ALL INDIA CO-ORDINATED RESEARCH PROJECT ON

SUGARCANE (ICAR)

ANNUAL REPORT (Crop Production)

2015-16

Agronomy Section

Punjab Agricultural University

Regional Research Station

Kapurthala (PUNJAB) – 144601

Project No.	**AS-42**	
Location	PAU, Regional Research Station, Kapurthala	
Title	Agronomic evaluation of promising new sugarcane genotypes	
Objective	To test the performance of early and mid –late maturing varieties under different nitrogen levels.	
Year of start	Long term experiment	
Treatments		
Early Varieties		
a) Varieties	**b) Fertilizer doses**	
V_1 – CoJ 64	F_1 – 75 % of recommended dose of N	
V_2 – Co 0118	F_2 – 100 % of recommended dose of N	
V_3 – S 818	F_3 – 125 % of recommended dose of N	
V_4 – CoPb 8212		
Mid-late Varieties		
a) Varieties	**b) Fertilizer doses**	
V_1 – CoPb 91	F_1 – 75 % of recommended dose of N	
V_2 – Co 0238	F_2 – 100 % of recommended dose of N	
V_3 – CoPb 8217	F_3 – 125 % of recommended dose of N	
V_4 –CoPb 11214		
Experimental Design	Factorial RBD	
Replication	3	
	Early set	**Mid-late set**
Date of planting	01-04-2015	03-04-2015
Date of harvesting	29-01-2016	19-02-2016

EARLY SET

The experiments on early and mid genotypes were conducted on sandy loam soil, tested low in organic carbon (0.25 %), medium in available P (13.5 kg/ha) and high in available K (135 kg/ha). The genotypes CoPb 8212, Co 0118 & S 818 were tested against check variety CoJ 64

(Table 42.1). The genotypes recorded significant differences in terms of growth and cane yield. The genotype Co 0118 recorded significantly highest cane yield (88.8 t ha^{-1}) which was 27.0% higher than standard check CoJ 64 . The cane yield of CoPb 8212 and S 818 (84.3 t/ha & 77.9 t/ha respectively) was also significantly higher than check variety CoJ 64 and CoPb 8212 was at par with Co 0118, the four genotypes were statistically different with respect to no. of tillers as the no. of tillers of Co 0118 (105.8 th/ha) were significantly less than CoJ 64 (158.9 th /ha) whereas those of S 818 (206.1 th/ha) were significantly higher than the check CoJ 64 & CoPb 8212 (148.2 th/ha). It was observed that the cane length of genotype S 818 (207.1 cm) and CoPb 8212 (205.2 cm) was at par but significantly higher than CoJ 64 (188.7 cm) and Co 0118 (195 cm) and the later two were also at par among each other . The no. of internodes per cane of the highest yielding variety Co 0118 (18.4) were significantly less than check CoJ64 (21.2) and new genotype CoPb 8212 (21.3) but were at par with S 818 (17.9). The no. of millable canes of genotypes CoJ 64,CoPb 8212 and S 818 were significantly higher (105.2,103.8 & 109.5 th/ha respectively) than Co 0118 (80.7 th/ha). Even though the no. of millable canes of Co 0118 were less than other genotypes but due to significantly higher single cane wt. (1014.2 g) the cane yield variety Co 0118 significantly higher than than CoJ 64 & S 818 and was at par with CoPb 8212. The quality aspect of early genotypes revealed that the genotypes differ significantly in terms of Pol(%). The Pol (%) of the variety Co 0118 (19.14%) & new genotype CoPb 8212 (19.30%) was significantly higher than S 818 (16.56%) but was at par with the check CoJ 64 (19.43 %)

Application of either 100% or 125% of the recommended dose of nitrogen to the early maturing genotypes helped in significantly improving the number of tillers and cane length, as compared to the treatments where 75% of the recommended dose of nitrogen was applied. The other growth parameters like millable canes followed the similar trend as that of number of tillers but the level of significance could not be achieved. The highest cane yield of 85.2 t ha^{-1} was obtained when the nitrogen was applied at 125% recommended rates which was at par (83.1 t/ha) with the treatments where 100 % of recommended N was applied. Similarly the differences for single cane weight and the quality aspects also remained non - significant.

Table- 42.1 Effect of genotypes and fertilizer levels on performance of sugarcane (Early set)

Treatments	Germination %	Tiller Count (000/ha)	Cane length (cm)	Internodes/ cane	Millable canes (000/ha)	Cane yield (t/ha)	Single Cane wt. (g)	Pol % juice
CoJ 64	41.6	158.9	188.7	21.2	105.2	69.9	682.0	19.43
Co 0118	38.9	105.8	195.0	18.4	80.7	88.8	1014.2	19.14
S 818	42.2	206.1	207.1	17.9	109.5	77.9	675.7	16.56
CoPb 8212	39.2	148.2	205.2	21.3	103.8	84.3	736.7	19.30
CD (0.05)	**NS**	**23.5**	**9.1**	**2.6**	**20.2**	**7.7**	**209.6**	**0.78**
Fertility level								
75 % of rec. N	40.0	143.1	168.1	19.4	97.1	72.4	714.6	18.63
100 % of rec. N	39.9	158.7	211.2	19.9	99.9	83.1	797.2	18.47
125 % of rec. N	41.5	162.5	217.7	19.9	102.4	85.2	819.7	18.72
CD (0.05)	**NS**	**11.1**	**11.7**	**NS**	**NS**	**8.3**	**NS**	**NS**
V x N	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Summary:

