	Vele cntl	Cosf cntl	Cosf cntl
	(lb ai/A) (lb/A)	----------(%)----------			
Betanex/Betanex/--	0.25/0.33/--	0	3	3	3
Betanex/Betanex+Stinger/--	0.25/0.33+0.09/--	1	60	83	97
Betanex+Stngr/Btnx+Stngr/--	0.25+0.09/0.33+0.09/--	3	71	94	96
Betamix/Btmx/--	0.25/0.33/--	3	25	0	18
Btmx+Stngr/Btmx+Stngr/--	0.25+0.09/0.33+0.09/--	0	51	96	95
Betanex/Betenex/Betanex	0.25/0.33/0.5	4	34	3	5
Betanex/Betanex/Betanex+Stinger	0.25/0.33/0.5+0.19	9	79	94	98
Btnx+Stngr-WSG/Btnx+Stngr-WSG/--	0.25+0.09/0.33+0.09/--	0	56	93	92
Betanex+Herb273/Betanex+Herb273/--	0.25+0.25/0.33+0.25/--	1	28	44	14
--/Stinger/--	--/0.09/--	0	0	83	97
--/Stinger/--	--/0.19/--	0	0	84	96
--/Stinger-WSG/--	--/0.09/--	0	0	74	86
--/Stinger+Enhance/--	--/0.09+0.5%/--	0	0	74	92
--/Stinger-WSG+Enhance/--	--/0.09+0.5%/--	0	0	70	95
--/Stinger+L-77/--	--/0.09+0.25%/--	0	0	84	93
--/Stinger-WSG+L-77/--	--/0.09+0.25%/--	0	0	86	95
--/Stinger+Sun-It/--	--/0.09+0.25G/--	0	0	85	95
--/Stinger+Herb273/--	--/0.09+0.5/--	0	41	93	94
--/Stinger+Herb273/--	--/0.19+0.5/--	1	33	91	94
EXP MEAN		1	25	70	76
C.V. %		269	54	10	10
LSD 5%		4	19	10	10
# OF REPS		4	4	4	4

* WSG = water-soluble granule; Sun-it = sunflower methyl ester from Agsco; L-77 = surfactant; Enhance = surfactant; Btmx = Betamix; Btnx = Betanex; Stngr = Stinger; Sgbt inj = Sugarbeet injury; Vele cntl = Velvetleaf control; Cosf Cntl = Common Sunflower control;
\+ = tankmix
/ = sequential treatment
-- = nothing applied at that time interval

COMMON COCKLEBUR CONTROL WITH

POSTEMERGENCE HERBICIDES, CLARA CITY, 1990

Objectives

To evaluate the control of common cocklebur with postemergence herbicide and additives.

Experimental Procedures

This experiment was established in a commercial sugarbeet field seeded with 'KW 3265' May 10, 1990. The first herbicide application was 1:00 pm June 4 when the air temperature was 61F, soil temperature was 61F, soil temperature at six inches was 62F, relative humidity was 67%, soil moisture was good, sugarbeets were in the cotyledon stage, and common cocklebur was in the 2 leaf stage. The second application was 9:30 am June 14 when the air temperature was 68F, soil temperature at six inches was 65F, relative humidity was 75%, wind was 0-5 mph, soil moisture was good, sugarbeets were in the 2 leaf stage, and common cocklebur was in the 2 to 4 leaf stage. The third application was 10:30 am June 21 when the air temperature was 68F, soil temperature at six inches was 73F, relative humidity was 72%, wind was 0 mph, soil moisture was good, sugarbeets were in the 4 to 6 leaf stage, and common cocklebur was in the 4 to 6 leaf stage. All herbicides were applied in 8.5 gpa water at 38 psi through 8001 nozzles to the center four rows of six row plots. Sugarbeet injury and common cocklebur control were evaluated June 22.

Results and Discussion

Sugarbeet injury was not evident regardless of treatment. Betamix or/and Betanex applied alone did not control common cocklebur adequately. Stinger was needed with Betamix or Betanex to obtain 60 percent or better for common cocklebur control. Stinger applied with Betamix only gave 63 percent control of common cocklebur. However, Stinger applied with Betanex gave as high as 86 percent control of common cocklebur.

Stinger applied alone at 0.09 and 0.19 lb ai/A gave 68 and 85 percent control of common cocklebur, respectively. Stinger applied with additives or as a water soluble granule had no benefit for control of common cocklebur.

Common cocklebur control of 95 percent was the best achieved which was 6 percent better than the next best treatment. These two treatments were similar in that Betamix was applied alone in the first application and Stinger and herbicide 273 were applied at the second application. The only difference is that when Stinger was applied at 0.19 lb ai/A, 95 percent common cocklebur control was achieved and 89 percent common cocklebur control was obtained when Stinger was applied at 0.09 lb ai/A. Stinger was needed for common cocklebur control. Common cocklebur control with Stinger was best with 0.19 lb ai/A when Stinger was applied alone. Betanex was better than Betamix to be mixed with Stinger for common cocklebur control. Stinger gave the best control when applied with herbicide 273, regardless of the rate of Stinger. Herbicide 273 and Betanex acted as an additive, enhancing common cocklebur control with Stinger. Stinger as a water soluble granule was of no benefit over Stinger as a water soluble liquid.

