PROJECT NUMBER: AS 42

Title		**Agronomic evaluation of promising sugarcane genotypes**
Objective		To work out agronomy of sugarcane genotypes of advance varietal trial (AVT)
Year of start		2007-2008 (with new set of genotype of AVT)
Year of completion		Continuing
Locations		All centres
Planting season		Autumn/ Spring/ Special season (Experiment will be conducted in one crop season only with two plants & one ratoon)
Treatments		
1. Varieties		Minimum of three promising genotypes (from AVT)
2. Fertilizer levels		i) 75% of the recommended dose of N ii) 100% of the recommended dose of N iii) 125% of the recommended dose of N
Design		RBD
Replications		3-4
Plot size	:	In the first year, the plot size will depend on the availability of seed, but in the second year, it will be 6 rows of at least 6 m length.
Row spacing	:	Recommended row spacing for a particular season in the concerned zone

Note: 1. Seed material of the test varieties may be obtained from concerned breeder of the centre.

2. Separate trials may be laid out for early and mid-late groups.

Observations to be recorded

i) Initial soil fertility status for available NPK, soil texture, physico-chemical properties of the soil.

ii) Data on germination, tillers, millable canes, cane yield, juice quality, CCS%, CCS yield of plants/ ratoon crop.

iii) Other specific characteristics of the genotypes.

iv) Planting and harvesting dates, name of variety, fertilizers applied, irrigations, plant protection measures etc.

SUMMARY OF RESULTS OBTAINED DURING LAST YEAR (2013-14)

NORTH WEST ZONE

1. FARIDKOT

For the plant crop among genotypes CoPb 09181 was promising in cane yield. In mid-late group CoH 08264 and CoH 08263 were better in cane yield. The response to N fertilizer was up to 100% recommended dose.

For ratoon crop, early genotype CoPb 09181 was promising in cane yield. In mid-late group CoH 08264 and CoH 08263 were better in cane yield. The response to N fertilizer was up to 100% recommended dose.

2. KOTA

Among early maturing genotypes CoH 06247 produced significantly higher millable cane and cane yield over CoLk 07201 and at par with CoPk 05191 and Co 06033. However, CoPk 05191 also maintained its superiority over other genotypes in terms of cane quality. Cane yield increased significantly up to 100% of the recommended dose of NPK fertilizer in different genotypes during both the years.

3. KAPURTHALA

Genotype CoPb 09181 recorded the highest cane yield while the standard check CoJ 83 recorded highest Pol % juice among early genotypes. The cane yield with 100% of recommended nitrogen was highest i.e.78.9 t/ha and was at par with other two fertilizer levels**.**

Among mid-late genotypes, CoH 06266 recorded the highest cane yield and was comparable to CoPb 6219 being significantly better than the genotype CoPb 05211 & the check CoJ88. The all three new genotypes were significantly poor to check variety CoJ 88 in terms of Pol % juice. 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.

4. LUCKNOW

Sugarcane genotype, CoH 06265 produced the highest number of millable cane (102350/ha) followed by CoS 06247 (90840/ha) and CoH 06266 (76830/ha). There were no significant differences in sucrose content of different genotypes. The highest cane and sugar yields (88.5 and 11.1 t/ha, respectively) was observed with genotype CoH 06265. Recommended level of NPK i.e., 150, 60 and 60 kg /ha fetched significantly higher cane (80.12 t/ha) and sugar yields (9.99 t/ha) which was at par with 125% NPK levels.

5. PANTNAGAR

Genotype Co Pant 5224 performed better for higher NMC, Cane yield, individual cane weight over rest of the genotypes. However, CCS yield was recorded highest in Co Pant 2218. Higher NMC, average cane weight, shoot population, cane yield and CCS yield were recorded higher in 125 % of the recorded N (150 kg N/ha) over 75 or 100 % the recommended in sugarcane.

6. SHAHJAHANPUR

Genotype CoS 07240 produced significantly higher cane yield of 86.53t/ha followed by CoS 03261 with cane yield of 81.17 t/ha, CCS % in cane was found significantly higher in genotype CoS 03251 as compared to CoS 07240 and CoS 03261. In case of fertilizer levels significantly higher cane yield (85.61 t/ha) was obtained with 125% of the recommended dose of NPK and it was at par with 100% recommended NPK.

7. UCHANI

In early group, varieties CoLk 07201 (91.5 t/ha) and Co 7025 (88.2 t/ha) being at par produced significantly higher cane yield as compared to CoH 7261 (84.5 t/ha) and Co 7023 (82.1 t/ha). Whereas in mid late group of varieties CoPb 7212 (99.5 t/ha), CoLk 7203 (98.2 t/ha) and CoS7234 (96.9 t/ha) being at par produced significantly higher cane yield as compared to variety CoH 7263 (92.4 t/ha). All the varieties in both the group responded up to recommended dose of nitrogen fertilizers.

8. SRIGANGANAGAR

For early genotypes, CoPb 09181 recorded highest cane yield of 87.29 t/ha which was significantly higher over the genotype CoH 09263 (72.29 t/ha) but was comparable to local check Co 6617 (86.52 t/ha). In different N levels, application of either recommended or 125% of the recommended dose of N significantly improved yield and yield attributes as compared to 75% of the recommended dose of nitrogen.

Genotype CoH 09264 recorded significantly thicker (2.48 cm) and heavier (1.28 kg) canes as well as higher cane yield (98.38 t/ha) than rest of the mid-late genotypes under testing. The yield and yield attributes were influenced significantly due to different nitrogen levels. Highest cane yield was recorded in 125% N of the recommended (150 kg N/ha) which was significantly higher over 75% of the recommended N but at par with the recommended level of nitrogen.

PENINSULAR ZONE

9. KOLHAPUR

Among the tested early genotypes, PI 07132 recorded significantly higher cane yield (128.05 t ha^{-1}) followed by PI 06132 (124.53 t ha^{-1}) and CoN 07071 (123.06 t ha^{-1}) and found at par with each other. However, significantly higher CCS yield (20.39 t ha^{-1}) was recorded by CoN 07071 and found at par with PI 06132 (20.09 t ha^{-1}) and PI 07132 (19.65 t ha^{-1}). The cane and CCS yield were influenced significantly due to different fertilizer levels. The fertilizer level 125 % RD N: P_2O_5:K_2O ha^{-1} recorded significantly higher cane yield (126.72 t ha^{-1}) and CCS yield (20.60 t ha^{-1}) followed by 100 % RD N:P_2O_5:K_2O ha^{-1} which recorded cane yield (115.44 t ha^{-1}) and CCS yield (18.83 t ha^{-1}). The interaction effect between genotypes and fertilizer levels was found to be non-significant.

The cane yield and CCS yield were influenced significantly due to different sugarcane mid-late genotypes. Among the tested genotypes, Co 08016 recorded significantly higher cane yield (118.68 t ha^{-1}) and CCS yield (17.60 t ha^{-1}) and found at par with Co 09009 and Co 08008. The cane and CCS yield were influenced non-significantly due to different fertilizer levels and interaction effect between genotypes and fertilizer levels.

10. PADEGAON

For the early genotypes, Co 06002 was found significantly superior for cane and CCS yields than the other genotypes followed by PI 06032. The application of 125 % recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen.

Among mid-late genotypes Co 86032 recorded significantly higher cane and CCS yields than the other genotypes and it was followed by Co-06015. The application of 125 percent recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen.

11. PUNE

Among various genotypes evaluated, the cane yield of genotype PI 07131 was significantly higher (114.16 t/ha) over the genotypes Co 8001 and Co 7015 but at par with CoC 671 and Co86032. Maximum cane yield 102.29 t/ha was recorded due to application of 125 % RDF. Maximum Brix % (22.80) and Sucrose % (19.58) was noticed in genotype PI07131 than the other genotypes under study. Maximum B: C ratio (1:2.26) was also obtained with genotype PI07131. Final conclusion could be drawn after having ratoon and second plant crop studies.

12. POWARKHEDA

Results revealed that among the early (plant crop) genotypes Co 06022 gave significantly higher cane yield of 72.08 t/ha than Co C 671 (65.16 t/ha) and Co 06002(63.31 t/ha). Application of 125 % RDF N gave significantly higher cane yield of (70.06 t/ha) than 75 % RDF N (62.00 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF N.

Results revealed that among the mid late genotypes Co 06010 gave significantly higher cane yield of (87.58 t/ha) than Co 06015 (80.90 t/ha), Co 06027 (73.46 t/ha) and Co JN 86-600 (66.91 t/ha). Application of 125 % RDF N gave significantly higher cane yield ((81.02 t/ha) than 75 % RDF N (72.35 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF N.

13. NAVSARI

Highest plant cane and CCS (132.58 & 17.27 t ha^{-1}) yields were noticed with variety Co N 07072 but remained at par with Co 0403 regarding CCS yield. The fertilizer level F_3 and F_2 resulted in significantly higher cane and CCS (130.67 &17.31 t ha^{-1}) yields but at par with F_2 regarding cane yield.

In the trial on ratoon significantly highest NMC (109.89 ha^{-1}), cane (127.57 t ha^{-1}) and CCS (17.24 t ha^{-1}) yields were recorded with V_2& remained at par with V_4 except CCS yield which at par with V_1. The fertilizer level F_3 and F_2 resulted in significantly higher NMC (106.70 ha^{-1}), cane (125.55 t ha^{-1}) & CCS (16.94 t ha^{-1}) yields and remained at par with each other.

14. THIRUVALLA

It can be concluded from the study that the genotype Co 6012 is promising as it has recorded the highest cane and sugar yield both in plant crop and ratoon followed by the genotype Co 6027. All the genotypes performed better at 125 % of the recommended dose of N.

EAST COAST ZONE

15. ANAKAPALLE

Mid – late group:

The results showed that application of 'N' at 125% recommended dose registered significantly higher cane yield of 85.1 t/ha than lower levels of 75% (74.1 t/ha) and 100% (78.7 t/ha) recommended nitrogen. Among the three new mid late genotypes under test 2007A126 proved superior (84.1 t/ha) to 2004A104 (76.1 t/ha) and 2007A177 ((68.0 t/ha). Due to heavy rainfall (573.6 mm) received during the month of October when crop is in grand growth and maturity phase the experimental field was subjected to water logging and the crop was lodged, under such abnormal situation. As check such the variety Co 7219 performed better and recorded higher cane yield (88.9 t/ha).

Early group:

Performance of new promising early sugarcane genotypes viz., 2004 A 55 and 2001 A 63 along with standard check 93 A 145 was studied under different levels of nitrogen under irrigated conditions. The results showed that application of nitrogen at 125% (93.1t/ha) and 100% (89.7 t/ha) recommended dose registered significantly higher cane yield than 75% recommended dose of nitrogen (86.7 t/ha). The cane yield of both new early sugarcane genotypes 2004A55 (93.7t/ha) and 2001A63 (91.1 t/ha) were on par and significantly superior as compared to check variety 93A145 (88.6 t/ha).

16. CUDDALORE

The genotype CoC 09 336 significantly registered the maximum millable cane, individual cane weight, cane yield and sugar yield in both spring and autumn season. Regarding the juice quality, the clone CoC 09 336 registered the highest commercial cane sugar (CCS) per cent in spring and autumn seasons and was on par with the entry CoC 24. Prescription of 125 per cent of the recommended dose of nitrogen significantly registered higher values of yield components, cane and sugar yield compared to 75 and 100 per cent of recommended dose of nitrogen

17. NAYAGARH

The genotype CoOr 8346 produced the highest average cane yield of 83.91 t/ha with application of 100 % RDN and was closely followed by Co 6907 (82.59 t/ha) andCo A 08324 (80.82 t/ha).

NORTH CENTRAL ZONE

18. PUSA

In early group, CoP 092 recorded significantly higher cane yield (107.2 t/ha) than BO 155 though was at par with CoP 123 (98.0 t/ha) while, in mid-late group CoP112 having cane yield of (101.0 t/ha) significantly out yielded CoP 111 but at par with CoP 081 (95.0 t/ha). Higher cane yield was recorded at 125 % of recommended dose of nitrogen but on par with 100 % RDF in early group where as in mid-late group response was significantly up to 125 % of RDF.

In the ratoon trial genotype BO 153 registered maximum cane yield in spring season in early group but was at par with BO 150. Under mid-late group BO 154 yielded significantly more than that of CoP 042 but was at par with CoP 2061 in spring season. Varieties response up to 125 % RDN and were on par with 100 % RDN.

19. SHEORAHI

Variety CoSe 11453 produced higher number of millable canes and cane yield as compared to CoSe 11451 and CoSe 11454 Cane yield increased with 125% recommend dose of N P K.

NORTH EASTERN ZONE

20. BURALIKSON

EARLY GROUP:

Among the four genotypes of early group plant crop CoBln07501 recorded significantly higher number of shoots (114.85 thousand/ha), higher cane yield (88.43 t/ha) which is statistically at par withCoBln 03172 which recorded 111.27 thousand/ ha and 87.29 t/ha respectively. As far levels of N similar cane yields were recorded with 100 and 125% N levels.

Among the four genotypes taken in ratoon, CoBln 03172 recorded significantly higher number of shoots (71.45 thousand/ha), number of millable canes (77.77 thousand/ha) and cane yield

(66.25t/ha) followed by CoBln 07501 which recorded 71.18 thousand/ha, 73.84 thousand 63.87 t/ha respectively. However no significant differences were recorded in terms other growth and juice quality parameters. In case of different nitrogen levels, application of 125% RD of N recorded significantly higher number of millable canes (74.58 thousand/ha) and cane yield (64.53 t/ha) than the other two nitrogen levels.

Pooled data of two plant crop and ratoon crop indicated that no significant difference on cane yield was recorded among four genotypes. However, application of 125% RD of N recorded significantly higher cane yield (75.23t/ha) followed by application of 100% RD of N (73. 87t/ha). Among the four genotypes, CoBln 04172 recorded significantly higher sucrose content (17.27%) followed by CoBln 05501 (16.96%), but no significant difference on CCS% was recorded due to genotypes, nitrogen levels and their interaction as well.

MID-LATE GROUP:

Among the four mid-late (plant crop) genotypes, CoBln 04174 recorded significantly the highest cane yield (79.28t/ha) which is statistically at par with CoBln 07503 (79.14 t/ha). The same genotypes also recorded significantly the highest number of shoots (101.42 thousand/ha) and number of millable canes (93.41 thousand/ha), respectively. Application of 125% RD of N recorded significantly the higher number of millable canes (93.72 thousand/ha) and cane yield (82.71 t/ha) which is at par with the application of 100% RD of N which registered NMC (90.23 thousand/ha) and cane yield (80.11 t/ha), respectively.