Genotype Co 0118 & CoPb 8212 recorded the higher cane yield while with respect to POL (%) these was very close to CoJ 64 which was highest in POL(%). The cane yield with 100% and 125% of recommended nitrogen increased significantly over 75% N while the former two were at par among themselves**.**

MID LATE SET: Among the mid-late maturing group, all the genotypes CoPb 91, Co 0238 , CoPb 8217 and CoPb 11214 showed significant differences in terms of growth and cane yield (Table 42.2). The genotype CoPb 8217 recorded the highest cane yield of 99.8 t ha^{-1} which was significantly higher than Co 0238 & CoPb 11214 (90.2 &87.9 t ha^{-1} respectively) and was at par with CoPb 91 (95.2 t ha^{-1}). The number of tillers of Co 0238 were significantly higher than all other three genotypes which were at par among themselves. The millable canes of Co 0238 were

also higher than all other genotypes but the differences was not significant. The response for cane length and number of internodes per cane were also found to be significant. The no. of internodes per cane and cane length of CoPb 8217 was significantly higher than all other three genotypes which were at par among themselves. Similarly, the single cane wt. of CoPb 8217 & CoPb 91was significantly higher (1003.4 & 1011.1 g respectively) than the Co 0238 & CoPb 11214 (959.4 & 907.8 g respectively).

Table- 42.2 Effect of genotypes and fertilizer levels on performance of sugarcane (Mid set)

Treatments	**Germination %**	**Tiller Count (000/ha)**	**Cane length (cm)**	**Internodes /cane**	**Millable canes (000/ha)**	**Cane yield (t/ha)**	**Single Cane wt. (g)**	**Pol % juice**
CoPb 91	42.3	133.0	198.7	18.6	99.8	95.2	1011.1	17.59
Co 0238	46.7	167.1	207.1	17.5	109.3	90.2	959.4	17.47
CoPb 8217	41.8	145.0	221.9	24.8	99.5	99.8	1003.4	17.62
S 11214	40.2	139.6	197.4	19.0	103.0	87.9	907.8	17.06
CD (0.05)	**4.1**	**16.5**	**13.1**	**4.1**	**NS**	**7.5**	**40.8**	**0.22**
Fertility level								
75 % of rec. N	42.5	129.8	190.9	19.0	97.6	86.1	869.6	17.37
100 % of rec. N	41.9	149.9	210.6	20.4	103.5	95.4	1006.9	17.39
125 % of rec. N	43.9	158.8	217.3	20.5	107.6	98.3	1034.8	17.55
CD (0.0 5)	**NS**	**NS**	**11.6**	**NS**	**NS**	**5.8**	**56.2**	NS
V x N	NS	NS	NS	**NS**	NS	NS	NS	NS

The cane quality too get influenced as the POL(%) of CoPb 8217 was highest (17.62%) and closely followed by CoPb 91 &Co 0238 (17.59 & 17.47% resp.) and all three were significantly higher than S 11214 (17.06%).

Restricting the application of nitrogen to 75% of the recommended dose significantly reduced the cane yield as compared to the 100% or 125% of the recommended dose of nitrogen.

The number of millable canes too followed the similar trend as that of cane yield, however, the differences were non-significant. Different nitrogen levels did not show any significant effect on other growth parameters and the cane quality recorded except single cane wt. where 75% N recorded significantly lower single cane wt. than 100% and 125% of recommended Nitrogen.

Summary

The genotype CoPb 8217 recorded the highest cane yield being significantly better than the check Co 0238 & CoPb 11214,and was comparable to CoPb 91. The POL% of CoPb 8217, Co 0238 & CoPb 91 was at par among each other and was significantly higher than CoPb 11214. Fertilizing the crop with 100% recommended dose of nitrogen i.e. 150 kg N ha^{-1} significantly improved cane yield over 75% of the recommended dose of nitrogen but was at par to 125% of the recommended dose of nitrogen.

Project No.	**AS-68**
Location	PAU Regional Research Station, Kapurthala
Title	Impact of integrated application of organics and in organics in improving soil health and sugarcane productivity.
Objective	To develop nutrient management strategy for sustaining soil health and sugarcane production.
Year of start	2014-15
Experimental Design	RBD
Replication	3
Variety	CoJ 88
Date of Ratooning/ harvesting	13-02-2015/ 27-01-2016

Treatments	
T_1	No organic + 50% RDF
T_2	No organic + 100% RDF
T_3	No organic + soil test based recommendation
T_4	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)
T_5	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)
T_6	Application of FYM/Compost @ 20 tonnes / ha + in-organic nutrient based on soil test
T_7	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/Acetobacter + PSB*) + 50% RDF
T_8	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/Acetobacter + PSB*) + 100% RDF
T_9	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/Acetobacter*

	+ *PSB*) + in-organic nutrient based on soil test

Note:

The biofertilizer (*Azotobacter/ Acetobacter* + PSB) was applied @ 5 kg/acre .