Table 1. List of treatments, crop injury and Common Cocklebur control from betamix and Stinger.

Treatment	Rate	Sugarbeet Injury	Common Cklbur Control
	(lb ai/A)	--------(%)--------	
Betamix/Betanex/--	0.2/0.33/--	0	28
Betamix/Betanex+Stinger/--	0.2/0.33+0.09/--	0	85
Betamix/Betanex+Stinger/--	0.2/0.33+0.09/--	0	86
Betamix/Betamix/--	0.2/0.33/--	0	51
Betamix/Betamix+Stinger/--	0.2/0.33+0.09/--	0	63
Betamix/Betanex/Betanex	0.2/0.33/0.5	0	35
Betamix/Betanex/Betanex+Stinger/--	0.2/0.33/0.5+0.19	0	80
Betamix/Betanex+Stinger-WSG/--	0.2/0.33+0.09/--	0	84
Betamix/Betanex+Herb273/--	0.2/0.33+0.25/--	0	56
Betamix/Stinger/--	0.2/0.09/--	0	68
Betamix/Stinger/--	0.2/0.19/--	0	85
Betamix/Stinger-WSG/--	0.2/0.09/--	0	54
Betamix/Stinger+Enhance/--	0.2/0.09+0.5%/--	0	68
Betamix/Stinger-WSG+Enhance	0.2/0.09+0.5%/--	0	64
Betamix/Stinger+L-77	0.2/0.09+0.25%/--	0	73
Betamix/Stinger-WSG+L-77	0.2/0.09+0.25%/--	0	65
Betamix/Stinger+Sun-It/--	0.2/0.09+0.25G/--	0	80
Betamix/Stinger-WSG+Sun-It/--	0.2/0.09+0.25G/--	0	66
Betamix/Stinger+Herb273/--	0.2/0.09+0.5/--	0	89
Betamix/Stinger+Herb273/--	0.2/0.19+0.5/--	0	95
EXP MEAN		0	69
C.V. %		0	14
LSD 5%		NS	13
# OF REPS		4	4

*WSG = water-soluble granule; Sun-It = sunflower methyl ester from Agsco;
L-77 = surfactant; Enhance = surfactant;
\+ = tankmix
/ = sequential treatment
-- = nothing applied at that time interval

Common Sunflower Control with Stinger and Betamix, Benson, 1990

Objectives

To evaluate common sunflower control with Stinger and Betamix.

Experimental Procedures

This experiment was established in a commercial sugarbeet field seeded with 'Hilleshog 5135' sugarbeet May 11. The first half of split application treatments and all single application treatments were applied May 28 when the air temperature was 62F, relative humidity was 85%, wind was 0 to 5 mph, soil moisture was good, sugarbeets were in the 4 leaf stage, and common sunflower was in the 4 leaf stage. The second half of split treatments was applied June 4 when the air temperature was 63F, relative humidity was 80%, wind was 5 to 10 mph, soil moisture was good, sugarbeets were in the 4 to 8 leaf stage, and common sunflower was in the 4 to 8 leaf stage. All treatments were applied in the 10 gpa water to the center four rows of six row plots. Sugarbeet injury was evaluated June 12. Common sunflower was evaluated June 12 and July 2.

Results and Discussion

Betamix applied alone did not control common sunflower. Common sunflower control two weeks after the first treatment was inadequate with Stinger applied alone. However, four weeks after the first treatment 90 percent common sunflower control was achieved with only .0625 lb ai/A of Stinger applied alone.

Early common sunflower control of 81 percent or greater was obtained when Stinger was applied with Betamix. Stinger at only .0265 lb ai/A applied in both the first and second split application treatments with Betamix gave 90 percent control of common sunflower after two weeks. After four weeks all treatments except Betamix applied alone gave 90 percent control or better.

This data indicates that Stinger is required for control of common sunflower. The decision of whether or not you mix Stinger and Betamix may be dictated by the species of weeds to control other than common sunflower.

Table 1. List of treatments, crop injury and common sunflower control from Stinger and Betamix.

Treatment	Rate	- June 12 Sugar Beet Injury	- June 12 Common Sunflower Control	- July 2 Common Sunflower Control
	(lb/A)	---------- (%) ----------		
Stinger/--	0.0625/--	1	51	90
Stinger/--	0.125/--	0	59	94
Stinger/--	0.19/--	0	59	91
Stinger/Stinger	0.0625/0.0625	0	61	94
Stinger+Betamix	0.125+0.25	6	73	95
Stngr+Btmx/Stngr+Btmx	0.0625+0.25/0.0625+0.33	13	90	96
Stngr+Btmx/Stngr+Btmx	0.09+0.25/0.09+0.33	16	88	97
Betamix/Betamix	0.25/0.33	13	33	3
Stinger/Betamix	0.125/0.33	6	84	97
Betamix/Stinger	0.25/0.125	0	66	94
Stinger+Betamix/Betamix	0.125+0.25/0.33	13	85	96
Betamix/Stinger+Betamix	0.25/0.125+0.33	16	81	94
Untreated Check	0	0	0	0
EXP MEAN		6	64	80
C.V. %		54	14	5
LSD 5%		5	13	6
# OF REPS		4	4	4

* Btmx = Betamix; Stngr - Stinger;
+ = tankmix
/ = sequential treatment
-- = nothing applied at that time interval

Giant Ragweed Control With

Clopyralid, Fernando, 1990

Objectives

To evaluate giant ragweed control with Stinger and Betamix.