For ratoon crop there was no significant difference observed on cane yield and its quality parameters observed among the four genotypes. However, application of different nitrogen levels showed signification difference on cane and juice quality parameters. The highest cane yield (67.17t/ha) was recorded when 125% RD of N was applied which is statistically superior to 75% RD of N which recorded cane yield (57.17 t/ha) but statistically at par with 100 % RD of N which registered cane yield (65.21 t/ha).

Pooled data of two plant crop and ratoon crop presented in table AS-42-06. Among the four mid-late genotypes, CoBln 07503 significantly recorded the highest cane yield (71.19 t/ha) which is statistically at par with CoBln 04174 (70.59 t/ha). In case of nitrogen levels, application of 125% RD of N recorded significantly higher yield (73.65 t/ha) which is statistically at par 100% RD of N (72.06t/ha). However there was no significant difference observed on Juice quality among genotypes, nitrogen levels and their interaction as well.

Important Observations

North West Zone: Depending on centres, CoPb09181/ 07212, CoH 08264/ 06247/ 06266/ 06265, 09264 CoLk 07201, CoS 07240 and CoPant 05224 seem to be promising varieties. Significant response to N was observed from 100-125% of RDN.

Peninsular Zone: Depending on the trials conducted at different centres Co 06002/ 06010/ 06012/ 06022/ 08016, CoN07072, PI 07131 and PI 07132 proved to be superior genotypes. At most of the centres yield increased significantly up to 125% RDN.

East Coast Zone: 2004A55, 2001 A 63, CoC 09 336 and CoOr 8346 were observed to be promising genotypes. Response to N was from 100 to 125% of RDN.

North Central Zone: CoP 092/ 112, BO 153/ 154 and CoSe 11453 were promising materials responding up to 125% of RDN however at par with 100 % RDN.

North Eastern Zone: CoBln 07503/ 7501/ 03172/ 04174 proved to be good genotypes responding up to 125% of RDN.

Centres allotted : 24

A. **North West Zone (8) :** Faridkot, Kota, Lucknow, Ludhiana, Pantnagar, Shahjahanpur, Sriganganagar and Uchani.
B. **Peninsular Zone (10)** : Coimbatore, Kolhapur, Mandya, Navsari, Padegaon, Powerkheda, Pune, Thiruvalla, Navsari and Sankeshwar.
C. **East Coast Zone (3) :** Anakapalle, Cuddalore and Nayagarh.
D. **North Central Zone (2) :** Pusa and Seorahi.
E. **North Eastern Zone (1) :** Buralikson.

Centres Reported : 20

A. **North West Zone** : 8
B. **Peninsular Zone** : 10
C. **East Coast Zone** : 3
D. **North Coast Zone** : 2
E. **North Eastern Zone** : 1

Zone wise and centre wise results

NORTH WEST ZONE

1. FARIDKOT

The experiment was initiated in 2014-15 with new set of early and mid-late genotypes.

A. Early group

- **Genotypes:** 3 (Co 10035, CoH 10261 and CoJ 64)
- **Fertilizer levels (kg N/ha):** 3 (N_1: 112.5; N_2: 150.0 and N_3: 187.5)

Design: Factorial RBD, **Replications:** Three,
Date of Planting: 18.02.2014
Initial Soil Status: pH: 9.0, EC: 0.21 dsm^{-1}, OC= 0.54 %, P =7.4 kg/acre, K= 300 kg/acre, S= ppm, Zn= 1.64 ppm, Fe= 3.41 ppm, Mn=4.5 ppm

Results:

Genotypes

CoH 10261 was significantly better in cane yield (105.0 t/ha), germination (36.4%), cane diameter (2.92 cm) and cane weight (1310 g) than both the genotypes (Table AS 42.1.1). Cane length was the highest in Co 10035 (218 cm) followed by CoJ 64 (214 cm) and was significantly better than CoH 10261 (199 cm). Sucrose % was the highest in Co 10035 (17.50) followed by CoJ 64 (17.47) and was significantly better than CoH 10261 (16.75).

N Levels

There was increase in cane yield upto 125% recommended N but statistically significant increase was there with 100% recommended N.

Table AS 42.1.1: Agronomical evaluation of promising sugarcane genotypes (early)

Treatments	Germination (%)	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)
Genotypes								
Co 10035	23.6	155.8	99.8	218	2.39	1004	67.5	17.50
CoH 10261	36.4	213.4	101.9	199	2.92	1310	105.0	16.75
CoJ 64	35.6	165.7	100.8	214	2.56	1049	91.9	17.47
CD (5%)	3.3	21.3	NS	14	0.13	92	6.7	0.28
N levels (kg N/ha)								
112.5	31.8	170.7	94.3	209	2.61	1085	80.8	17.16
150.0	31.5	180.3	102.0	210	2.64	1125	89.4	17.32
187.5	32.3	183.8	106.1	211	2.61	1153	94.1	17.23
CD (5%)	NS	NS	6.9	NS	NS	NS	6.7	NS

B. Mid-late Group

- **Genotypes:** 3 (CoPb 10181, CoPb 10182 and CoS 8436)
- **Fertilizer levels (kg N/ha):** 3 (N_1: 112.5; N_2: 150.0 and N_3: 187.5)

Design: Factorial RBD **Replications:** Three

Date of Planting: 18.02.2014

Initial Soil Status: pH: 9.0, EC: 0.21 dsm^{-1}, OC= 0.54 %, P =7.4 kg/acre, K= 300 kg/acre, S= ppm, Zn= 1.64 ppm, Fe= 3.41 ppm, Mn=4.5 ppm

Results:

Genotypes

CoPb 10181 was significantly better in cane yield (105.1 t/ha) than CoS 8436 (78.5 t/ha) and was at par with CoPb 10182 (101.9 t/ha). Sucrose % was at par in all the genotypes.

N Levels

There was increase in number of millable canes and cane yield upto 125% recommended N but statistically significant increase was there with 100% recommended N.

Table AS 42.1.2: Agronomical evaluation of promising sugarcane genotypes (mid-late) at Faridkot during 2014-15

Treatments	Germination (%)	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)
Genotypes								
CoPb 10181	35.2	211.1	107.1	252	2.87	1386	105.1	17.22
CoPb 10182	34.5	202.3	98.5	287	2.68	1387	101.9	16.95
CoS 8436	37.6	192.7	96.2	184	2.76	1030	78.5	17.23
CD (5%)	NS	13.9	7.5	22	NS	72	6.6	NS
N levels (kg N/ha)								
112.5	35.2	191.2	93.9	235	2.72	1187	89.5	17.16
150.0	35.4	206.3	102.7	242	2.73	1263	97.1	17.13
187.5	36.6	208.6	105.1	245	2.85	1352	98.9	17.12
CD (5%)	NS	13.9	7.5	NS	NS	72	6.6	NS

Conclusion:

In early genotypes CoH 10261 was promising in cane yield and Co 10035 in sucrose%. In midlate group CoPb 10181 and CoPb 10182 were better in cane yield. Genotype, CoPb 10181 was better in sucrose%. The response to N fertilizer was upto 100% recommended dose.

2. KOTA:

The experimental soil was clay loam in texture, alkaline in reaction (8.15) and was medium in available phosphorus (23.6 Kg /ha) and high in available nitrogen (355.0 kg /ha) and potassium (287.0 kg/ha) during both the years having organic carbon 0.55%. The experiments crop was planted on 24.02.2014.The experiment consisted of 4 genotypes viz; Co-06033, CoLK-07201, CoH-06247 and CoPK-05191(c) and three fertility levels viz; F_1 - 75% of the recommended dose of NPK (150:45:.50), 100% of the recommended dose of NPK (200:60:40) and 125% of the recommended dose of NPK (250:75:50).

Perusal of data (Table AS 42.2.1) revealed that among genotypes CoS 06247 produced significantly higher millable cane and cane yield over CoLK 07201 and at par with CoPK 05191 and Co-06033.Cane yield increased significantly upto 100% of the recommended dose of NPK fertilizer in different genotypes during three years. Same trends of treatments effect on cane yield attributes and quality parameters were also recorded during this year.

Summary: Among genotypes CoH-06247 produced significantly higher millable cane and cane yield over CoLK-07201 and at par with CoPK-05191 and Co-06033. However, CoPK-05191 also maintained its superiority over other genotypes in terms of cane quality. Cane yield increased significantly up to 100% of the recommended dose of NPK fertilizer in different genotypes.

Table: AS 42.2.1: Effect of genotypes and fertility levels on yield attributes, yield and quality of the sugarcane during 2014-15 at Kota

Treatment	Germination (%)	Tillers (000/ha)	Cane length (cm)	Millable cane (000/ ha)	Cane yield (t/ha)	Pol % in juice	CCS yield (t/ha)
Varieties							
Co-06033	45.60	144.13	220.29	129.24	102.04	16.57	11.60
CoLK-07201	43.34	130.66	206.90	115.61	92.13	16.38	10.33
CoS-06247	48.00	154.19	228.22	130.69	107.24	17.98	13.28
CoPK-05191(c)	43.30	144.32	217.33	125.28	93.86	18.32	11.89
SEm	0.74	2.05	2.91	1.84	2.27	0.15	0.22
CD (P=0.05)	2.14	5.93	8.41	5.31	6.55	0.42	0.64
CV	8.05	7.02	6.54	7.197	7.33	4.16	9.26
Fertility levels							
75 % RDF	44.43	134.18	211.18	117.14	90.33	17.04	10.56
100% RDF	44.83	146.71	220.35	128.38	101.18	17.09	11.86
125 %RDF	45.93	149.09	223.03	130.09	104.95	17.81	12.91
SEm ±	1.48	4.11	5.83	3.68	2.96	0.29	0.45
CD (P=0.05)	NS	11.86	NS	10.62	8.54	NS	1.29
CV	8.05	7.02	6.54	7.20	7.33	4.16	9.26

3. KAPOORTHALA

The experiments on early and mid-late genotypes were planted on 28.3.2014 and 1.04.2014 respectively.

EARLY MATURITY SET

The experiments on early and mid-genotypes were conducted on loamy sand soil, tested low in organic carbon (0.30 %), medium in available P (30.8 kg/ha) and low in available K (125 kg/ha). The genotypes S 0818, Co 0118 were tested against check variety CoJ 64 and CoJ 85 (Table 42.1). The genotypes recorded significant differences in terms of growth and cane yield. The genotype Co 0118 recorded significantly highest cane yield (83.9 t ha^{-1}) which was 23.9% higher than standard check CoJ 64. The cane yield of varieties CoJ 85 and S 0818 were similar (73.8 t/ha & 74.3 t/ha respectively) but, recorded significantly higher than check (CoJ64).All the genotypes differed statistically in terms of total tillers as the no. of tillers, milliable canes, intermodal length, POL % and single cane weight. Genotype S 0818 produced significantly higher tillers (214.2 th/ha) than CoJ 85, Co 0118 andCoJ 64 (92.3, 115.1 and 166.5 th/ha respectively). It was observed that the cane length of genotype S 0818 (165.6cm) was significantly higher than CoJ 85 (145cm) and CoJ64 (148.7cm) and was at par with Co 0118 (157.7cm). The no. of internodes per cane of the highest yielding variety S 0118 (16.4) were significantly less than check CoJ64 (20.5) but were at par with other two genotypes. The no. of millable canes of genotypes CoJ 64 and S 0818 were significantly higher (101.0 & 113.8 th/ha respectively) than CoJ 85 and Co 0118 (60.8 & 72.5 th/ha respectively). Even though the no. of millable canes of Co 0118 were less than the S 0818 and the check CoJ 64 but due to significantly higher single cane wt. (995.7 g) the variety Co 0118 yielded significantly higher than other genotypes. The quality aspect of early genotypes revealed that the genotypes differ significantly in terms of Pol %. The Pol %

of the highest yielding variety Co 0118 (18.52%) was significantly higher than CoJ 85 and S 0818 (17.81 & 17.60% resp.) but was at par with the check CoJ 64 (18.56 %)

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 over the 75% of the recommended dose of applied nitrogen. The growth parameters like internodes per cane followed the similar trend as that of number of tillers but the level of significance could not be achieved. The highest cane yield of 78.6 t ha^{-1} was obtained at 125% of recommended nitrogen. Whereas, single cane weight and the quality aspects remains unchanged.

SUMMARY:

Genotype Co 0118 recorded the highest cane yield. Whereas as CoJ 64 was shown highest POL% but similar to Co 0118. The nitrogen application upto 100% of recommended increased cane yield significantly over 75% of recommended nitrogen.

Table AS 42.3.1: Effect of genotypes and fertilizer levels on performance of sugarcane (Early set)

Treatment	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	40.3	166.5	148.7	20.5	101.0	67.7	631.0	18.56
CoJ 85	38.4	92.3	145.0	19.9	60.8	73.8	1024.6	17.81
Co 0118	38.8	115.1	157.7	16.4	72.5	83.9	995.7	18.52
S 818	41.3	214.2	165.6	17.0	113.8	74.3	616.7	17.60
CD (0.05)	**NS**	**21.2**	**10.2**	**3.4**	**20.5**	**5.9**	**209.6**	**0.58**
Fertility level								
75 % of rec. N	40.4	138.1	148.3	18.1	87.1	68.4	767.6	18.07
100 % of rec. N	39.8	148.9	156.1	19.1	86.1	77.8	827.5	18.21
125 % of rec. N	38.9	154.1	158.5	18.2	87.9	78.6	855.8	18.09
CD (0.05)	**NS**	**9.1**	**6.7**	**NS**	**NS**	**6.8**	**NS**	**NS**
V x N	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

MID-LATE SET:

The experiment was laid out by selecting genotypes CoJ 88 (check), CoPb 91, Co 0238 and Co08217 under mid maturing group. The genotype Co 08217 recorded significantly higher cane yield (84.9 t ha^{-1}) than variety CoJ 88 (75.2 t ha^{-1}) but at par with variety CoPb91 (83.8 t ha^{-1}) and Co 0238 (Table 42.2). The per cent increase in cane yield of genotype Co 08217 over the check CoJ88 was found to be 12.9%. However, non-significant response was observed among the varieties in production millable canes. But variety CoJ 88 is better in milliable canes production. Variety Co 0238 was significantly better in tiller production over CoJ 88 (check), CoPb 91and Co08217 which were at par among each other .Cane length and internodes per cane were also found to be significant. The internodes per cane and cane length of genotype Co 08217 was significantly higher than all other genotypes which were at par among themselves. Similarly cane weight of genotype Co 08217 was

highest (907.8g) closely followed by CoPb 91(889.4g), both were significantly higher than the check CoJ88 (621.1g) and Co 0238 (783.4g).

