

Effect of method of gap-filling and gypsum application on yield and quality of sugarcane ratoon

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ABSTRACT

The field experiment was conducted to study the effect of method of gap-filling and gypsum application on cane and sugar yield of sugarcane ratoon on April–May planted crop during 1998–2000 in sodic soils at Anbil Dharmalingam Agricultural College and Research Institute, Trichirappalli. The results envisaged that gap-filling with sprouted seedlings of ratoon field had the highest mean cane and sugar yield of 99.3 and 13.0 tonnes/ha respectively. Gypsum application in furrow has the mean cane and sugar yield of 99.7 and 12.9 tonnes/ha. Interaction of the above treatments also resulted in high yield of cane and sugar yield in both years.

Key words : Gap-filling methods, Gypsum application, Cane yield, Quality

The salt-affected soils of India occur in 8.6 million ha and of Tamil Nadu in 0.47 million ha. Normally, cane yield of plant crop under salt-affected soil is low when compared to normal soil. Ratoon cane yield under problem soil is very poor. Sah and Singh (2001) reported that though the ratoon area was 50–55% of total cane area, the cane production was only 30–35% of total production. The main reason for decreasing the cane yield was the formation of gap in the ratoon field and the non-adoption of appropriate technology for cane cultivated under salt-affected soil. The good management practices followed for ratoon cane can increase the yield and have possibility to get as much as plant crop (Alexander and Arulraj, 1995). As not much research work has been carried out for ratoon cane under salt-affected soil, this study was carried out to study the effect of method of gap-filling and gypsum application on yield and quality of juice.

MATERIALS AND METHODS

A field experiment was conducted during late season (April–May) of 1998–99 and 1999–2000 in clay loam soil of Anbil Dharmalingam Agricultural College and Research Institute, Trichirappalli. The soil was low in organic carbon, available N (182.5 kg/ha), P (9.4 kg/ha) and medium in available K (258.6 kg/ha), with pH 9.2. The experiment was carried out in factorial randomized block design with 3 replications. The test variety was 'CoS 95071'. The treatments include the combination of 4 gap-filling methods (with 2-budded setts, 21-day-old polybag seed-

lings, sprouted ratoon seedlings of the same field and no gap-filling) and 4 methods of gypsum application (in furrow, near plants through pockets, broadcasting and without gypsum application). The quantity of gypsum application was 50% gypsum requirement (3,421 kg/ha). Gypsum was not applied to the plant crop. After harvest of the plant cane, stubble was shaved for uniform sprouting. Gap-filling was taken on 21-day-old crop where the gap was more than 45 cm.

Sprout counts on 15th day of crop age and millable cane at harvest were taken. Juice quality, viz. brix, sucrose and purity (%), were registered as per the procedure of Spencer and Meade (1945). Commercial cane sugar (%) was worked out as per the procedure given by Parthasarathi *et al.* (1979).

RESULTS AND DISCUSSION

Gap-filling methods

Significant difference was observed in millable cane numbers at harvest; but this difference could not be observed in sprout counts. Filling the gap with sprouted seedlings of the same field registered the highest number of millable canes with 1,01,400/ha which was on a par with gap-filling with polybag seedling (93,700/ha).

Gap-filling with sprouted seedlings of the same field registered significantly the highest juice quality parameters of brix, sucrose and purity %. This may be due to optimum utilization of resources by the cane. The same treatment recorded significantly highest cane and sugar

yield in both the years. It recorded the mean of 99.3 and 13.0 tonnes/ha of cane and sugar yield respectively. This treatment was followed by the gap-filling method with polybag seedlings (92.3 and 11.9 tonnes/ha cane and sugar yield respectively). Gap-filling with sprouted seedlings registered 20.4 and 28.7 % higher yield than without gap-

filling, 7.9 and 9.2% than gap-filling with polybag seedlings and 12.6 and 5.3% than using 2-budded sets for gap-filling respectively. Sah and Singh (2001) reported that gaps below 10–15% in the field can reduce the yield loss and it can be achieved by gap-filling with sprouted stubbles of the previous plant crop of the same field.

Table 1. Effect of method of gap-filling and gypsum application on cane population and juice quality in sugarcane

Treatment	Population ('000/ha)		Quality (%)		
	Sprouts on 15 DAR	Millable canes	Sucrose	Purity	Commercial cane sugar
<i>Gap filling with</i>					
2-budded sets	103.3	89.7	17.9	90.6	12.9
Poly bag seedlings	113.9	93.7	17.9	90.7	12.9
Sprouted ratoon seedlings	119.9	101.4	18.8	90.9	13.0
No gap filling	105.0	84.4	17.4	88.5	12.3
<i>Gypsum applied</i>					
in furrow	116.8	106.1	18.0	90.5	12.9
Near to plant	112.8	99.1	17.9	90.5	12.9
Broadcasting	104.8	90.2	17.8	90.1	12.8
No gypsum	100.3	78.2	17.4	89.5	12.5
CD (P=0.05)	NS	7.86	0.22	0.24	0.08

Table 2. Effect of method of gap-filling and gypsum application on cane and sugar yield and benefit : cost ratio