Experimental Procedure

This experiment was established in a commercial sugarbeet field seeded with 'Hilleshog 5135; sugarbeet May 6. The first half of split application treatments and all single application treatments were applied May 22 when the air temperature was 70F, relative humidity was 55%, wind was 15 mph, soil moisture was good, sugarbeets were in the 2 leaf stage, and giant ragweed was 2 inches tall. Heavy rains (1.5 to 2 inches) fell 3.5 hours after herbicide application May 22. The second half of split treatments was applied June 4 when the air temperature was 67F, relative humidity was 59%, wind was 5 mph, soil moisture was good, sugarbeets were in the 4 leaf stage, and giant ragweed was in the 4 to 6 leaf stage. All treatments were applied in 10 gpa water to the center four rows of six row plots. Sugarbeet injury was evaluated June 11. Giant ragweed was evaluated June 11 and June 19.

Results and Discussion

Betamix control of giant ragweed did not exceed 36 percent when Betamix was applied alone. Stinger was needed either in combination with Betamix or alone for giant ragweed control. Giant Ragweed control only tended to be better when Stinger at .09 lb ai/A vs. .0625 ai/A was applied with Betamix at both the first and second half of the split application treatments. Stinger applied at the first half of split application treatment tended to give greater control than when Stinger was applied at the second half of split application treatment. This indicates that early control of giant ragweed is important. Stinger applied at .125 and .19 lb ai/A alone in one treatment gave similar giant ragweed control as when Stinger was applied with Betamix in split application treatments.

Stinger did control giant ragweed when applied alone with at least .125 lb ai/A needed for giant ragweed control. Stinger applied early tended to be important for control of giant ragweed. Stinger with an accumulative rate of 0.125 lb ai/A applied once alone or in a split application gave 90 percent or greater giant ragweed control. Thus, a good giant ragweed control program could include Stinger applied early once alone or in a split application with an accumulative Stinger rate of 0.125 lb ai/A.

Table 1. List of treatments, crop injury and giant ragweed control from Stinger and Betamix.

Treatment	Rate	Sugar Beet Injury	- June 11 Giant Ragweed Control	- June 19 Giant Ragweed Control
	(lb/A)			
Stinger/--	0.0625/--	0	56	76
Stinger/--	0.125/--	0	74	90
Stinger/--	0.19/--	0	81	93
Stinger/Stinger	0.0625/0.0625	0	71	89
Stinger+Betamix	0.125+0.25	0	81	84
Stngr+Btmx/Stngr+Btmx	0.0625+0.25/0.0625+0.33	0	80	94
Stngr+Btmx/Stngr+Btmx	0.09+0.25/0.09+0.33	0	86	96
Betamix/Betamix	0.25/0.33	3	25	36
Stinger/Betamix	0.125/0.33	0	84	94
Betamix/Stinger	0.25/0.125	0	68	90
Stinger+Betamix/Betamix	0.125+0.25/0.33	3	83	88
Betamix/Stinger+Betamix	0.25/0.125+0.33	0	60	93
Untreated Check	0	0	0	0
EXP MEAN		0	65	79
C.V. %		488	14	11
LSD 5%		NS	14	13
# OF REPS		4	4	4

* Btmx = Betamix; Stngr = Stinger;
+ = tankmix
/ = sequential treatment
-- = nothing applied at that time interval

Disease Index Summary of 1990

Introduction

Three remote weather stations were used to monitor leaf spot. Installations were 2 miles south of Sacred Heart, 9 miles north of Clara City, and 1 mile east of Hector piling station. The stations monitored air temperature, soil temperature at 2 and 6 inches, relative humidity, leaf wetness and precipitation. The Sacred Heart station also monitored wind speed and wind direction. The recorded data were used in a Cercospora computer model developed by Shane and Teng of the University of Minnesota. The purpose of the program is to give the sugarbeet grower an indication of the high probability of leaf infection. The predictive nature of Cercospora leaf spot lead to the development of a model that uses temperature, relative humidity and time. it is important to note, canopy sensor placement is important to adequately model the Cercospora leaf spot disease. Sugarbeet fields are highly variable in spore number, thus, the model should be used in conjunction with field disease monitoring. The table for calculating the disease index values is table 1. The data for 1990 for Renville, Clara City, and Bird Island are presented in figures 1-10. Data for Bird Island was terminated at the end of July due to a malfunction of the intrumentation at that site.

During harvest, temperature probes were placed in the crown of the sugarbeet and the resulting temperatures were used to aid in the decision for piler station shutdown during freezing conditions.