Table AS 42.3.2: Effect of genotypes and fertilizer levels on performance of sugarcane (Midlate 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 88	38.3	138.0	160.7	16.1	102.0	75.2	621.1	18.08
Co Pb 91	42.7	127.7	167.1	17.2	89.3	83.8	889.4	17.52
Co 0238	46.8	155.0	171.9	16.8	89.5	80.9	783.4	17.14
Co 08217	40.2	131.6	197.0	23.0	83.0	84.9	907.8	17.70
CD (0.05)	**4.8**	**13.5**	**20.1**	**4.5**	**NS**	**5.1**	**95.8**	**0.71**
Fertility level								
75 % of rec. N	41.6	137.5	170.3	17.7	84.4	74.1	757.5	17.45
100 % of rec. N	42.4	135.3	171.6	18.4	91.5	83.4	812.9	17.56
125 % of rec. N	41.9	141.5	180.7	18.8	96.9	86.1	830.9	17.53
CD (0.0 5)	**NS**	**NS**	**NS**	**NS**	**NS**	**6.5**	**40.2**	NS
V x N	NS	NS	NS	**NS**	NS	NS	NS	NS

The cane quality too get influenced as the POL% of standard check CoJ 88 was significantly higher than Co 0238 but at par with that of genotype Co 08217 and variety CoPb 91.

Restricting the application of nitrogen to 75% of the recommended significantly reduced the cane yield and cane weight as compared to the 100% or 125% of recommended nitrogen. However, non-significant response was observed with respect to all others parameters.

Summary

The genotype Co 08217 recorded the highest cane yield being significantly better than the check CoJ88 and comparable to Co 0238 and CoPb 91. The POL% of CoJ 88 was significantly higher than Co 0238 and was at par with Co 08217 and CoPb 91. 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.

4. LUCKNOW

Field experiment was conducted to determine the response of fertilizer application on different genotypes of sugarcane. The experiment consisted 9 treatment combinations with three genotypes viz., COPb 08217, CoLk 09204 and CoS 08235 and three doses of fertilizers application viz., 75, 100 and 125% RDF. The experiment was laid out in factorial RBD design with three replication. The data revealed that growth, yield and yield attributes and juice quality affected significantly with different genotypes of sugarcane, except germination. The genotype CoLk 09204 recorded highest shoot count and NMC over the CoPb 08217 and CoS 08235. However, significantly higher cane yield (70.9 t/ha) was recorded with CoPb 08217 over the CoS 08235 and CoLk 09204. The genotype CoS 08235 and CoLk 09204 were at par to each other in respect of cane yield, cane length, cane juice. Application of fertilizers at different levels showed significant effect only on NMC, cane yield and cane length. However, germination, shoot counts, pol (%) and purity (%) were non-significant.

Application of 125% RDF recorded highest growth, yield attributes, cane yield and juice quality. No significant differences were found between 100% and 125% RDF application but significant differences were found between 75% and 125% RDF in most of the cases.

Table AS 42.4.1: Plant growth, yield attributes, cane yield and quality of juice affected under different genotypes and fertilizer doses

Treatment	Germination (%) at 45 DAP	Shoot Count (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Cane length (cm)	Pol (%)	Purity (%)	CCS (t/ha)
Genotypes								
COPb 08217	35.0	137.2	101.7	70.9	227.3	18.00	87.1	8.78
CoLk 09204	33.8	149.4	117.9	63.6	215.1	16.60	85.5	7.19
CoS 08235	33.7	148.2	103.6	63.7	210.2	16.70	84.9	7.23
CD (P=0.05)	NS	6.05	4.58	5.23	11.8	0.81	0.93	0.57
Fertilizers doses								
75% RDF	34.2	141.8	105.0	63.9	212.9	16.98	85.8	7.41
100% RDF	34.2	146.4	107.0	65.7	218.1	17.11	85.8	7.69
125% RDF	34.0	146.5	111.0	68.5	221.7	17.20	86.1	8.09
CD (P=0.05)	NS	NS	4.58	5.23	11.8	NS	NS	NS

SUMMARY

The data revealed that growth, yield and yield attributes and juice quality affected significantly with different genotypes of sugarcane, except germination. The genotype CoLk 09204 recorded highest shoot count and NMC over the CoPb 08217 and CoS 08235. However, significantly higher cane yield (70.9 t/ha) was recorded with CoPb 08217 over the CoS 08235 and CoLk 09204.Application of 125% RDF recorded highest growth, yield attributes, cane yield and juice quality. No significant differences were found between 100% and 125% RDF.

5. PANTNAGAR

Early genotypes:

Sugarcane genotypes,Co Pant 5224, Co Pant 3220, Co Pant 97222 and Co Pant 99214 were planted on March 19, 2014 at 75 cm apart in 10 cm deep furrow using 4 setts per meter row length. Setts were treated with 0.25 % solution of carbendazim to prevent from fungal infection if any. N, P and K were applied as per treatments. Half dose of N along with full dose of P_2O_5 and K_2O were given as basal and remaining N was top dressed in two splits within 90 days after planting. Cultural operations were performed as per recommendations and need of the crop. The experimental soil was silty loam in texture, rich in organic carbon (1.05 %) and medium in available P_2O_5 (49.0 kg/ha) and K_2O (240.7 kg/ha). Soil was neutral in pH (7.4). The crop was harvested on 23.03.2015.

Results: Data given in Table AS 42.5.1 revealed that higher germination (%) was recorded in variety Co Pant 5224 which was significantly higher over Co Pant 3220 and Co Pant 97222 in planted cane. Higher net millable canes were recorded in variety Co Pant 5224 which were found significantly higher over rest of the varieties. Cane length and cane weight were also recorded higher in variety Co Pant 5224 as compared to rest of the varieties. Cane yield was higher in variety Co Pant 5224 which was found significantly higher over rest of the varieties

i.e. Co Pant 3220 and Co Pant 97222 and was at par to Co Pant 99214. Sucrose % was higher in variety Co Pant 3220 which was significantly higher over Co Pant 99214. CCS yield (t/ha) was highest in variety Co Pant 5224 which was significantly higher over Co Pant 3220.

Germination % at 45 DAP could not influence due to fertility treatments. Cane yield was recorded higher in 125 % of the recommended dose of NPK which was significantly higher over 75 and 100 % of the recommended dose of N, P and K. Net millable canes/ha were significantly higher in 125 % of the recommended NPK over 75 % of the recommended dose of NPK. Plant height was also recorded significantly higher in 125 % of the recommended NPK over either 75 % or 100 %. However, cane girth could not influenced significantly due to fertility level. Average cane weight was higher significantly in 125 % of the recommended dose of N, P and K which was found significantly higher over 75 or 100 % of the recommended dose of NPK. Cane yield was influenced in 125 % of the recommended dose of NPK due to higher shoot population, average cane weight, cane length over 75 or 100 % of the recommended. CCS yield (ton/ha) was also higher in 125 % of the recommended NPK over rest of the fertility levels.

Summary: Among all the sugarcane varieties Co Pant 5224 performed better for higher, NMC, cane yield, cane girth and cane length over rest of the varieties. However, cane yield was at par with variety Co Pant 99214. Cane yield, NMC, cane girth, CCS yield (t/ha) were higher in 125 % of the recommended dose of NPK over 75 or 100 % of the recommended dose.

Table1 AS 42.5.1: Effects of genotypes and fertility levels on growth and yield of spring planted sugarcane at Pantnagar

Treatments	Germ. (%) 45 DAP	Shoot population (000/ha)			Av. cane weight (g)	Plant ht. (cm)	Cane girth (cm)	NMC (000/ ha)	Cane yield (t/ha)	Sucrose (%)	CCS (t/ha)
		60 DAP	90 DAP	120 DAP							
Genotypes											
Co Pant 5224	55.3	115.1	126.6	120.6	1033.3	388.0	8.4	104.1	88.2	14.3	7.0
Co Pant 3220	50.4	125.0	149.5	133.9	896.6	382.8	7.9	94.9	82.2	14.4	6.7
Co Pant 97222	45.7	108.0	141.7	130.2	956.7	385.0	8.4	79.3	83.5	14.3	6.8
Co Pant 99214	51.3	120.5	170.7	151.9	977.8	375.0	8.3	76.9	88.1	14.0	6.8
SEm ±	1.4	7.2	7.2	7.2	26.9	1.1	0.1	1.3	0.3	0.06	0.06
CD at 5%	4.2	21.2	21.2	21.2	78.9	3.4	NS	4.0	0.9	0.19	0.19
Fertility levels (% of Recommended N, P and K)											
75	48.0	112.5	136.9	120.2	855.8	370.0	7.5	82.6	82.5	15.2	6.4
* 100	49.3	112.0	146.3	135.7	938.3	385.0	7.9	90.9	86.1	13.8	6.7
125	49.8	127.1	158.3	141.3	1104.2	393.2	9.3	93.0	87.8	13.6	7.8
SEm ±	1.2	6.2	6.3	6.2	23.3	1.0	0.1	1.2	0.2	0.06	0.1
CD at 5 %	NS	NS	18.4	18.3	68.3	3.0	NS	3.6	0.7	0.18	0.4

***(Recommended dose of N, P and K were 120: 60: 40 kg N, P_2O_5 and K_2O/ha)**

Pooled (2012-13 & 2013-14)

On the basis of two years pooled analysis it was observed that Co Pant 5224 performed better then rest of the genotypes (Table AS 42.5.2) which was significantly higher over rest of the treatments. Significantly higher NMC were also recorded in Co Pant 5224 over rest of the genotypes. However, CCS yield was higher significant higher over Co Pant 6224. NMC, cane yield and CCS yield were higher in 125 % of the recommended dose of N as compared to either 100 % or 75 % of the recommended N.

Summary: Among all the genotype Co Pant 5224 performed better for cane yield and NMC, CCS yield was recorded highest in Co Pant 4222 which was significantly higher over Co Pant

6224.NMC, cane yield and CCS yield were higher in 125 % of the recommended dose of N as compared to either 100 % or 75 % of the recommended N.

Table AS 42.5.2: NMC (000/ha), cane yield (t/ha) and CCS yield (t/ha) influenced by various genotypes and fertility levels (Pooled)

Treatment	NMC (000/ha)			Cane yield (t/ha)			CCS (t/ha)		
	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled	2012-13	2013-14	Pooled
Genotypes									
Co Pant 5224	87.2	88.0	87.6	85.9	87.7	86.8	8.5	6.9	7.7
Co Pant 6224	86.6	86.4	86.5	84.8	84.5	84.7	7.8	7.3	7.5
Co Pant 4222	87.0	80.4	83.7	85.0	82.2	83.6	8.8	7.5	8.2
Co Pant 2218	80.2	87.7	83.9	81.0	85.5	83.3	8.3	7.8	8.1
SEm ±	0.3	0.2	0.2	0.4	0.2	0.3	0.2	0.2	0.2
CD at 5%	0.9	0.6	0.6	1.6	0.6	1.1	0.8	0.6	0.6
Fertility levels (Nitrogen level % of the recommended)									
75	82.9	84.4	83.7	81.4	82.9	82.2	8.1	6.9	7.5
100	82.6	85.9	84.2	81.4	85.1	83.3	8.2	7.3	7.8
125	90.1	86.6	88.4	88.0	86.8	87.4	8.9	8.0	8.5
SEm ±	0.3	0.1	0.2	0.5	0.2	0.4	0.2	0.2	0.2
CD at 5 %	1.1	0.5	0.8	1.6	0.6	1.2	0.6	0.6	0.6

RATOON

Sugarcane genotype *i.e.* Co Pant 5224, Co Pant 6224, Co Pant 4222 and Co Pant 2218 were raised as plant crop during 2013-14 with the 75 %, 100 % and 125 % of the recommended dose of N/ha. Uniform dose of P_2O_5 (60 kg/ha) and K_2O (40 kg/ha) was given along with different doses of N in plant cane and ratoon. Recommended dose of N was 150 kg N/ha. Half dose of N was given as basal (at ratoon initiation) and remaining half N was splitted in two parts was applied up to June last. Cultural practices (irrigation, weeding, hoeing, earthing, tying etc.) were adopted as per recommendations. The ratoon was harvested on 17.02.2015.

Results: Highest cane yield was recorded from sugarcane variety Co Pant 5224 which was significantly higher over rest of the genotypes *i.e.* Co Pant 6224, Co Pant 4222 and Co Pant 2218. The higher cane yield in the variety Co Pant 5224 was the result of higher millable cane, cane girth, length of cane. Number of clumps (000/ha) were also higher in variety Co Pant 5224 as compared to Co Pant 4222 and Co Pant 2218. Sucrose % in the canes of variety Co Pant 5224 was recorded higher as compared to rest of the genotypes. However CCS yield was not influenced in any of the variety/genotype significantly.

Significantly higher shoot population at different stages of crop growth *i.e.* 60, 90, 120 and 150 DAP was recorded in 125 % of the recommended N (150 kg N/ha) over 75 or 100 % of the recommended dose of N (150 kg N/ha). Cane yield was significantly higher in the treatment of 125 % of the recommended N over 75 % or 100 % of the recommended N/ha. The higher yield in 125 % of the recommended was the result of higher cane length, cane girth, millable cane. Sucrose % was recorded significantly higher in 75 % of the recommended N over either 100 % or 125 % of the recommended N. CCS yield was significantly higher in 125 % of the recommended N over 75 % of the recommended N. (Table - 2)

Summary: Sugarcane variety Co Pant 5224 performed better over rest of the genotypes *i.e.* Co Pant 6224, Co Pant 4222 and Co Pant 2218 as the ratoon cane yield was significantly higher in Co Pant 5224. Sucrose % was also recorded higher in the variety Co Pant 5224. 125

% of the recommended N (150 kg N/ha) was found good over 75 or 100 % of the recommended N. Cane length, cane weight, millable cane, CCS yield were also significantly higher in 125 % of the recommended N/ha over recommended or sub optimal dose (75 % of the recommended).

