

3.1 PERIODIC HARVEST OF SUGAR BEET, 1988
(Not funded by SBREC)

NAS 512 ML
13th year

Summary

After an early April drilling, the 1988 crop grew well and produced a good yield of sugar. Sugar content rose from 17.6% in mid-September to a maximum of 18.8% in late September and remained within this range throughout the growing season. Sugar yield reached a maximum of 11.9 t/ha on 6 December. Maleic hydrazide applied on 23 August increased the sugar content of the September and October lifted samples, but did not affect the root yield. Sugar yield on 25 October was significantly higher after maleic hydrazide applied on 23 August compared to untreated plots harvested on the same date.

Object

To monitor the progress of the beet crop through the harvest campaign period, and to determine the effect of a late August application of maleic hydrazide on early lifted samples.

Material and method

Four 18m² plots were hand harvested at fortnightly intervals and samples were washed, weighed and sugar content determined from brei samples. The first lift was on 13 September and the final one on 20 December. In addition, samples were taken from plots which had been sprayed with 12 l/ha maleic hydrazide on 23 August. These samples were taken between 13 September and 25 October.

Results and conclusions

The plant population averaged 76,020/ha (range 71,670 to 82,360/ha). The differences in plant populations at the different harvests were not statistically significant.

*NOT FOR PUBLICATION WITHOUT THE DIRECTOR'S CONSENT. This report deals primarily with only one year's work, so any conclusions given are only provisional.

Yield data

	Root yield (t/ha)	Sugar content (%)	Sugar yield (t/ha)
(ESE)	(+1.35)	(+0.11)	(+0.26)
13 September	50.3	17.6	8.8
27 September	51.7	18.8	9.7
11 October	58.6	18.7	10.9
25 October	60.4	17.6	10.6
8 November	61.1	17.6	10.8
22 November	61.5	18.7	11.5
6 December	64.8	18.5	11.9
20 December	63.3	18.6	11.8
<u>Maleic hydrazide treated plots</u>			
<u>(23 August)</u>			
13 September	49.8	18.0	9.0
27 September	50.8	19.4	9.8
11 October	56.3	19.1	10.8
25 October	62.5	18.3	11.5
S.E. per plot (33 d.f.) or as % G.M.	+2.70 or 4.7%	+0.22 or 1.2%	+0.52 or 4.9%

Sugar content was reasonable (17.6%) on 13 September and rose to a peak of 18.8% on 27 September. This was lower than the peaks of 20.1% in 1986, 19.3% in 1985 and 19.0% in 1987. Levels remained within this range throughout the season.

Root yields were good (50.3 t/ha) at the first harvest and rose steadily to 64.8 t/ha on 6 December. This maximum was higher than that of 1987 (62.0 t/ha) but was considerably lower than those of 1982 (70.3 t/ha) and 1984 (70.0 t/ha).

Sugar yields reached a maximum (11.9 t/ha) on 6 December and were still near this level on 20 December. Maximum sugar yield was higher in 1982, 1984 and 1986 but lower in 1983, 1985 and 1987. The daily gain in sugar yield from the first lift to the date of the highest yield (6 December) was 37 kg/ha/day. This was higher than that of 1985 but lower than all the others from 1982 onwards, and was spread over a longer period of yield increase than in many years.

Root yield was not significantly affected by the use of maleic hydrazide. However, sugar content was increased significantly by maleic hydrazide at all dates, and sufficiently so to produce a significant rise in sugar yield on 25 October of 0.9 t/ha.

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Summary 1986-1988

EFFECT OF LATE AUGUST APPLICATION OF MALEIC HYDRAZIDE ON EARLY LIFTED SAMPLES OF SUGAR BEET

Maleic hydrazide at 12 l/ha was applied on 29 August in 1986, 28 August in 1987 and 23 August in 1988. Harvest samples were taken at four fortnightly intervals, starting on 25 September in 1986, 10 September in 1987 and 13 September in 1988.

In 1986 and 1987 the weather for September was dry and sunny. It was very cool in 1986 but the mean temperature for September 1987 was 0.3°C above normal. September 1988 was wet, cloudy and cool.

October was wetter than normal in all the three years and very wet (126mm) in 1987. Sunshine was above normal in 1986 and 1987, but 1988 was cloudy. The mean temperature was slightly above normal in October 1986 and 1988, but slightly below in 1987.

Results

1986

At the third lift (23 October) maleic hydrazide significantly increased sugar content from 18.8% to 19.8%, but this was counteracted by a corresponding, but non-significant, reduction in root yield so that sugar yield was not affected. There was no significant difference between maleic hydrazide treated plots and the untreated in the samples taken two weeks prior or two weeks after 23 October.

1987

At the fourth lift (22 October) maleic hydrazide increased sugar content from 18.3% to 19.0% but clean root yield was reduced significantly from 59.7 to 54.7 t/ha. The reduction of sugar yield from 10.9 to 10.4 t/ha was not significant.

1988

Maleic hydrazide increased sugar contents at all four sampling dates (by 0.4% to 0.7%) but did not affect root yields significantly. Sugar yield at the fourth lift (25 October) was significantly increased by maleic hydrazide compared to the untreated.