Treatment	Cane yield (tonnes/ha)			Sugar yield (tonnes/ha)			Benefit : cost ratio		
	1998-99	1999-2000	Mean	1998-99	1999-2000	Mean	1998-99	1999-2000	Mean
<i>Gap-filling with</i>									
2-budded sets (F ₁)	89.6	86.8	88.2	11.6	11.1	11.3	2.16	2.11	2.13
Poly bag seedlings (F ₂)	93.0	90.8	92.3	12.2	11.5	11.9	2.19	2.14	2.16
Sprouted ratoon seedlings (F ₃)	98.1	100.6	99.3	13.1	12.8	13.0	2.28	2.36	2.32
No gap filling (F ₄)	83.2	81.8	82.5	10.1	10.2	10.1	1.86	1.81	1.83
<i>Gypsum applied</i>									
In furrow (G ₁)	97.8	101.5	99.7	12.8	12.9	12.9	2.26	2.41	2.34
Near to plant (G ₂)	94.3	95.3	94.8	12.3	12.1	12.2	2.20	2.22	2.21
Broadcasting (G ₃)	92.9	86.2	89.5	12.1	10.9	12.5	2.18	2.08	2.13
No gypsum (G ₄)	78.1	77.2	77.6	9.9	9.6	9.8	1.78	1.79	1.78
CD (P=0.05)	1.77	3.23	1.89	1.11	1.16	0.38			

Table 3. Interaction effect of method of gap-filling (F) and gypsum application (G) on cane and sugar yields

Treatment	Cane yield (tonnes/ha)					Sugar yield (tonnes/ha)				
	F ₁	F ₂	F ₃	F ₄	Mean	F ₁	F ₂	F ₃	F ₄	Mean
G ₁	97.1	102.4	107.8	91.3	99.7	12.7	13.3	14.2	11.4	12.9
G ₂	91.6	94.7	106.5	96.8	94.8	11.8	12.3	13.8	10.6	12.2
G ₃	88.3	89.5	99.0	79.9	89.5	11.9	11.6	12.7	10.2	11.5
G ₄	75.8	81.0	84.5	71.8	77.6	9.4	10.3	10.9	8.2	9.8
Mean	88.2	92.3	99.3	82.5	-	11.3	11.9	13.0	10.1	-
CD (P=0.05)	F at G and G at F				3.62	F at G and G at F				0.89

Details of treatments are given in Table 2

Venugopal (2001) reported that maximum solar radiation was harvested by maintaining the optimum plant population per unit area. Using 2-budded setts for gap-filling had lesser number of tillers and millable cane numbers than sprouted seedlings and polybag seedlings. It may be due to the competitive effect of the same crop. The seedlings which were grown from setts had been suppressed by the neighbouring, already established cane plant. This effect could also be reflected on economics, viz. the benefit : cost ratio that was high in the treatment of gap-filling with sprouted seedlings of the same field and recorded 2.28 and 2.36 during 1998–99 and 1999–2000 respectively.

Effect of gypsum application

Gypsum application with 50% gypsum requirement quantity in the furrow recorded the millable canes 106,100/ha. However, it was on par with the application of gypsum to the plant through pocket (99,000/ha). Furrow method of application of gypsum recorded lengthy and stout cane which showed more weight. The same treatment registered more brix, sucrose and purity % than other method of application. It was on a par with the application through pocket in respect of purity. The above 2 methods had beneficial effect to the rhizosphere of the cane plant.

Gypsum application in furrow resulted significantly higher mean cane yield of 99.7 tonnes/ha which was 28.5, 11.4 and 5.7 % more yield than without gypsum, applied through broadcasting and near plant respectively. The

similar trend was also observed in sugar yield. Due to this effect, it registered the mean benefit : cost ratio of 2.34.

Interaction effect

Gap-filling with sprouted seedlings of the same field and gypsum application in the furrow had the highest cane and sugar yield (107.8 and 14.2 tonnes/ha). Irrespective of method of gap-fillings, gypsum applied in the furrow registered high cane and sugar yield. In the plot of without gap-filling, application of gypsum through pocket recorded the cane yield of 96.8 tonnes/ha.

REFERENCES

- Alexander, K.C. and Arulraj, S. 1995. *Sugarcane Production Manual*. Sugarcane Breeding Institute, Coimbatore, Tamil Nadu.
- Parthasarathi, S.V., Rao, M.P.J. and Krishnan, B. 1979. *Guide to Sugarcane Research and Development*, pp. 213–214. Sugarcane Development Technology Services, Soraiyur.
- Sah, A.K. and Singh, M.R. 2001. Production technologies for cultivation of sugarcane ratoon. *Kisan World* **28** (12) : 29.
- Singh, Sudama and Reddy, M. Sanjiva. 1980. Growth, yield and juice quality performance of sugarcane varieties under different soil moisture-regime in relation to drought resistance. *Proceedings of International Society of Sugarcane Technologists* **17** : 541–545.
- Spencer, G.L. and Meade, G.P. 1945. *Cane Sugar Book*, 512 pp. John Wiley & Sons, New York.
- Venugopal, R. 2001. Seed saving technology in sugarcane culture. *Kisan World* **28** (12) : 33.