Table AS 42.5.3: Growth, cane yield and juice quality in ratoon affected by various genotypes and fertility levels

Treatments	Clumps (000/ha)	Shoot population (000/ha)				Plant height (cm)	Cane girth (cm)	Per cane wt. (g)	Millable cane (000/ha)	Yield (t/ha)	Sucrose % at harvest	CCS (t/ha)
		60 DAP	90 DAP	120 DAP	150 DAP							
Genotypes												
Co Pant 5224	22.9	71.1	79.0	88.6	97.8	327.4	2.5	812.0	60.4	57.1	14.0	6.7
Co Pant 6224	22.4	96.1	113.5	118.8	99.9	313.4	1.9	677.0	58.7	53.9	12.6	6.4
Co Pant 4222	19.1	74.7	102.0	116.3	91.9	320.4	1.8	833.0	56.6	53.1	13.0	6.4
Co Pant 2218	18.8	84.9	101.1	121.1	98.9	316.9	2.1	844.0	55.9	53.4	13.5	6.5
SEm ±	0.6	3.6	4.4	3.5	1.3	6.3	0.02	16.6	0.7	0.5	0.03	0.09
CD at 5%	1.9	10.6	12.9	10.3	3.9	NS	0.09	49.0	2.1	1.6	0.1	NS
Fertility levels (% of Recommended N)												
75	20.8	72.8	94	104	88.4	303	1.8	708.0	54.7	51.4	14.4	6.3
100	20.4	74.4	94	109	98.2	318	2.1	780.0	57.4	53.6	13.0	6.5
125	21.4	95.0	106	120	104	337	2.4	887.0	61.5	58.2	12.4	6.7
SEm ±	0.6	3.1	3.8	3.0	1.2	5.4	0.02	14.4	0.6	0.5	0.03	0.08
CD at 5 %	NS	9.2	11.2	9.1	3.6	16.0	0.07	43.2	1.8	1.5	0.09	0.24

*** Recommended N was 150 kg/ha + uniform dose of P_2O_5 (60 kg/ha) + K_2O (40 kg/ha)**

6. SHAHJAHANPUR

The soil of experimental field was medium in organic carbon (0.63), low in phosphorus (14.80 kg/ha) and medium in potash (118 kg/ha) with pH 6.76. Experimental crop was planted on 13.02.2014 and harvested on 04.02.2015.

Experimental results (Table-1) reveled that genotype CoS 07240 produced significantly higher cane yield (85.34 t/ha) than that of genotype CoS 03261 (81.67 t/ha) and CoS 03251 (78.82). CCS % in cane was observed significantly higher in genotype CoS 03251 (11.23) than that of CoS 03261 (10.65) and CoS 07240 (10.23). Regarding nitrogen levels, significantly higher cane yield (86.34 t/ha) was recorded with 125 % of recommended dose of N than that of 75 % of recommended N, however, 100 % recommended N (180 kg/ha) was found at par with 125 % recommended dose of N.

Summary

Genotype CoS 07240 gave significantly higher cane yield (85.34 t/ha) followed by genotype CoS 03261 (81.67 t/ha) and CoS 03251 (78.82). Regarding different nitrogen levels, significantly higher cane yield (86.34 t/ha) was obtained with 125 % of recommended N than that of 75 % of recommended N.

Table AS 42.6.1: Effect of treatments on germination, shoots, millable canes, cane yield and CCS % of cane

Treatment	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)
(A) Genotypes					
V_1- CoS 03251	37.60	133.14	95.52	78.82	11.23
V_2- CoS 07240	48.10	174.03	130.83	85.34	10.46
V_3- CoS 03261	37.60	158.10	119.68	81.67	10.65
SE±	1.56	2.79	3.81	2.33	0.17
CD 5%	3.32	5.92	8.07	4.95	0.35
(B) Fertilizer levels					
N_1-75% of recommended dose of N	40.61	151.31	107.87	75.31	10.71
N_2-100% of recommended dose of N	40.91	155.36	114.54	84.10	10.84
N_3-125% of recommended dose of N	41.73	158.60	121.60	86.34	10.78
SE±	1.56	2.79	3.81	2.33	0.17
CD 5%	NS	5.92	8.07	4.95	NS

7. UCHANI

The experiments were conducted on early and mid-late sugarcane varieties as mentioned above in Factorial RBD with three replications. The crop was planted at 75 cm row spacing on March 22, 2014. The soil of the experimental field was clay loam in texture having pH 7.8, EC 0.4 dsm^{-1}, organic carbon 0.33%, available P 12.4 kg/ha and available K 156 kg/ha. Recommended doses of phosphorus (50 kg P_2O_5/ha) and potash (50 kg K_2O/ha) were applied at the time of planting whereas nitrogen as per treatments was applied in three equal splits. Recommended dose of Nitrogen is 150 kg/ha. The crop was irrigated at 8-10 days intervals during pre-monsoon period and 20 days interval during post monsoon period. The harvesting of the experiment was done on March 10, 2015.

In early group, significantly higher germination was recorded in variety CoH 9262 as compare to rest of the varieties. Variety CoLk 9202 produced significantly highest cane (75.5 t/ha) and sugar yield (8.69 t/ha). Varieties CoS 92046 and CoH 9262 were found at par with each other in most of the characters except CCS% and sugar yield. CoH 9262 produced significantly higher CCS % and sugar yield as compared to CoS 92046. All the varieties responded upto 25 % higher than recommended dose of nitrogen (187 kg/ha).

In late group, varieties CoP10221 and Co 10036 being at par in all the characters produced significantly higher values of germination, tillers, millable cane, cane yield and sugar yield as compared to variety Co 10231. No significant differences were observed among varieties in terms of Commercial cane sugar (%). All the varieties responded upto 25 % higher than recommended dose of nitrogen (187 kg/ha).

Summary: In early group, variety CoLk 9202 produced significantly highest cane (75.5 t/ha) and sugar yield (8.69 t/ha). CoH 9262 produced significantly higher CCS % and sugar yield as compared rest of the varieties. In mid late group, varieties CoP10231 and Co 10036 being at par produced significantly higher cane yield and sugar yield as compared to variety

Co 10031. All the varieties responded upto 25 % higher than recommended dose of nitrogen (187 kg/ha) irrespective of maturity group.

Table AS 42.7. 1: Effect of different fertility levels on growth, yield and quality of early group varieties.

Treatment	Germination (%)	No. of tillers (000/ha)	No. of millable canes (000/ha)	Single cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
Genotypes							
CoLk 9202	44.1	124.3	94.2	800	75.5	11.51	8.69
CoS 92046	43	118.8	90.0	705	63.5	11.50	7.13
CoH 9262	46.3	122.1	92.3	708	65.4	12.08	7.90
CD at 5%	1.3	NS	3.1	12	2.2	0.15	0.35
Nitrogen dose							
75% of recom.	44.4	115.8	87.4	715	62.6	11.52	7.21
Recommended	44.8	122.9	93.1	746	69.6	11.81	8.20
125% of recom.	44.3	126.4	96.0	752	72.3	11.77	8.49
CD at 5%	NS	3.5	2.5	11	2.3	0.18	0.12

* Recommended Nitrogen - 150 kg /ha

Table AS 42.7.2: Effect of different fertility levels on growth, yield and quality of mid-late group varieties

Treatment	Germination (%)	No. of tillers (000/ha)	No. of millable canes (000/ha)	Single cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
Genotypes							
Co 10036	40.8	113.4	88.7	840	73.7	11.93	8.80
CoP10221	45.2	124.6	96.5	860	82.2	11.93	9.80
Co10231	44.4	122.7	95.0	852	80.0	11.87	9.52
CD at 5%	2.2	5.5	3.7	12	3.2	NS	0.43
Nitrogen dose							
75% of recom.	43.2	113.6	87.8	828	71.9	11.86	8.53
Recommended	43.6	121.0	94.0	860	80.0	11.92	9.55
125% of recom.	43.7	126.2	98.4	864	84.1	11.92	10.00
CD at 5%	NS	4.2	2.9	13	2.4	NS	0.32

PENINSULAR ZONE

8. COIMBATORE

The experiment was planted during February 2014 with a new set of four promising clones (Co 08001, Co 08009, Co 08016 and co 08020) which performed best in AVT along with Co 86032 as check. The experimental field was low in available N (228 kg N/ha) and high in available in P and K. The soil pH was 7.52 and the EC was 0.86 dS/m. Germination and initial crop growth was satisfactory. In the plant crop the shoot population showed significant difference due to varieties, wherein, Co 08016 (109.25 thousand/ha) recorded significantly higher number of shoot than all other varieties except the shoot count of variety Co 08009(101.07 thousand /ha) which was on par with it.

Juice Brix and Sucrose at harvest showed significant varietal difference whereas Purity and CCS (%) were found non-significant. In the plant crop Co 08016 recorded significantly highest mean brix of 21.25 and it was at par with the brix recorded by Co 08009 (21.55).The varieties Co 08016 and Co 08009 recorded more than 19 % of juice sucrose and more than 13 % CCS.

The appreciable difference in mean cane yield was observed among the five varieties and it ranged from 56.22 to 139.85 t/ha. The variety Co 86032 recorded the highest mean cane yield of 133.34 t/ha and the new genotype Co 08009 with 75 % of Recommended Dose of Fertilizer (225 kg N + 60 kg P_2o_5+120 kg K_2O) gave the on par yield of 113.00 t/ha with check variety Co 86032 The fertilizer levels did not significantly influence the cane yield .The CCS yield was significantly affected by the fertilizer levels. The effect of different treatments on CCS yield (t/ha) was similar to that on cane yield.

Table AS 42.8.1: Cane yield (t/ha) of promising sugarcane varieties at different fertilizer levels

Variety	Fertilizer level			
	75 %	**100 %**	**125 %**	**Mean**
Co 08001	56.22	73.14	86.12	71.83
Co 08009	113.00	136.72	115.12	121.61
Co 08016	110.83	111.62	103.93	108.79
Co 08020	107.48	88.11	98.68	98.09
Co 86032	125.14	139.85	135.04	133.34
Mean	102.53	109.89	107.78	

CD: Varieties30.26; Fertilizer levelsNS; V x F NS

9. PADEGAON

EARLY GROUP

The experiment was initiated on 07.01.2014 in medium black soil with normal fertilizer dose (250:115:115 kg N, P_2O_5, K_2O ha^{-1}). Five early genotypes (Co 06001, Co 06002, Co 06022, PI 06032, CoC 671) were evaluated under varying fertilizer levels. Data revealed that the genotype Co 06002 recorded the highest cane (123.81 t ha^{-1}) and CCS yield (17.70 t ha^{-1}) and was significantly superior to all other genotypes. It was followed by Co 06001 (115.01 t ha^{-1} cane and 15.97 t ha^{-1} CCS yield).The nitrogen levels had a non-significant effect on cane yield. While significantly the highest CCS yield (16.95 t ha^{-1}) was recorded with the application of 125% recommended dose of nitrogen. It was found at par with 100 % recommended dose of nitrogen (15.92 t ha^{-1}).

Genotype, Co 06002 recorded significantly highest brix (22.01), sucrose (19.87%) and purity (92.96%). It was found at par with PI 06032 with respect to brix and sucrose. The CCS percentage was found significantly highest in genotype CoC671, which was found at par with Co-06002.The application of 125% recommended dose of nitrogen recorded significantly highest brix (21.86), Sucrose (19.91%), Purity (92.68 %) and CCS (14.41%) which was found at par with that of 100% recommended dose of nitrogen.

SUMMARY

Co 06002 was found significantly superior for cane and CCS yields than the other genotypes followed by PI 06032. The application of 125 % recommended dose of nitrogen produced significantly higher CCS yields which was found at par with 100% recommended dose of nitrogen. While cane yield was not affected by different nitrogen levels.

Table AS 42.9.1:Cane and CCS yield affected by sugarcane genotypes and N levels

Treatment	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Genotypes		
V_1– Co 06001	115.01	15.97
V_2 – Co 06002	123.81	17.70
V_3– Co 06022	105.23	14.70
V_4 – PI 06032	113.18	15.94
V_5 – CoC 671	112.06	15.41
SE±	**0.83**	**0.17**
C.D. at 5%	**2.72**	**0.55**
B) N levels		
F_1 - 75% N	110.69	14.64
F_2 - 100% N	113.42	15.92
F_3 – 125 % N	117.46	16.95
SE±	**2.14**	**0.45**
C.D. at 5%	**NS**	**1.33**
C) Interactions		
SE±	**4.79**	**1.01**
C.D. at 5%	**NS**	**NS**
General Mean	**113.86**	**15.84**

Table AS 42.9.2: Growth and yield attributes affected by sugarcane genotypes and N levels

Treatment	Germination (%)	Tillering ratio	Height (cm)	Girth (cm)	No. of internodes $cane^{-1}$	Millable canes (000 ha^{-1})	Avg. cane wt. (kg)
A) Genotypes							
V_1– Co 06001	67.93	1.68	272	6	24	100.44	0.15
V_2 – Co 06002	70.83	1.76	286	10.0	27	104.14	9
V_3– Co 06022	63.21	1.56	267	9.3	22	93.21	3
V_4 – PI 06032	69.61	1.73	279	9.8	25	96.71	7
V_5 – CoC 671	66.38	1.59	269	9.5	24	98.49	4
SE±	0.84	0.02	2.42	0.10	1.30	1.61	0.01
C.D. at 5%	**2.73**	**0.05**	**7.89**	**0.33**	**NS**	**5.23**	**NS**
B) N levels							
F_1 - 75% N	63.13	1.60	268	8	00	101.68	1.09
F_2 - 100% N	67.76	1.67	276	8	26	96.70	1.17
F_3 – 125 % N	71.88	1.73	280	0.4	30	97.41	1.21
SE±	1.64	0.03	3.85	26	0	1.41	0.01
C.D. at 5%	**NS**	**0.10**	**NS**	**76**	**5.02**	**4.15**	**0.06**
C) Interactions							
SE±	3.66	0.07	8.60	58	3.80	3.15	0.04
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
General Mean	67.69	1.66	275	9.6	24	98.60	1.16

Table AS 42.9. 3: Quality parameters as affected by sugarcane genotypes and N levels

Treatments	^{0}Brix	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– Co 06001	21.46	19.56	91.85	13.89
V_2 – Co 06002	22.01	19.87	92.96	14.02
V_3– Co 06022	21.19	19.14	91.43	13.43
V_4 – PI 06032	21.67	19.76	92.12	13.73
V_5 – CoC 671	21.42	19.43	91.61	14.27
SE±	0.13	0.12	0.22	0.10
C.D. at 5%	**0.42**	**0.40**	**0.71**	**0.34**
B) N levels				
F_1 - 75% N	21.14	19.02	91.15	13.19
F_2 - 100% N	21.65	19.73	92.15	14.00
F_3 – 125 % N	21.86	19.91	92.68	14.41
SE±	0.19	0.18	0.35	0.17
C.D. at 5%	**0.55**	**0.53**	**1.04**	**0.49**
C) Interactions				
SE±	0.41	0.40	0.79	0.37
C.D. at 5%	**NS**	**NS**	**NS**	**NS**

MID LATE GROUP

The field experiment was planted on 13.01.2014 in a medium black soil with five genotypes (Co 06012, Co 06015, Co 06027, CoM 06082 and Co 86032) evaluated under varying nutrient doses as per the technical programme. Data revealed that the genotype Co 86032 recorded significantly the highest cane (126.86 t ha^{-1}) and CCS (19.25 t ha^{-1}) yields. It was followed by Co 06015. The N levels had a significant effect on cane yield only. Significantly the highest cane (122.63 t ha^{-1}) yield was recorded with the application of 125% recommended dose of N. It was found at par with 100% recommended dose of N (117.07 t ha^{-1}).The interactions between genotypes and fertilizer levels were found to be non-significant for both cane and CCS yields.

