

Effect of Maleic Hydrazide and 2 Chloroethyl Trimethyl Ammonium Chloride on Maturity and Sugar Yield of Sugarbeet

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ABSTRACT

Two growth regulators viz, maleic hydrazide and 2 chloroethyl trimethyl ammonium chloride each at 100, 200 and 400 ppm were tested on sugarbeet to regulate the maturity of the standing crop with a view to supply beet roots to the factory continuously for a longer period of time without causing much loss in sugar yield. MH at 200-400 ppm induced early maturity by about 10-20 days while that of CCC at similar concentrations delayed it to an extent of 20 days than the normal period of harvest. The sugar yield due to spray treatments was unaffected.

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INTRODUCTION

SUGARBEET can be grown successfully (Singh, Behd, Kanwar and Kochav 1964; Panje, 1965; Panje and Gill, 1966a and 1966b and Kumar, 1972) and processed (Gill, 1969) in India especially in the states enjoying temperate and subtropical climates. Regulating the supply of beets to the factories which are to be set up in areas where best growing season is short is yet a problem untackled. An attempt is made here to regulate the maturity of sugarbeet plants in the field so that harvestings can be adjusted according to the needs of the factory.

MATERIAL AND METHODS

A field experiment with 7 treatments consisting of 2 growth regulators viz, maleic hydrazide (MH) and 2 chloroethyl trimethyl ammonium chloride (C C C) each at 100, 200 and 400 ppm concentration with an untreated control,

randomised in 2 replications was laid out on sandy loam (*goradu*) soils of the Anand campus of the Gujarat Agricultural University during the year 1972-73. The seeds of the sugarbeet variety 'Ramonskaya' were sown at 45 cm and 20 cm row and plant spacing respectively on November 16, 1972. The growth regulators of each concentration were sprayed over an area of 38.5 m² thrice at the ages of 7, 9 and 11 weeks. The effects of the chemicals on maturity and sugar yield were studied by drawing samples at an interval of 10 days, the first being after 135 days of sowing. The sugar yield was calculated as per method of Scott *et al* (1973) by multiplying root sucrose content (% Sucrose) to average root weight of sampled beets and that again multiplied to a normal population stand (75000) in a hectare land after leaving a margin of 25% of total population as a gap.

The sucrose per cent was estimated by titrating root extracts against standard Fehlings solutions.

RESULTS AND DISCUSSION

The maturity of sugarbeet was studied on the basis of the ratio between root and top fresh weights. The inflection point (when root and foliage weigh equal), on an average was found to occur around 140 days for November 16 sown crop which was about 15 days earlier to the ideal harvest (third) which had registered maximum sugar yield (8.76 m tons/ha). Under Manitoba conditions such metabolic ripening (inflection point) occurred 4-5 weeks before harvest and any deviations from this resulted in poor yields or lowered the quality of beets (Schreiber and Ferguson, 1966). However, Matic' and Djurdjevic' (1970) have observed inflection point itself as a sign of maturity and it occurred hardly a few days before the harvest.

The growth regulators at proper concentrations not only had an impact

on increasing sugar yields to, as much as about 10.0 m tons/ha (Table 1) after particular period of spray but also exerted greater influence on maturity of beets. The MH had a property of inducing early maturity in sugarbeet while that of CCC delayed it. The beets sprayed with 200-400 ppm of MH matured about 10-20 days earlier than the normal unsprayed beets. The maturity of beets was delayed to the extent of 20 days by spraying CCC of higher concentrations without affecting the sugar yield. The possible reason for early maturity in MH treated plants is that they senesced more number of leaves than CCC treated plants and hence on an average had higher root: leaf ratio (3.06) than the plants treated with CCC (2.85); (Table 1). The plants treated with MH at 200 and 400 ppm have registered 10.23 and 10.56 m tons/ha sugar, 135 and 155 days respectively after sowing and almost similar quantum (10.30 m tons/ha) of sugar was also obtained by plants sprayed with CCC.

TABLE 1
Effect of growth regulators on sugarbeet.

Treatments	Maturity (Root : top ratio)							Sugar yield (m./tons/ha)						
	Days after sowing							Days after sowing						
	135	145	155	165	175	Mean	Mean over conc.	135	145	155	165	175	Mean	Mean over conc.
MH 100 ppm	0.79	1.53	3.36	3.37	1.31	2.08	3.06	7.57	6.99	8.07	7.26	6.20	7.22	8.05
MH 200 "	0.93	1.14	4.87	4.05	6.50	3.50		10.23	7.79	7.97	7.90	8.88	8.55	
MH 400 "	1.19	1.59	3.84	4.09	7.27	3.60		8.97	7.51	10.56	5.79	9.09	8.38	
CCC 100 "	0.50	1.82	2.34	4.39	3.93	2.60	2.85	5.83	8.08	8.87	5.48	8.66	7.38	7.68
CCC 200 "	0.67	0.88	2.42	4.49	5.63	2.82		7.14	7.02	9.01	5.39	9.69	7.66	
CCC 400 "	0.72	0.78	1.83	5.00	7.31	3.13		6.10	7.55	9.91	6.09	10.30	7.99	
Control	0.71	0.99	2.14	3.02	3.57	2.09		8.36	7.82	6.94	8.97	5.37	7.49	
Mean	0.79	1.25	2.98	4.06	5.08			7.24	7.52	8.76	6.70	8.31		
S. Em.	—	—	± 0.44	—	—	—		—	±	0.435	—	—	—	

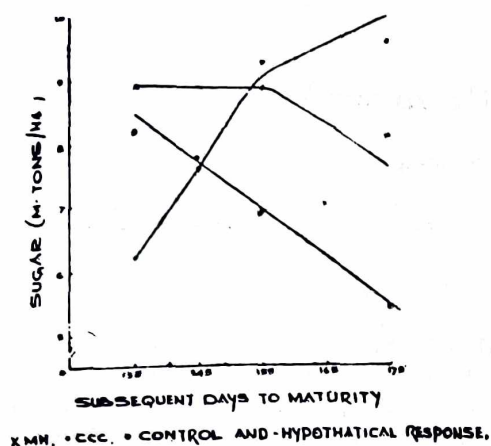


Fig. 1 Response of sugarbeet to growth regulators

at 400 ppm but after 175 days of sowing. This indicates that there is close interaction among growth regulators, their effect on maturity (days to harvest) and sugar yield which is illustrated in Fig. 1. The work of Wort and Singh (1970) also reveals that sugarbeets treated with MH matured early with a higher sucrose content in them; although information on such aspect of CCC on sugarbeet is lacking. As far as sugar yields of the treated beets are concerned, Poostchi and Schmehl (1971) have also opined that the sugar production remained unaffected when either MH or CCC were sprayed on sugarbeet plants.

The results of this experiment show that growth regulators like MH and CCC when sprayed at proper concentration on sugarbeet plants at their ideal stage of growth have brought about early and late maturity respectively without affecting the sugar yield. This

information helps in scheduling continuous supply of beets to the factories in the areas of short beet-growing-season where all the beets come to harvest at a time and thus creating glut in the factory which may cause severe loss of sugar due to storage of beets. It is felt that there is yet a wide scope for thorough investigation on this line.

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