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Response of sugarcane genotypes to planting season and levels of fertilization in north Bihar

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ABSTRACT

A field experiment was conducted during the autumn and spring seasons of 1998–2001 on sandy-loam soil of Pusa, to study the performance of 3 sugarcane genotypes ('CoP 9501', 'CoP 9502' and 'BO 132') at 3 fertility levels (75, 100 and 125 % recommended dose of fertilizer), besides during the autumn, mustard [*Brassica juncea* (L.) Czernj. & Cosson] was taken as an intercrop. The autumn-planted cane intercropped with mustard produced 58.1 tonnes/ha cane and 10.0 q/ha of mustard and fetched net profit of Rs 35,149/ha, whereas spring-planted cane recorded cane yield of 56.5 tonnes/ha with net profit of Rs 28, 343/ha. Among genotypes, 'BO 132' (61.8 tonnes/ha) recorded significantly higher cane yield than 'CoP 9502' (57.1 tonnes/ha) and 'CoP 9501' (54.1 tonnes/ha), the later 2 were similar among themselves. Application of 125% RDF gave higher cane yield, than its lower levels. The germination and sucrose (%) in juice were significantly higher in spring and autumn-planted cane respectively.

Key words : Sugarcane genotypes, planting season, fertility levels, Net profit

Sugarcane is planted during autumn and spring seasons in north India. There are differences in crop husbandry of both season crops due to differences in gemrmination (%), growth rate, nutrients, water requirement and ripening. Sugracane genotpes after a considerable period of cultivations show a tendency to decline in vigour and yield. Since it is a heavy feeder crop, needs a large amount of nutrients for better yield. An increase in cane productivity is the interaction of genotypes, amount of nutrients applied to the crop plants and system of farming. Thus, it is important ot select sugacane genotypes along with its fertilizer doses for sustainable sugarcane production. Keeping this in view, present experiment was carried out to select suitable genotypes along with its fertilizer requirement for increasing the productivity and profitability of sugarcane.

MATERIALS AND METHODS

A field experiment was conducted during 1998–2001 on sandy-loam soil of Sugarcane Research Institure, Farm, Pusa (Samastipur), Bihar. The experimental soil had 130.4, 23.5 and 116 kg/ha, available N, P and K, respectively, with pH 8.2 Treatments comprising 2 seasons (autumn and spring), 3 genotypes ('CoP 9501', 'CoP 9502' and 'BO 132') and 3 levels of fertilization (75,100 and 125% of recommended dose of fertilizer) were replicated thrice in split-plot design. Planting seasons were kept in main plot and combination of genotypes and levels of fertilization in subplot. Autumn cane was intercropped with 2 rows of mustard ('Varuna'). The recommended fertilizer dose was 120 kg N, 85 kg P_2O_5 and 60 kg K_2O/ha. No additional amount of nutrient was applied to intercrop. Half of total N and full dose of P and K were applied as basal and remaining N in 2 splits, after first irrigation and earthing-up. Sugarcane was planted in the second week of November during autumn season, followed by sowing of 2 rows of mustard ('Varuna') in the last week of February and harvested in the following year in the last week of March.

Juice quality was calculated and thereby sugar yield. Production potential in terms of cane-equivalent yield and economics were worked out on the basis of cane and intercrop yield at prevailing market rates.

RESULTS AND DISCUSSION

Planting season

Among the planting seasons (autumn and spring), autumn-planted crop recorded significantly higher number of tillers than spring–planted crop, owing to longer period received for tillering in autumn crop than spring crop. The results confirm the findings of Verma *et al.* (1996). Plant height, number of millable canes and cane yield were higher in autumn-planted cane than spring cane, though the differences were non-significant. It was due to growing of mustard as an intercrop with autumn cane which caused competion for nutrient, moisture, light and space. Similar observation was also made by Shukla and Pandey

Table 1. Growth yield, juice quality of sugarcane genotypes as influenced by planting season and fertility levels (mean data of 2 years)

Treatment	Germination (%)	No. of tillers ('000/ha)	Cane height (cm)	NMC ('000/ha)	Cane yield (tonnes/ha)	Sucrose % in juice	Sugar-yield (tonnes/ha)	Yield of intercrop	Cane equivalent (tonnes/ha)	Net profit (Rs/ha)
Planting season										
Autumn	36.4	127.0	223	98.3	58.1	16.9	7.27	10.0	72.3	35,149
Spring	44.0	116.2	210	96.3	56.5	16.3	6.36		56.5	28,343
CD (P=0.05)	4.5	10.1	NS	NS	NS	0.5	0.51			
Genotype										
'COP 9501'	37.6	112.6	210	92.6	54.1	16.3	6.27	9.4	67.5	32,735
'COP 9502'	37.6	116.3	215	94.3	57.1	16.7	6.65	10.1	71.4	34,626
'BO 132'	45.3	127.4	227	104.8	61.8	16.4	7.15	10.7	77.1	37,392
CD (P=0.05)	5.5	11.1	11	9.2	5.2	NS	0.39			
Fertility level										
75% RDF	39.5	112.3	205	91.7	53.4	16.5	6.16	9.0	66.2	32,120
100% RDF	38.5	120.3	218	98.8	58.2	16.8	6.46	10.2	72.8	35,312
125% RDF	42.5	124.7	230	101.0	61.3	16.5	6.58	11.0	77.0	37,339
CD (P=0.05)	NS	11.1	11	9.2	5.2	NS	0.39			

RDF, Recommended dose of fertilizer

(2002). However, cane equivalent yield of autumn cane was 28% higher than spring cane. This was owing to better production of component crop. Singh *et al.* (1990) also reported similar results. The germination (%) of spring crop (44%) was significantly higher than autumn crop (36%), which was due to favourable temperature at the time of planting. The sucrose (%) in juice was significantly higher in autumn cane than spring cane which might be due to longer growth period of former in the field.

Genotype

Among the genotypes, 'BO 132' recorded significantly higher germination (%), number of tillers, cane height and number of millable canes than 'CoP 9502' and 'CoP 9501', and the later 2 were statistically similar among themselves in all these growth and yield attributes (Table 1). Improvement in these attributes led to higher tonnage in 'BO 132' which was 8.23 and 14.23 % more than 'CoP 9502' and 'CoP 9501' respectively. Singh *et al.* (1998) also reported variation in cane yield of different varieties of sugarcane. Mean sucrose % in juice did not differ among genotypes, though 'BO 132' gave significantly higher sugar yield than 'CoP 9501'and similar to 'CoP 9502' and the trend was similar to cane yield.

Fertility level

Application of 125% RDF resulted in significantly higher number of tillers, cane height, number of millable canes and cane yield than 75% RDF and was at par with 100% RDF (Table 1). Adequate quantities, balanced proportion and increased availability nutrients at recommended and higher level of fertilization have enhanced meristematic activities, size of cells, formation and functioning of protoplasm which consequently improved the cane growth. Singh *et al.* (1990) and Vasishtha and Sinha (2000) reported increase in cane yield with corresponding increase in levels of fertilization. Sugar yield was significantly higher at 125% (6.58 tonnes) and 100% RDF (6.46 tonnes/ha) than 75% RDF (6.16 tonnes/ha) though fertility level did not cause significant variation in sucrose % in juice. Maximum net return of Rs 37,339/ha was accrued under 125 % RDF, followed by 100 and 75 % RDF with the net return of Rs 35,315 and Rs 32,120/ha respectively.

Interaction effects were non-significant.

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