Effect of genotypes was found significant for all the parameters except cane girth and number of millable canes. The genotype Co 86032 recorded significantly the highest germination (71.48 %), tillering ratio, (1.79), millable height (294 cm), number of internodes per cane (27), and weight per cane (1.29 kg). However, it was at par with Co 06015 in respect of germination percentage, number of internodes per cane and average cane weight. Effect of N levels was found significant for tillering ratio, cane girth, number of internodes per cane and average cane weight. Application of 125% recommended dose of nitrogen recorded significantly the highest tillering ratio (1.76) ,cane girth (9.5 cm), number of internodes per cane (29.0) and the average cane weight (1.28 kg) over other levels. It was found at par with 100 % recommended dose of nitrogen for all these parameters.

SUMMARY:

Co 86032 recorded significantly higher cane and CCS yields than the other genotypes and it was followed by Co-06015. The application of 125 percent recommended dose of nitrogen produced significantly higher cane yield and found at par with 100 % recommended dose of nitrogen.

Table AS 42.9.4:Cane and CCS yield as affected by sugarcane genotypes and N levels

Treatment	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Genotypes		
V_1– Co 06012	117.67	16.45
V_2 – Co 06015	122.06	18.29
V_3– Co 06027	111.26	15.44
V_4 – CoM 06082	110.57	14.97
V_5 – Co 86032	126.86	19.25
SE±	**0.65**	**0.83**
C.D. at 5%	**2.12**	**2.71**
B) N levels		
F_1 - 75% N	113.36	16.63
F_2 - 100% N	117.07	16.50
F_3 – 125 % N	122.63	17.50
SE±	**1.96**	**0.69**
C.D. at 5%	**5.79**	**NS**
C) Interactions		
SE±	**4.93**	**1.54**
C.D. at 5%	**NS**	**NS**
General Mean	**117.68**	**16.88**

Table AS 42.9.5 : Growth and yield attributes as affected by sugarcane genotypes and N levels

Treatments	Germination %	Tillering ratio	Height (cm)	Girth (cm)	No of internodes $cane^{-1}$	Millable canes (000 ha^{-1})	Avg. cane wt. (kg)
A) Genotypes							
V_1– Co 06012	68.73	1.71	281	9.0	24	95.00	1.24
V_2 – Co 06015	70.12	1.76	286	9.4	25	96.18	1.27
V_3– Co 06027	65.74	1.63	273	8.9	24	93.55	1.19
V_4 – CoM 06082	62.15	1.59	269	8.7	22	97.02	1.14
V_5 – Co 86032	71.48	1.79	294	9.3	27	98.31	1.29
SE±	**0.73**	**0.01**	**1.75**	**0.2**	**0.61**	**1.02**	**0.01**
C.D. at 5%	**2.36**	**0.03**	**5.71**	**NS**	**2.00**	**NS**	**0.03**
B) N levels							
F_1 - 75% N	68.18	1.63	274	8.5	20	97.61	1.16
F_2 - 100% N	68.07	1.70	282	9.2	25	94.99	1.23
F_3 – 125 % N	71.69	1.76	286	9.5	29	95.44	1.28
SE±	**2.65**	**0.02**	**3.42**	**0.25**	**1.62**	**0.80**	**0.02**
C.D. at 5%	**NS**	**0.07**	**NS**	**0.72**	**4.77**	**NS**	**0.5**

Table AS 42.9.6 : Quality parameters of sugarcane affected by sugaracane genotypes and N levels

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– Co 06012	21.81	19.74	91.02	13.97
V_2 – Co 06015	21.76	19.81	91.36	14.39
V_3– Co 06027	21.46	19.56	90.62	13.89
V_4 – CoM 06082	21.02	19.46	89.62	13.53
V_5 – Co 86032	21.97	19.87	92.17	15.82
SE±	**0.09**	**0.09**	**0.27**	**0.70**
C.D. at 5%	**0.29**	**0.28**	**0.88**	**NS**
B) N levels				
\F_1 - 75% N	21.60	19.45	90.34	14.63
F_2 - 100% N	21.36	19.65	90.99	14.08
F_3 – 125 % N	21.85	19.97	91.55	14.25
SE±	**0.18**	**0.13**	**0.42**	**0.55**
C.D. at 5%	**NS**	**0.39**	**NS**	**NS**
C) Interactions				
SE±	**0.40**	**0.30**	**0.94**	**1.23**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**21.60**	**19.69**	**90.96**	**14.32**

10. PUNE

The pooled data of two plant and one ratoon crops pertaining to cane and CCS yields, growth observations and quality parameters are presented in table AS 42.11.1. It revealed that PI07131 recorded significantly higher cane yield (100.22 t/ha) followed by the check variety Co 86032 (96.72 t/ha). Cane yield of rest of the genotypes i.e. Co 8001 & Co 7015 (92.82 t/ha & 84.38 t/ha respectively) were more than the variety Co C 671 (76.60 t/ha).CCS yield was significantly higher in variety Co 86032 (14.26 t/ha) than rest of the genotypes under testing, but at par with the genotype PI07131 (14.17 t/ha).

Application of 125 % recommended fertilizer dose of NPK to *suru* season sugarcane recorded significantly higher cane yield (92.66 t/ha) & CCS yield (13.31 t/ha) than rest of the fertilizer levels. It produced 4.30 & 0.47 t/ha more cane and CCS yields over recommended dose of NPK fertilizers.

The effect of interaction between genotypes & fertilizer levels in respect of pooled cane yield was significant, where in CCS yield was not significant.

Growth and yield attributes:

All the growth and yield attributes except single cane weight were found significant. The pooled data revealed that the genotype PI07131 recorded significantly higher germination (71.05%), number of millable canes (0.72 lac/ha) andinternodes (22/cane). While the highest tillering at 120 DAP (1.44 la/ha), cane girth (10.29 cm) and single cane weight (1.43 kg) was recorded in genotype Co 8001. Maximum total and millable height (255 and 223 cm) was observed in variety Co 86032.

Cost benefit ratio was significantly higher (1: 1.90) in genotype PI07131 followed by the check variety Co 86032 (1: 1.83).

The pooled data revealed that application of 125% recommended fertilizer dose of NPK to suru season sugarcane, recorded significantly maximum germination (69.88%), total & millable height (250 & 213 cm respectively), single cane weight (1.41 kg), & no of

millable canes (0.67 l/ha) than the recommended dose of NPK fertilizers. The B:C ratio was also numerically higher (1: 1.75) in 125% NPK application.

Effect of interaction:

Effect of interaction between genotypes & fertilizer levels in respect of all the pooled growth attributes were found significant to single cane weight, germination at 45 DAP, and cane girth while it was not significant for the tillering at 120DAP,number of internodes and cane length.

Quality parameters:

The pooled data pertaining to juice quality parameters revealed that the genotype PI07131 recorded significantly highest brix % (24.82%), than the rest of the genotypes under study. The variety CoC 671 noticed significantly higher sucrose% and CCS% (22.00% & 15.86%), respectively. Which was followed by the variety Co 86032 (sucrose% 20.43 & CCS 14.76 %).

The pooled data on application of recommended fertilizer dose of NPK to *suru* season sugarcane revealed that 75% RDF of NPK recorded higher CCS% & sucrose% (14.95% & 20.64% respectively) than other fertilizer levels however, differences were no significant.

Interaction effect between genotypes & fertilizer levels were found not significant.

SUMMARY

The genotype PI07131 recorded significantly higher cane yield (100.22t/ha) & B:C ratio (1: 1.90) than the other genotypes under study. However it was on par with the check variety Co 86032. Application 125% of recommended fertilizer dose of NPK to *suru* season sugarcane produced significantly higher cane yield (92.66 t/ha), CCS yield (13.31 t/ha) & B:C ratio (1: 1.75) than the other doses of NPK fertilizer applications.

Table AS 42.10.1 : Pooled Mean of cane and CCS yield (t/ha) as affected by various genotypes and levels of fertilizers

Treatment	Cane yield (t/ha)				CCS yield (t/ha)			
	Ist Plant	IInd Plant	Ratoon	Pooled mean	Ist Plant	IInd Plant	Ratoon	Pooled mean
A) Genotype								
PI07131	114.16	99.34	89.13	100.22	15.38	15.10	13.03	14.17
Co 8001	96.50	92.99	86.28	92.82	13.37	14.22	12.96	13.58
Co 7015	83.09	82.16	70.42	84.38	13.79	11.68	9.92	11.54
CoC 671	104.70	67.16	65.18	76.60	13.94	10.69	10.34	11.63
Co 86032	101.15	96.97	92.29	96.72	12.70	15.21	13.56	14.26
S.E. ±	5.75	0.90	11.65	7.17	0.82	0.02	0.84	1.18
C.D. at 5 %	18.74	1.47	19.09	11.69	NS	0.04	1.38	1.93
Fertilizer Level								
75 %	99.16	81.56	77.38	83.42	13.53	13.07	11.87	12.35
100 %	98.31	88.74	81.64	88.36	13.95	13.76	12.11	12.84
125 %	102.29	92.86	82.96	92.66	14.02	13.91	12.50	13.31
S.E. ±	3.68	0.77	9.16	3.94	0.80	0.91	0.45	0.82
C.D. at 5 %	NS	NS	NS	5.82	NS	0.3	0.95	1.21
Interaction								
S.E. ±	8.86	1.67	20.38	10.16	1.68	0.42	1.45	1.90
C.D. at 5 %	NS	2.55	31.12	15.78	NS	0.70	2.21	2.93
CV%	17.26	11.55	21.69	8.68	17.86	0.29	10.47	12.40

11. POWARKHEDA

EARLY GROUP:

Genotypes, Co 06022, Co 06002, Co C 671 were evaluated under varying nutrient doses. Sugarcane was planted on 13-12-2013in a soil having pH 7.46, EC 0.39 dS/m, OC0.61%, available N 237 kg/ha, $P_2O_5$16.63 kg/ha and K_2O 475 kg/ha.

Results reveal that germination percentage did not differ significantly. The germination percentage recorded higher with Co 06022 (68.75%) than Co C 671 (67.94%) and Co 06002 (66.65%). The germination percentage was not influenced by different fertility levels.

TableAS42.11.1: Effect of different fertility levels on growth, yield and quality of early maturing sugarcane genotypes at Powarkheda.

S. No.	Treatments	Germination (%)	Tillers (000'/ha)	Plant Height (cm)	NMC (000'/ha)	Brix (%)	Cane Yield (t/ha)
	Genotypes						
1	Co 06022	68.75	104.59	252	0.82	21.36	98.87
2	Co 06002	66.65	94.10	234	90.42	20.33	88.61
3	Co C 671	67.94	99.00	236	95.09	21.85	93.20
	S Em +	2.48	1.78	2.64	1.76	0.17	1.75
	CD at 5%	NS	5.34	7.91	5.28	NS	5.24
	Fertilizer dose (% Recommended NPK)						
1	75%	68.05	95.33	231	91.59	21.47	89.74
2	100%	68.05	100.85	243	96.94	21.52	95.06
3	125%	68.23	101.50	248	97.80	21.55	95.88
	S Em +	2.48	1.78	2.64	1.76	0.17	1.75
	CD at 5%	NS	5.34	7.91	5.28	NS	5.24

Tillers (000'/ha): Among varieties Co 06022 showed significantly higher number of tillers which recorded (104.59) than Co C 671 (99.00) and Co 06002 (94.10) . The tillers recorded in-between Co C 671 and Co 06002 were at par. Fertility levels showed significant differences for tillers. The significantly higher number of tillers recorded with 125% recommended dose of NPK (101.50) as compared with 75% recommended dose of NPK (95.33).Both the levels of RDF NPK (100 and 125%) showed at par tillers but were significantly higher than the 75% RDF NPK.

Plant Height (cm): Among varieties Co 06022 showed significantly higher plant height (252 cm) as compared to Co C 671 (236 cm) and Co 06002 (234 cm). Fertilizer levels showed significant influence on plant height. The maximum plant height (248 cm) recorded with 125% RDF NPK and the differences were significantly higher than the plant height obtained due to application of 75% RDF NPK (231 cm). The plant height also increased significantly with the application of 100 % RDF NPK (243 cm) than 75% RDF NPK. Both the levels of RDF NPK (100 and 125%) showed at par plant height but were significantly higher than the 75% RDF NPK.

Number of Millable Canes (000'/ha): The NMC differed significantly due to varieties and fertility levels. Among varieties the NMC recorded significantly higher with Co 06022 (100.82) as compared to Co C 671 (95.09) and Co 06002 (90.42). The NMC recorded in-between Co C 671 and Co 06002 were at par. The NMC increased with the increase in

fertilizer levels. Significantly higher NMC (97.80) recorded with 125% RDF NPK than 75% RDF NPK (91.59). The NMC recorded in between 100% RDF NPK and 125% RDF NPK were at par.

Brix (%): The brix values ranged from 21.33 to 21.85 per cent for varieties and 21.47 to 21.55 per cent in fertilizer levels. However, brix values did not differ significantly due to varieties and fertilizer levels.

Cane Yield (t/ha): Among varieties Co 06022 recorded significantly higher cane yield (98.87 t/ha) than Co C 671 (93.20 t/ha) and Co 06002 (88.61 t/ha) but the cane yield obtained at par in between Co C 671 (93.20 t/ha) and Co 06002 (88.61 t/ha). Application of fertilizer doses increased cane yield correspondingly with the increase in fertilizer levels and significantly higher cane yield (95.88 t/ha) obtained due to application of 125 % RDF NPK than 75% RDF NPK (89.74 t/ha). The cane yield obtained at par in-between 100 and 125 % RDF NPK.