The experiment was conducted on sandy loam soil, tested low in organic carbon (0.25 %), medium in available P (13.5 kg/ha) and high in available K (135 kg/ha).The data presented in table no. 68.1 reveals that the highest cane yield (93.2 t/ha) was obtained in treatment T6 when FYM 20t/ ha was applied along with 100% of recommended RDF, which was significantly higher than the treatments (T1,T4 & T7) where 50% RDF was applied alone and also with combination of FYM & biofertilizer and was also significantly higher than T2 & T3 where no organic sources was applied. Similar trend was observed in case of millable canes where these were significantly high in T6 than T1,T4 &T7 and at par with other treatments. However the same trend was observed in case of tillers, cane length and single cane weight but the differences were not upto significant level.

Table: 68.1: Growth , yield and quality of Sugarcane (Ratoon 1) during 2015-16 under various treatments

Treatments	Tiller Count (000/ha)	Cane length (cm)	Cane girth (cm)	Single Cane wt. (g)	Millable canes (000/ha)	Cane yield (t/ha)	Pol (%) in juice
T_1	103.0	169	2.18	669	83.0	61.1	19.33
T_2	116.5	177	2.15	749	92.9	73.2	19.42
T_3	122.6	188	2.17	769	102.9	77.2	20.08
T_4	117.7	180	2.11	771	100.2	74.1	19.83
T_5	138.4	189	2.16	855	104.6	88.2	19.90
T_6	149.8	198	2.24	849	116.2	93.2	20.20
T_7	114.3	182	2.09	729	88.3	72.5	19.53
T_8	130.1	189	2.19	789	99.1	81.8	19.94
T_9	137.5	191	2.18	803	111.1	89.6	20.01

CD(5%)	15.1	NS	NS	NS	19.0	12.9	NS

Project No.	**AS-69**
Location	PAU Regional Research Station, Kapurthala
Title	Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane
Objective	1. To accelerate rate and extent of sugarcane germination through the use of PGRs 2. To assess the effect of PGRs on sugarcane growth, yield and juice quality
Year of start	2015-16
Experimental Design	RBD
Replication	3
Variety	CoJ 88
Date of planting/ harvesting	07-04-2015/ 16-02-2016

Treatments (8) **:**

1. Conventional planting/ Farmers' practice (3-bud setts)
2. Planting of setts after overnight soaking in water
3. Planting of setts after overnight soaking in 50 ppm ethrel solution
4. Planting of setts after overnight soaking in 100 ppm ethrel solution
5. T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP
6. T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP
7. T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP
8. T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP

Results: Germination of sugarcane under the treatments, where setts were soaked in water & Etheral solution ,was significantly better than the treatment where no soaking was done. There was improvement in germination when soaked in etheral solution than soaking in only water but the differences were non-significant (Table 69.1). The highest cane yield (82.8 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA_3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than all other treatments

except T7, T6,T4 and T3 (Table 69.2). The number of shoots (138.6 thousands/ha) , millable canes (121.6 thousand /ha) and single cane wt. (793 g) was also higher in T8 than other treatments.

Table 69.1: Germination (%) of sugarcane during 2015-16 under various treatments

Treatments	20 DAP	30 DAP	40 DAP	50 DAP	60 DAP
T_1	5.5	16.2	21.5	27.2	29.9
T_2	12.9	18.2	22.7	29.5	34.0
T_3	9.5	17.9	23.3	30.8	34.3
T_4	10.9	19.4	25.7	30.3	35.0
T_5	5.2	16.4	22.0	26.6	30.2
T_6	11.9	17.6	23.2	29.3	35.0
T_7	10.2	18.4	22.8	28.9	35.8
T_8	11.2	19.8	23.0	29.9	36.0
CD (5%)	3.1	3.4	NS	1.9	3.6

Table 69.2: Growth, yield and quality of Sugarcane during 2015-16 under various treatments

Treatments	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane girth (cm)	Single cane wt. (g)	Cane yield (t/ha)	Pol (%)
T_1	118.9	99.5	202	2.18	713	68.2	18.67
T_2	129.2	113.2	202	2.08	726	75.9	18.79
T_3	133.5	119.2	209	2.11	733	79.0	18.87
T_4	133.9	121.5	209	2.06	751	79.4	19.02
T_5	120.3	105.2	196	2.10	733	69.7	19.09
T_6	135.6	115.6	202	2.15	757	76.8	19.12
T_7	137.0	119.9	209	2.14	780	80.3	19.11
T_8	138.6	121.6	213	2.05	793	82.8	19.21
CD (5%)	9.6	8.8	NS	NS	19	6.5	NS