Conclusion

Maleic hydrazide does have the potential to increase sugar content approximately six weeks after application. However, its effect on root yield was variable and cannot be explained by weather records or other available data on the seasons.

However, in 1988 the maleic hydrazide was sprayed 5 days earlier than in 1987 and 6 days earlier than in 1986. This gave the chemical a correspondingly longer time to act. If further work was to be undertaken, additional later sampling dates should be included.

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APPENDIX NAS 512 ML

PERIODIC HARVEST OF SUGAR BEET, 1988

Field data

Morley

Soil type	Sandy loam (Hobart's Close)
Variety	Proma
Drilled	4 April with 7.5 kg/ha Temik
Fertiliser	10 November 1987 90 kg/ha P 120 kg/ha K 50 kg/ha Mg 150 kg/ha Na + Boron
Nitrogen	13 April 42 kg/ha 6 May 84 kg/ha
Pre-emergence herbicide	None
Post-emergence herbicides	5 May 1.7 kg/ha Goltix WG + 1.7 l/ha Actipron 21 May 1.5 kg/ha Goltix WG + 2.5 l/ha Betanal E
Other sprays	2 July 280 g/ha Aphox
Plot size	4 rows (2 m) wide by 20m long
Replication	x 4 (randomised blocks)
Conditions on day of spraying - 23 August 1988	
Weather	sunny spells, 19°C dry, wind NW force 1 to 2.
Soil	dry and firm on surface.
Crop	complete crop cover, some wilting in other parts of field.

The maleic hydrazide was applied in 400 l/ha using a Cornelius back-pack and 2m boom fitted with Spraying Systems 8004 TeeJets at 2 bar pressure.

Weather

1988 Weather (20 year mean in brackets)

Month	Rainfall (mm)		Sunshine (hours)		Mean temperatures (°C)	
January	108.1	(59.5)	53.2	(51.7)	5.1	(3.2)
February	25.3	(38.1)	115.7	(72.8)	4.3	(2.9)
March	81.6	(48.2)	93.5	(101.6)	5.7	(5.1)
April	22.8	(42.5)	136.2	(151.8)	7.9	(7.4)
May	37.3	(48.5)	196.7	(191.9)	12.0	(10.9)
June	16.9	(53.2)	144.5	(195.8)	13.5	(13.8)
July	129.4	(53.5)	157.6	(192.1)	15.1	(16.0)
August	34.7	(50.8)	210.7	(184.1)	16.2	(16.0)
September	58.5	(45.9)	131.4	(149.9)	13.5	(13.8)
October	61.4	(54.2)	99.4	(111.3)	10.7	(10.5)
November	38.3	(64.3)	93.0	(69.2)	5.0	(6.4)
December	23.8	(54.1)	55.1	(49.7)	6.1	(4.5)
Total	638.1	(612.8)	1487.0	(1521.9)		

The crop was drilled into good soil conditions in early April and emerged well in the drier and cloudier but slightly milder than normal weather in April. May was over 1°C warmer, and drier than normal and the beet made good progress. Dry, cool and dull weather in June gave way to a cool, dull July but with more than 240% of the normal rainfall. August was slightly warmer and drier than the average and sunshine was above normal. September and October were both wetter and cloudier than average. The mean temperature for September was slightly below normal whilst that for October was slightly above. November was drier and sunnier than usual but much cooler, whilst December, which was also sunny and mild, had less than 44% of the average rainfall.

Soil moisture

Soil moisture deficit

Date	Crop cover %	Soil moisture deficit (mm)	Date	Crop cover %	Soil moisture deficit (mm)
4 April	0	6.0	27 June	50	38.6
11 April	0	8.8	4 July	60	30.3
18 April	0	11.6	11 July	70	22.1
25 April	0	11.1	18 July	80	12.3
2 May	0.5	12.0	25 July	95	0.0
9 May	1	10.8	1 August	95	14.3
16 May	2	15.7	8 August	100	36.7
23 May	5	20.8	15 August	100	56.1
30 May	8	22.7	22 August	100	76.5
6 June	10	16.3	29 August	100	84.4
13 June	25	19.4	5 September	100	78.1
20 June	35	28.4	12 September	100	94.5

Weekly estimates of ground cover were taken from early April to early September for soil moisture deficit determinations by Norsk Hydro Fertilizers.

The soil moisture deficit remained at a low level throughout April and May but began to rise slowly in mid-June. Heavy rain in July gradually reduced the deficit to nil by 25 July.

The deficit rose steadily throughout August to reach 84.4mm by 29 August. A slight fall in the deficit in early September was followed by a rise to 94.5mm by the time of the last calculation on 12 September.

Crop growth

The crop emerged well in April and made steady growth in the warm weather in May. Growth slowed in the cool dull June but increased steadily in the wet July and warmer sunny weather in August.

Beet population

Date	'000s/ha
(ESE)	<u>±3.80</u>
13 September	72.2
27 September	73.9
11 October	76.4
25 October	82.4
8 November	77.4
22 November	75.1
6 December	78.3
20 December	75.4
<u>Maleic hydrazide treated plots</u> <u>(23 August)</u>	
13 September	71.7
27 September	75.1
11 October	74.0
25 October	80.4
S.E. per plot (33 d.f.) <u>± 7.61</u> or 10.0% G.M.	