Summary:

Results revealed that among the early genotypes Co 06022 gave significantly higher cane yield of (98.87 t/ha) than Co C 671 (93.20 t/ha) and Co 06002 (88.61 t/ha). Application of 125 % RDF NPK gave significantly higher cane yield of (95.88 t/ha) than 75 % RDF NPK (89.74 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF NPK.

MID-LATE GROUP:

Genotypes, Co 06010, Co 06015,Co 06027 and Co JN 86- 600 were evaluated by planting on 14.12.2013 under varying nutrient levels. Soil of the experimental field contained pH 7.46, EC0.39 dS/m, OC 0.61%, available N 237 kg/ha, $P_2O_5$16.63 kg/ha and K_2O 475 kg/ha. Findings narrate that germination percentage did not differ significantly due to varieties or fertility levels. However, germination percentage ranged from 67.44 to 68.34 percent for varieties and 67.57 to 68.12 percent for fertility levels.

Tillers (000'/ha): Among varieties Co 06027 recorded higher numbers of tillers (120.12) than Co JN 86-600 (105.00), but the tillers obtained at par in between Co 06027 (120.12) and Co 06010 (116.25), and Co 06015 (105.00) and Co JN 86- 600 (105.00). Application of fertilizer levels recorded higher number of tillers. Significantly higher number of tillers obtained at 125% RDF NPK (113.94) and 100% RDF NPK (113.32) as compared to number of tillers recorded with 75% RDF NPK (107.53). Number of tillers recorded at par in between 100 and 125% recommended dose of NPK.

Plant height (cm): Among varieties Co 06027 showed higher plant height (261 cm) as compared to Co 06010 (257 cm), Co 06015 (256 cm) and Co JN 86-600 (256 cm).The plant height recorded in between Co 06027, Co 06010, Co 06015 and Co JN 86-600 were at par. Fertilizer levels showed significant influence in plant height. Application of fertilizer levels increased plant height significantly and recorded higher plant height (264 cm) due to application of 125% RDF NPK than 75% RDF NPK (247 cm). Both the levels of RDF NPK (100 and 125%) showed at par plant height but were significantly higher than the 75% RDF NPK.

Brix (%): The brix values did not differ significantly either due to varieties or fertility levels. However, among varieties the brix value ranged from 21.20 to 22.15 for varieties and 21.90 to 21.91 per cent for fertility levels.

Table AS 42.11.2: Effect of different fertility levels on growth yield and quality of late maturing sugarcane genotypes at Powarkheda

S. No.	Treatment	Germin-ation (%)	Tillers (000'/ha)	Plant Height (cm)	NMC (000'/ha)	Brix (%)	Cane Yield (t/ha)
	Genotypes						
1	Co 06010	68.34	116.25	257	112.99	22.13	111.41
2	Co 06015	67.44	105.00	256	101.92	22.14	100.68
3	Co 06027	67.64	120.12	261	116.83	22.15	115.22
4	Co JN 86-600	67.93	105.00	256	101.92	21.20	100.99
	S Em +	2.23	1.82	2.85	1.73	0.01	1.77
	CD at 5%	NS	5.32	8.32	5.05	NS	5.19
	Fertilizer dose (% Recommended NPK)						
1	75% RDF	67.57	107.53	247	104.27	21.90	103.21
2	100% RDF	67.83	113.32	262	110.23	21.91	108.74
3	125% RDF	68.12	113.94	264	110.75	21.91	109.28
	S Em +	2.23	1.82	2.85	1.73	0.01	1.77
	CD at 5%	NS	5.32	8.32	5.05	NS	5.19

Number of Millable Canes (NMC '000'/ha): Among varieties the NMC population recorded significantly higher with Co 06027 (116.83) as compared to Co 06015 (101.92), and Co JN 86-600 (101.92), but the NMC obtained at par in between Co 06027 (116.83) and Co 06010 (112.99). The NMC increased significantly due to application of fertilizer levels. Significantly higher NMC (110.75) recorded with 125% RDF NPK than 75% RDF NPK (104.27). The NMC values recorded with 100 and 125% RDF NPK was at par.

Cane yield (t/ha): The cane yield was influenced significantly due to different varieties. However, among varieties Co 06027 recorded significantly higher cane yield of (115.22 t/ha) than Co 06015 (100.68 t/ha) and Co JN 86-600 (100.99 t/ha). but the cane yield obtained at par in between Co 06027 (115.22 t/ha) and Co 06010 (111.41 t/ha). Application of fertilizer doses increased cane yield with the increase in fertilizer levels. The cane yield was significantly higher with 125% RDF NPK (109.28 t/ha) than 75% RDF NPK (103.21 t/ha). The cane yield recorded with 100 and 125% RDF NPK was at par.

Summary: Results revealed that among the mid late genotypes Co 06027 gave significantly higher cane yield of (115.22 t/ha) than Co 06015 (100.68 t/ha), and Co JN 86-600 (100.99 t/ha), but the cane yield obtained at par in between Co 06027 (115.22 t/ha) and Co 06010 (111.41 t/ha). Application of 125 % RDF NPK gave significantly higher cane yield (109.28 t/ha) than 75 % RDF NPK (103.21 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF NPK.

12. SANKESHWAR

Field experiment was conducted with six sugarcane genotypes (Co 7008, Co 86032, CoSNK 07103, CoSNK 07131, Co 7015andCo 94012) planted on 12.12.2013 under varying nutrient doses as described in the technical programme. The soil contained 0.60 % organic carbon, 164 kg available N, 16.3 kg P_2O_5 and 333 kg/ha K_2O with pH 6.7 and Ec 0.23 dS/m. Findings elucidate that cane height differed significantly among the varieties for different fertilizer doses. The higher cane height was recorded in Co 94012 (3.004) with 100% RDF application followed by 125% RDF application (2.822). The lowest cane height was recorded in CoSNK 07131 (1.848).Cane girth did not differ significantly among the varieties

for higher fertilizer dose of 125%. However, there was response for 100% and 75% RDF. The highest cane girth was recorded in Co 7008 (3.123) at 125% RDF and the lowest was recorded in Co 7015 (2.723).

Number of millable canes per hectare at 100% and 125% RDF was non-significant among the varieties. However, there was significantly difference in 75% RDF applied plots. The highest NMC was recorded in CoSNK 07103 (127623) and the lowest was recorded in Co 94012 (86111).Cane yield was not influenced by varieties at higher doses of fertilizer application (100% & 125%). However, there were significant differences in yield levels among the varieties at lower doses of fertilizer. Significantly the higher cane yield was recorded in Co 7015 (217.99) at 75% RDF application and the lowest yield was recorded in Co 94012 (168.17).

Brix percent was highest in Co 94012 (24.84) with 100% RDF and the lowest was recorded in Co 86032 (22.44) with 100% RDF.Pol percent was highest in Co 94012 with 100 % & 125% RDF (23.97) and the lowest was recorded in CoSNK 07103 (2037) with 100% RDF.Juice purity (%) was highest in Co 7015 (96.73) with 125% RDF and the lowest was recorded in Co SNK 07103 (89.03) with 100% RDF application.CCS yield did not differ significantly at 100 % & 125% RDF. The significant difference in CCS yiled with 75% RDF was recorded with Co 7015 (34.29) as highest and with Co 86032 (23.59) as lowest.

Table AS 42.12.1: Growth attributes of sugarcane genotypes as influenced by nutrient doses.

Varieties/RDF	Cane height (m)			Cane girth (cm)			Number of internodes		
	75%	100%	125%	75%	100%	125%	75%	100%	125%
Co 7008	2.254	2.453	2.240	3.095	3.083	3.123	24.107	24.64	23.55
Co 86032	2.477	2.439	2.398	2.884	2.865	2.820	24.530	24.99	23.87
Co SNK 07103	2.239	2.362	2.188	2.871	2.838	2.817	23.773	25.00	23.11
Co SNK 07131	1.848	2.187	2.111	2.842	3.033	2.984	22.543	22.55	23.09
Co 7015	2.648	2.293	2.525	3.058	2.723	2.886	25.333	22.55	22.44
Co94012	2.764	3.004	2.822	2.977	3.017	2.914	24.110	22.65	23.33
CV	3.21	2.62	1.43	3.57	5.19	6.50	6.93	7.92	8.51
S.EM+	0.04	0.04	0.02	0.06	0.09	0.11	0.96	1.09	1.14
CD (5%)	0.14	0.12	0.06	0.19	0.28	NS	NS	NS	NS

Table AS 42.12.2: Yield and yield attributes.

Varieties/RDF	Single Cane weight (Kg)			NMC/ha			Cane yield (t/ha)		
	75%	100%	125%	75%	100%	125%	75%	100%	125%
Co 7008	1.61	1.74	1.73	109877	107407	88426	176.77	186.36	153.20
Co 86032	1.57	1.75	1.53	115278	106481	103241	181.29	185.97	157.77
Co SNK 07103	1.61	1.70	1.66	127623	97840	103549	205.33	166.87	171.83
Co SNK 07131	1.60	1.73	1.72	112037	91512	101543	179.81	158.40	174.45
Co 7015	1.93	1.36	1.70	113889	110185	103086	217.99	152.06	174.68
Co 94012	1.97	2.12	2.06	86420	90741	86111	168.17	188.98	173.08
CV	9.24	11.18	8.40	6.03	17.81	22.17	10.02	19.43	21.60
S.EM+	0.09	0.11	0.08	3859.77	10352.51	12501.11	10.89	19.42	20.89
CD (5%)	0.29	0.35	0.26	12162.39	NS	NS	34.3	NS	NS

Table AS 42.12.4: Quality attributes of sugarcane genotypes

Varieties/RDF	PURITY %			CCS %			CCS Yield t/ha		
	75%	100%	125%	75%	100%	125%	75%	100%	125%
Co 7008	95.08	92.64	92.74	15.43	14.91	15.59	27.18	27.77	23.78
Co 86032	92.34	92.73	93.42	14.73	14.71	14.98	26.72	27.36	23.59
Co SNK 07103	90.83	89.08	91.88	14.90	14.14	15.15	30.64	23.64	25.68
Co SNK 07131	93.43	92.63	92.32	15.45	15.12	15.29	27.81	24.01	26.63
Co 7015	92.72	92.30	96.73	15.68	15.65	17.04	34.29	23.62	29.80
Co 94012	95.06	96.54	96.66	16.75	17.25	17.25	28.16	32.60	29.89
CV	1.34	2.71	2.71	3.62	4.06	4.16	10.39	18.77	19.91
S.EM+	0.72	1.45	1.49	0.32	0.36	0.38	1.75	2.87	3.05
CD (5%)	2.27	4.57	4.71	1.02	1.13	1.2	5.5	NS	NS

13. NAVSARI

EARLY GROUP

Genotypes, Co 08001, CoVSI 08121, CoN 09071 and CoN 10071 were planted on 27.01.2014 to evaluate their performance under varying nutrient doses keeping 250,125 and 125 kg/ha of N, P and K as niormal. The soil of the experimental field contained 0.57 organic carbon, available N 315 kg/ha, available P_2O_5 49.78 kg/ha and available K_2O362 kg/ha.

The results asrecorded in table AS 42.14.1& 2 exhibit that germination % at 45 DAP were recorded significantly highest with variety V_2 (CoVSI 08121) over other varieties. Fertilizer level F_3 (125 % RDN) counted highest germination (48.73) over F_1 and at par with F_2 (100 % RDN). Number of tillers were not significantly influenced due to different varieties at 90 DAP. At 120 and 180 DAP, variety V_4 (CoN 10071) recorded significantly higher no. of tillers over V_1 and V_3 and at par with variety V_2 (CoVSI 08121). The fertilizer level F_3 (125 % RDN) and F_2 (100 % RDN)were equally effective in counting higher tillers and remained at par with each other over F_1. Variety V_4 and V_3 recorded significantly highest NMC (115.97 &111.81 ha^{-1}) respectively over V_1 and V_2. The fertilizer level F_3 and F_2 recorded highest NMC ha^{-1} (111.88 & 109.38 ha^{-1}) and remained at par with each other.

Significantly highest cane (133.26 t ha^{-1}) yield was noticed with variety V_4 but remained at par with V_3 over V_1 and V_2. CCS yield was not influenced significantly due to varieties. The fertilizer level F_3 recorded significantly higher cane and CCS (130.47 &16.96 t ha^{-1}) yields over F_1 but at par with F_2 regarding cane yield.

Among various quality parameters, pol % juice, pol % cane and CCS % were recorded highest with V_2 and V_1 and remained at par with each other; purity % was highest with V_3 while fibre % was not influenced significantly due to varieties. Fertilizer levels did not show any significant effect on quality parameters. Interaction between variety and fertilizer level was failed to show significant results for above all parameters.

Table AS 42.13.1: Growth, yield parameters, cane and CCS yields of sugarcane as influenced by sugarcane varieties and various fertilizer levels

Treatment	Germination % at 45 DAP	No. of tillers at 180 DAP 000/ha	NMC 000/ha at harvest	Cane yield (t/ha)	CCS yield (t/ha)
Variety					
V_1-Co 08001	44.18	112.78	96.53	116.52	16.06
V_2- CoVSI 08121	54.72	119.72	100.21	121.04	16.32
V_3- CoN 09071	46.60	116.04	111.81	127.99	15.74
V_4-CoN 10071	42.91	126.04	115.97	133.26	15.54
S.Em.±	1.67	3.25	3.13	3.06	0.43
C.D. at 5%	4.89	9.53	9.17	8.97	NS
Fertilizer levels					
F_1-75 % of RDN	44.55	110.47	97.14	119.32	15.09
F_2-100 % of RDN	48.4	122.45	109.38	124.32	15.84
F_3-125 % RDN	48.73	123.02	111.88	130.47	16.98
S. Em. ±	1.44	2.81	3.61	3.06	0.37
C.D. at 5%	4.23	8.25	10.59	8.97	1.09
C.V. %	10.61	8.21	10.42	7.36	8.06
Interaction	NS	NS	NS	NS	NS

MID-LATE GROUP

Mid-late genotypes CoSnk 08101, Co 08009, CoN 11073 and CoN 13073 were evaluated in the group by planting the experiment on 27.01.2014. The results as given in table AS 42.14.2 reveal that germination % at 45 DAP was not significantly influenced due to different varieties and fertilizer levels. Number of tillers were recorded significantly highest with variety V_4 (CoN 13073) over V_1 (CoSnk 08101) and V_2 (Co 08009) and at par with V_3 (CoN 11073) & remained at par with each other at all the three growth stages. The fertilizer level F_3 (125 % RDN) recorded significantly higher tillers over F_1& remained at par with F_2 (100 % RDN) at all the three growth stages.

Significantly highest NMC (113.96 ha^{-1}) and cane (127.78 t ha^{-1}) and yield were recorded with V_4 (CoN 13073) over V_1 and V_2& remained at par with V_3. CCS yield was not influenced significantly due to varieties. The fertilizer level F_3 (125 % RDN) failed to reach the level of significance on NMC and CCS yield while cane (125.68 t ha^{-1}) yield recorded significantly highest with F_2 over F_1 and remained at par with F_3.

Almost all the quality parameters were not significantly influenced due to varieties except pol % juice and pol % cane which recorded highest with variety V_2 (Co 08009) over other varieties. The various fertilizer levels failed to show significant effect on quality.

Interaction between various varieties & fertilizer levels was observed non-significant for all these parameters.

Table AS 42.13.2: Growth, yield parameters, cane and CCS yield of sugarcane as influenced by sugarcane varieties and various fertilizers levels

Treatment	Germination % at 45 DAP	No. of tillers at 180 DAP 000/ha	NMC 000/ha at harvest	Cane yield (t/ha)	CCS yield (t/ha)
Variety					
V_1-CoSnk 08101	47.16	135.63	96.53	114.58	14.30
V_2- Co 08009	53.14	138.33	98.89	120.14	15.45
V_3- CoN 11073	56.74	146.04	111.74	123.26	15.26
V_4-CoN 13073	58.32	151.39	113.96	127.78	16.00
S.Em.±	1.87	3.94	3.55	2.45	0.46
C.D. at 5%	NS	11.55	10.46	7.20	NS
Fertilizer levels					
F_1-75 % of RDN	53.19	134.48	100.52	117.86	14.72
F_2-100 % of RDN	54.45	148.59	109.69	125.68	15.91
F_3-125 % RDN	53.87	145.47	105.63	120.78	15.13
S. Em. ±	1.62	3.41	3.09	2.13	0.40
C.D. at 5%	NS	10.00	NS	6.23	NS
C.V. %	10.44	8.27	10.17	6.06	9.11
Interaction	NS	NS	NS	NS	NS

14. THIRUVALLA

In a field experiment three genotypes, Co 0816, CoSnk 08101 and Co 07008 were evaluated at three nitrogen levels of 75, 100, and 125% of the recommended dose. (100% 0f the recommended dose = 165: 82.5: 82.5 Kg NPK/ha) in a soil having 0.80 % organic carbon, 291.13 kg available N, 15.42 kg available P_2O_5 and 222.67 kg exchangeable K_2O/ha. The crop was planted on 16.1.2014 and harvested on 5.1.2015.

Even though no considerable effect on germination resulting from the genotypes and nitrogen level was visible, a slight effect on tiller count was seen influenced by the genotypes where V_2 recorded higher value compared to others.

The treatment variations due to genotypes were significant for growth and yield parameters. Among the genotypes studied, the genotype V_2 recorded maximum values for cane length, cane weight, millable cane count and resulted in reasonably good yield which was significantly superior to others (79.31 t/ha) followed by V_3 with an yield of 75.58 t/ha. Brix and sugar yield also followed same trend with significantly superior yield for V_2 (10.40 t/ha).

The treatment variations due to N levels were also significant for growth and yield parameters. The growth and yield of the genotypes at 125% at the recommended dose of N was significantly superior to that at 100% (78.86 t/ha). Similarly sugar yield at 125% of recommended dose of N was significantly superior to that at 100% (10.17 t/ha). Interaction effect of the genotypes with N nutrition was not significant for the parameters under study.

There was no considerable variation in the fertility status of the soil before and after the conduct of the trial. Among the treatment combinations, the highest BC ratio of 1.38 was recorded by V_2 when 125% of the recommended dose of N was applied.

Table AS 42.14.1: Growth, juice quality and yield as influenced by varieties and nitrogen levels

Treatment	Germination (%)		Tiller count (000/ha)		Cane length (cm)	MCC (`000/ ha)	SMT Brix (%)	Cane yield (t/ha)	Sugar yield (t/ha)
	30 DAP	45 DAP	120 DAP	150 DAP					
V_1	50.57	54.20	76.08	68.21	217.48	65.34	19.8	71.86	9.34
V_2	56.12	61.08	85.42	76.44	231.69	76.86	20.2	79.39	10.40
V_3	52.64	56.76	80.61	72.40	220.56	70.09	19.6	75.58	9.03
CD (0.05)	**NS**	**NS**	**5.06***	**4.24***	**12.05***	**6.92***	**0.25***	**4.06***	**0.54***
F_1	54.15	58.84	81.14	72.14	220..62	67.62	19.8	72.06	9.22
F_2	55.06	59.44	83.27	74.12	225.00	69.05	20.0	74.36	9.56
F_3	56.10	60.38	83.96	76.00	238.10	75.99	20.6	78.86	10.17
CD (0.05)	**NS**	**NS**	**NS**	**NS**	**12.05***	**6.92***	**0.25***	**4.06***	**0.54***
V_1F_1	5.22	55.00	78.78	69.12	219.77	62.81	19.6	68.80	8.94
V_1F_2	50.91	56.01	79.64	70.25	211.80	66.70	19.5	72.60	9.44
V_1F_3	51.24	55.22	80.02	72.64	220.87	73.77	19.8	74.19	9.50
V_2F_1	55.95	59.94	84.58	76.91	229.10	74.90	20.4	77.13	9.84
V_2F_2	56.07	61.25	85.32	77.11	234.79	77.44	20.2	79.25	10.15
V_2F_3	56.94	62.24	86.18	79.02	231.11	80.04	20.4	81.92	10.57
V_3F_1	52.50	57.61	81.25	73.43	231.11	68.19	19.6	73.27	9.38
V_3F_2	52.70	59.84	81.56	72.75	228.33	69.00	19.8	74.35	9.71
V_3F_3	52.95	58.65	82.01	73.59	232.36	80.00	19.8	79.14	10.21
VxF CD (0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	NS

EAST COAST ZONE

15. ANAKAPALLE

PLANT CROP

Mid-late maturing genotypes 2004A104, 2007A177, 2007A126 and Co 7219 were tested under varying nutrient supply levels. The crop was planted on 23.03.2014.

Initial soil analysis was done. Soil of the experimental site was neutral in pH (7.122), normal in E.C(0.238dSm^{-1}) low in organic carbon (0.61%), low in available nitrogen (198 kg N /ha), medium in available phosphorus (47.9 kg/ha) and high in available potassium (313 kg / K_2O /ha).

Germination:

Germination per cent was recorded at 35 days after planting expressed in % and presented in table-1. Germination percentage did not vary significantly due to application of different doses of nitrogen fertilizers. Among the varieties 2007A126 recorded significantly higher germination percentage (77.2) followed by 2004A104 (69.4) than the check variety Co7219 (66.3). 2007A177 recorded significantly lower germination (60.8%).

Tiller Population at 150 DAP:

Tiller population at 150 days after planting varied significantly with mid late sugarcane genotype and levels of nitrogen. Among different new mid late sugarcane genotypes 2007A126 and 2004A104 recorded significantly higher number of tillers (Table-1). Application of nitrogen at 125% recommended dose registered significantly higher number of tillers (1,

42,664/ha) as compared to 75% (1,35,938/ha) and 100% (1,41,991/ha) recommended nitrogen.

Number of millable canes/ha:

Significant differences in number of millable canes at harvest were observed due to different sugarcane genotypes and levels of nitrogen nutrient (Table-1). Application of nitrogen at 125% recommended dose registered significantly higher number of millable canes (63,091/ha) than 100% (60,981/ha) recommended nitrogen. Significantly lowest number of millable canes were recorded with the application of 75% (59,244/ha) recommended dose. Among the new genotypes 2004A104 (64,156/ha) had higher number of millable canes than 2007A126(59,317) and 2007A177(52,291/ha). However the check variety Co7219 recorded 52,291 millable canes /ha.

Juice sucrose (%):

Cane juices were analyzed for sucrose content at harvest (Table – 1). Percent juice sucrose did not vary significantly both with sugarcane genotypes and application of different nitrogen doses.

Commercial cane sugar(%):

Commercial cane sugar percent was calculated treatment wise. Commercial cane sugar percent did not vary with application of different doses of nitrogen fertilizers and also with different early sugarcane genotypes. However among genotypes, the check variety Co7219 recorded higher CCS percentage (12.6) as compared to new genotypes under study.

Cane yield (t/ha):

Cane yield per plot was recorded at harvest expressed in t/ha and presented in Table 1. Cane yield of new mid late sugarcane genotypes under irrigated conditions varied significantly due to different N levels. Application of nitrogen at 125% recommended dose registered significantly higher cane yield of 60.5 t/ha than lower levels of 75% (54.1 t/ha) and 100% (56.2 t/ha) recommended nitrogen. Among the new mid late genotypes under test, 2004A104 (59.9 t/ha) proved significantly superior over 2007A126 (54.7 t/ha) and 2007A177 (53.3 t/ha) but was on par with the check variety Co 7219(59.4 t/ha).

Sugar yield (t/ha):

Sugar yield was computed treatment wise and data are presented in table – 1. Sugar yields followed the same trend as that of cane yield.

Summary:

Performance of new promising mid late sugarcane genotypes viz., 2004A104, 2007A177 and 2007A16 along with check Co 7219 was studied under graded levels of Nitrogen under irrigated conditions at Regional Agricultural Research Station, Anakapalle during 2014-15 season. The results showed that application of 'N' at 125% recommended dose registered significantly higher cane yield of 60.5 t/ha than lower levels of 75% (54.1 t/ha) and 100% (56.2 t/ha) recommended nitrogen. Among the three new mid late genotypes under test 2004A104 proved superior (59.9 t/ha) to 2007A126 (54.7 t/ha) and 2007A177 (53.3 t/ha) and on par with the check variety Co 7219(59.4 t/ha). Due to heavy rainfall (231.0 mm) received during the month of October due to *hud hud* cyclone, when crop was in grand growth phase the experimental field was lodged and hence the yields obtained were very low.

Table AS 42.15.1: Yield and quality of promising sugarcane genotypes (mid late group-plant crop) as influenced by different levels of nitrogen under irrigated conditions

Treatment	Germination (%)	Tiller population/ha at 150DAP	NMC/ha	Cane yield (t/ha)	Juice sucrose (%)	CCS (%)	Sugar yield (t/ha)
Varieties							
2004A104	69.4	1,45,660	64,156	59.9	17.7	12.5	7.5
2007A177	60.8	1,14,439	52,291	53.3	17.6	12.4	6.5
2007A126	77.2	1,46,267	59,317	54.7	17.1	12.2	6.7
Co7219	66.3	1,54,427	63,657	59.4	17.7	12.6	7.5
SEm +	0.7	738	621	0.88	-	-	-
C.D (0.05)	2.0	2165	1850	2.6	NS	NS	NS
N levels (Rec.dose-112 Kg N/ha)							
N1- 75% RDN	68.4	1,35,938	59,244	54.1	17.4	12.3	6.7
N2-100% RDN	68.7	1,41,991	60,981	56.2	17.1	12.1	6.8
N3-125% RDN	68.2	1,42,664	63,091	60.5	17.8	12.8	7.7
SEm +	0.6	639	590	0.76	-	-	-
C.D (0.05)	1.8	1875	1710	2.2	NS	NS	NS
Interaction (VxN)							
C.D (0.05)	NS	NS	NS	NS	NS	NS	
C.V %	2.8	2.9	3.1	4.9	5.5	7.2	

RATOON CROP

Initial soil analysis was done. Soil was neutral in pH (7.46), normal in E.C(0.18 dSm^{-1}) low in organic carbon (0.56%), low in available nitrogen (241 kg N /ha), medium in available phosphorus (66.5 kg/ha), high in available potassium (242 kg / K_2O /ha).

Shoot population at 150 DAI:

Shoot population at 150 DAR of different new early sugarcane genotypes varied significantly due to different nitrogen doses. Application of nitrogen fertilizer at 125% recommended dose to early sugarcane genotypes significantly increased the shoot population (90,625/ha) as compared to 75% recommended dose of nitrogen fertilizer (78,935/ha) and 100% recommended dose of nitrogen fertilizer (50,000/ha). Among different new early sugarcane genotypes 2004A55 recorded significantly higher shoot population of 94,965 /ha as compared to 2001A63 (87,674/ha) and the check variety 93A145 (83,234/ha).

Number of millable canes/ha:

Number of millable canes varied significantly due to different nitrogen doses (Table 2). Application of nitrogen fertilizer at 125% recommended dose to early sugarcane genotypes significantly increased the number of millable canes (50,994/ha) as compared to 75% recommended dose of nitrogen fertilizer (48,710/ha) and 100% recommended dose of nitrogen fertilizer (49,504 /ha). Among the genotypes 2004A55 recorded significantly higher number of millable canes (52,456/ha) than 2001 A63 (50,000/ha) and check variety 93A145 (48,156/ha).

Juice Sucrose (%):

Significant differences in juice sucrose (%) was not observed either with genotypes or of nitrogen doses.

Commercial cane sugar per cent:

Commercial cane sugar percent was calculated treatment wise. Commercial cane sugar percent did not varied with the levels of nitrogen fertilizer and also with different early sugarcane genotypes.

Cane yield (t/ha):

Cane yield was recorded at harvest and the data are presented in table-2. Cane yield of early maturing sugarcane genotypes did not varied significantly due to different levels of nitrogen. As the crop completely lodged and subjected to water logging for one month due to **Hud-hud** cyclone occurred during the month of October, 2014 which coincided with maturity stage of the crop, cane yield in different treatmental plots were reduced drastically and significant variations were also not found.

Sugar yield:

Sugar yield was calculated based on CCS% and cane yield. Significant variations were not found in sugar yield both with the levels of nitrogen and genotypes.

Summary:

Performance of new promising early sugarcane genotypes viz., 2004A55 and 2001A63 along with check 93A145 was studied in ratoon under graded levels of Nitrogen under irrigated conditions at Regional Agricultural Research Station, Anakapalle during 2014-15 season. Significant variation in cane yield was not observed both, with genotypes and nitrogen doses as ratoon sugarcane crop was lodged and subjected to water logging for more than one month during huhud cyclone occurred on 12.10.2014. However application of 150 % RDN to new promising early sugarcane genotypes (2004A55 and 2001A63) registered higher cane yield of 51.5 t/ha. Both the new genotypes viz. 2004A55 (50.5 t/ha) and 2001A63 (49.3 t/ha) registered higher cane yield than the check variety 93A145 (48.6 t/ha).

Table AS 42.15.2: Yield and quality of promising early maturing sugarcane genotypes as Influenced by different levels of nitrogen in ratoon under irrigated Conditions during 2014-15

Treatment	Shoot population at 150 DAR	NMC/ha	*Cane yield (t/ha)	Juice sucrose (%)	CCS (%)	Sugar yield (t/ha)
Varieties						
2004A55	94,965	52,456	50.5	17.0	11.5	5.9
2001A63	87,674	50,000	49.3	16.7	11.2	5.8
93A145	83,234	48,156	48.6	16.8	11.3	5.7
SEm ±	494	285	-	-	-	-
C.D (0.05)	1447	835	NS	NS	NS	NS
N levels (Rec.dose-224 Kg N/ha for ratoon)						
75% RDN	78,935	48,710	48.0	16.7	11.4	5.7
100% RDN	85,532	49,504	48.5	16.7	11.2	5.6
125% RDN	90,625	50,994	49.6	17.0	11.2	5.9
SEm ±	570	329	-	-	-	-
C.D (0.05)	1671	964	NS	NS	NS	NS
Interaction (VxN)						
C.D (0.05)	NS	NS	NS	NS	NS	NS

Pooled data:

Pooled data mean (two plant crops) of number of millable canes (NMC), juice sucrose %, cane yield and sugar yield was calculated and presented in table-3. Three years studies (two plant crops and one ratoon)onperformance of new promising early sugarcane genotypes viz., 2004A55 and 2001A63 along with check 93A145 under graded levels of Nitrogen in irrigated conditions indicated that, among different sugarcane genotypes (early group) 2004A55 recorded higher number of millable canes (91,000/ha) and cane yield (90.5 t/ha). Three tested genotypes performed well and registered higher number of millable canes (89,900/ha), cane yield (91.0 t/ha) and sugar yield (10.5 t/ha) at 125% (140 Kg N/ha) recommended nitrogen. However highest mean juice sucrose per cent and sugar yield were recorded at 100%recommended dose of nitrogen dose.

Table AS 42.15.3: Pooled data of number of millable canes, juice sucrose %, cane yield and sugar yield of new early promising sugarcane genotypes as influenced by different levels of nitrogen under irrigated conditions (2012-13 to 2014-15)

Treatments	**Number of millable Canes (000/ha)**			Mean of two plant crops	Juice sucrose %			Mean of two plant crops	Cane yield(t/ha)			Mean of two plant crops	**Sugar yield (t/ha)**			Mean of two plant crops
	2012-13 (plant)	**2013-14 (plant)**	**2014-15 Ratoon**		**2012-13**	**2013-14**	**2014-15 Ratoon**		**2012-13**	**2013-14**	**2014-15 Ratoon**		**2012-13**	**2013-14**	**2014-15 Ratoon**	
Varieties																
V1-2004A55	79.3	102.6	52,456	91.0	14.85	16.2	17.0	15.53	87.3	93.7	50.5	90.5	9.53	12.4	5.9	11.0
V2-2001A63	82.5	98.0	50,000	90.3	15.53	16.1	16.7	15.82	88.0	91.1	49.3	89.6	9.87	11.9	5.8	10.9
V3-93A145	78.9	95.9	48,156	87.4	16.06	16.4	16.8	16.23	82.9	88.6	48.6	85.8	9.58	12.1	5.7	11.04
S.Em+	0.99	0.713	285		0.33	-	-		1.09	1.24	-			-	-	
C.D. (P = 0.05)	2.93	2.092	835		0.95	NS	NS		3.22	3.7	NS			NS	NS	
Nitrogen Levels																
N1:75% of RDN (84 kg N/ha)	75.44	92.6	78,935	84.02	15.42	16.2	16.7	15.81	78.5	86.7	48.0	82.6	8.57	11.4	5.7	10.0
N2:100% of RDN (112 kg N/ha)	78.54	99.07	85,532	88.81	15.53	16.4	16.7	16.0	87.8	89.7	48.5	88.8	9.79	12.4	5.6	11.1
N3:125% of RDN (140 kg N/ha)	81.57	98.15	90,625	89.9	15.14	16.3	17.0	15.7	88.9	93.1	49.6	91.0	9.94	12.1	5.9	11.02
S.Em+	1153	824	570			-	-		1.27	1.44	-			-	-	
C.D. (P = 0.05)	3384	2416	1671		NS	NS	NS		3.72	4.2	NS					
Interaction(VXN)	NS	NS	NS		NS	NS	NS		NS	NS	NS					

16. CUDDLORE

The experiment was laid out during 2014 – 15 in randomized block design with three replications. Four AVT sugarcane genotypes viz., Co C 10 336, Co C 11 336, Co A 11 321 and Co A 11 323 were compared with the standard Co C 24. In addition, the effect of three levels of nitrogen fertilization (75, 100 and 125 per cent of recommended dose) was also studied.

The data documented on varied growth, yield and quality parameters for the respective cropping seasons are presented in Tables1 & 2. Among the entries, the clone CoC 11 336 significantly registered the maximum germination of 84.19 and 78.23 per cent respectively during spring and autumn season and it was comparable with the standard Co C 24. The levels of nitrogen application did not shown any significant results on germination.

The entry Co C 11 336 significantly registered maximum cane yield 138.5 and 133.2 t ha^{-1} respectively during spring and autumn season and it was comparable with the standard Co C 24 with a cane yield of 131.2 t ha^{-1} during spring season and 124.9 t ha^{-1} in autumn season. The clone Co A 11 321 recorded the lowest cane yield of 118.4 and 111.7 t ha^{-1} in

the respective cropping seasons. Regarding the juice quality, the sugarcane varietyCo 11 336 registered the highest commercial cane sugar (CCS) percent of 12.38 and 12.36 respectively in spring and autumn season, and it was on par with the standard Co C 24 in both the cropping season.

Among the levels of N applications, the prescription of 125 per cent of the recommended dose of N (375 kg ha^{-1}) significantly registered higher values of yield components, cane and sugar yield compared to 75 and 100 per cent of recommended dose of nitrogen.

Table AS 42.16.1: Performance of sugarcane genotypes under varied levels of N (Spring season) (2014-15)

Treatments	Germination (%)	Tillers ('000 ha^{-1})	Millable canes ('000 ha^{-1})	Individual cane weight (kg)	Cane yield (t ha^{-1})	CCS (%)	Sugar yield (t ha^{-1})
Genotypes							
CoC 10 336	80.43	198.17	119.51	1.40	129.8	12.32	15.99
CoC 11 336	84.19	221.97	128.82	1.48	138.5	12.38	17.15
Co A 11 321	78.85	173.80	115.05	1.31	118.4	12.08	14.30
Co A 11 323	79.69	182.23	110.20	1.28	121.2	12.14	14.71
Co C 24	82.28	185.89	125.45	1.41	131.2	12.21	16.02
CD (p=0.05)	3.90	5.21	4.23	0.05	6.80	0.43	0.78
N Levels							
75% RD N	74.26	179.22	108.50	1.20	102.1	12.38	12.64
100% RD N	77.01	185.51	114.16	1.39	115.4	12.41	14.32
125% RD N	80.00	189.72	124.72	1.45	136.8	12.85	17.58
CD (p=0.05)	NS	10.15	7.38	0.06	9.10	0.51	0.80

Table AS 42.16.2 : Performance of sugarcane genotypes under varied levels of N (Autumn season) (2014-15)

Treatments	Germination (%)	Tillers ('000 ha^{-1})	Millable canes ('000 ha^{-1})	Individual cane weight (kg)	Cane yield (t ha^{-1})	CCS (%)	Sugar yield (t ha^{-1})
Genotypes							
CoC 10 336	74.25	179.89	116.06	1.36	122.9	12.17	14.97
CoC 11 336	78.23	187.29	122.33	1.47	133.2	12.36	16.46
Co A 11 321	73.52	164.38	110.89	1.32	111.7	12.05	13.46
Co A 11 323	75.35	173.40	104.12	1.30	113.5	12.11	13.75
Co C 24	76.25	177.95	119.62	1.42	124.9	12.30	15.36
CD (p=0.05)	3.20	6.01	5.30	0.06	5.12	0.40	0.61
N Levels							
75% RD N	70.26	139.64	108.15	1.24	97.10	12.34	11.98
100% RD N	75.36	154.17	112.08	1.36	105.98	12.37	13.11
125% RD N	79.65	162.61	117.64	1.40	126.80	12.80	16.23
CD (p=0.05)	NS	8.35	5.21	0.08	7.80	0.44	0.78

Salient findings:

The genotype CoC 11 336 significantly registered the maximum millable cane, individual cane weight, cane yield and sugar yield in both spring and autumn season. Also in the juice quality, the clone CoC 11 336 registered the highest commercial cane sugar (CCS) per cent and was on par with the entry CoC 24. Prescription of 125 per cent of the recommended dose of nitrogen significantly registered higher values of yield components, cane and sugar yield compared to 75 and 100 per cent of recommended dose of nitrogen.

17. NAYAGARH

The experiment was laid out in factorial randomized block design with three genotypes from AVT namely CoC 07336, Co A 08324 and CoOr 8346 along with one standard check *i.e.* Co 6907 on red laterite soil of the experimental farm of Sugarcane Research Station, Nayagarh. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dsm^{-1}. Available N content was in lower range (155 kg/ha), but the soil was medium in available P (19.6 kg/ha) and (K 164 kg/ha) content. The genotype CoOr 8346 produced the highest average cane yield of 88.47 t/ha with application of 100 % RDN and was closely followed by Co A 08324 (86.50 t/ha) and Co 6907 (84.07 t/ha). All these genotypes were statistically superior to CoC 07336 (76.90 t/ha). Among the four genotypes tried in the said experiment CoC 07336 produced the lowest average cane (76.90 t/ha) and CCS (7.99 t/ha) yield.

Table AS 42.17.1: Performance of genotypes and nutrient doses as expressed through sugarcane growth and yield

Treatments	Germination % at 45 DAP	No of tillers (000/ha) at 90 DAP	No of tillers (000/ha) at 120 DAP	NMC (000/ha)	Cane yield (t/ha)	Juice Brix %	Juice Sucrose %	CCS %	CCS yield (t/ha)
Genotypes									
CoC 07336	50.74	76.97	74.43	72.61	76.90	18.11	15.32	10.37	7.99
CoA 08324	52.83	90.08	87.54	83.52	86.50	18.59	15.64	10.55	9.15
CoOr 8346	52.48	93.83	91.29	85.76	88.47	18.86	15.90	10.75	9.55
Co 6907	51.61	88.41	85.86	80.77	84.07	18.77	15.41	10.27	8.66
SEm ±	5.519	3.400	3.400	2.760	2.429	0.141	0.145	0.136	0.294
CD at 5 %	NS	9.972	9.972	8.096	7.124	0.413	0.425	NS	0.862
N levels									
75 %	54.52	91.40	88.856	83.87	86.80	18.68	15.83	10.73	9.36
100 %	51.29	92.29	89.750	85.07	87.86	18.80	15.62	10.47	9.21
125 %	49.94	78.27	75.733	73.05	77.29	18.27	15.25	10.25	7.93
SEm ±	4.780	2.945	2.966	2.391	2.104	0.122	0.126	0.188	0.255
CD at 5 %	14.018	8.636	8.636	7.011	6.170	0.357	0.368	NS	0.747

NORTH CENTRAL ZONE

18. PUSA

Early group:

Planting of experiment was done on 3rd February 2014. Soil of the experimental field contained 216 kg available N, 23 kg available P_2O_5 and 121 kg exchangeable K_2O/ha with pH 8.1.

Among early genotypes, BO 112 recorded significantly higher germination percentage (37.6 %) though it was on a par with CoP 111. Similarly, significantly higher plant population (181.7 thousand/ha), millable canes (125.9 thousand/ha) and cane yield

(95.9 t/ha) were recorded by the genotype BO 112 though it was on a par with CoP 081 in respect of millable canes and cane yield. Genotypes failed to exhibit significant influence on sucrose percent juice. The growth parameters such as plant populations and millable canes recorded marked increase up to 100% recommended dose of nitrogen, and were on a par with 125% RDN. Though significantly higher cane yield was noticed upto 125% RDF. Pol percent juice remained unaffected by level of nitrogen. Interaction effect on V X N was found to be non-significant.

MID-LATE GROUP:

Experiment was planted on 5th February 2014. The data indicated that mid-late genotype CoP 092 recorded significantly higher plant population (194.8 thousand/ha), millable canes (132.2 thousand/ha) and cane yield (103.0 t/ha) when compared with BO 155 and statistically similar to CoP 123. Sucrose % juice did not cross the level of significance. The application of different levels of nitrogen had significant impact on plant population, millable canes and cane yield while, the effect on germination and sucrose in juice were non-significant. The significantly higher plant population (204.3 thousand/ ha) was recorded with each incremental level of nitrogen upto 125% RDF. However, significantly higher millable canes (124.7 thousand/ha) and cane yields (94.2 t/ha) were noticed up to 100 % RDN, which were statistically similar to 125 % RDN.

Interaction effect were found to be non – significant.

Summary

From the results it may be summarized that sugarcane early genotypes CoP 112 and CoP 081 should be fertilized with 125% recommended dose of nitrogen for getting higher yield of sugarcane. The investigations showed that sugarcane mid-late genotype CoP 092 can be grown with 100 % recommended dose of nitrogen to get higher productivity under north Bihar conditions.

Table AS 42.18.1: Effect of early promising genotypes of sugarcane and levels of nitrogen on growth, yield and quality of sugarcane

Treatment	Germination (%)	Plant population ('000/ha)	NMC ('000/ha)	Cane yield (t/ha)	Pol (%) in juice
Early promising genotype					
CoP 111	37.5	133.1	105.0	72.2	16.78
CoP 112	37.6	181.7	125.9	95.9	17.51
CoP 081	31.0	157.0	118.4	88.4	16.92
SEm ±	1.60	7.99	4.79	3.70	0.22
CD (P = 0.05)	4.8	24.0	14.4	11.1	NS
Level of nitrogen (% RDN)					
75%	33.9	128.2	99.8	68.7	17.21
100%	35.6	160.1	119.5	87.1	17.10
125%	36.5	183.5	130.0	100.7	16.90
SEm ±	1.60	7.99	4.79	3.70	0.22
CD (P = 0.05)	NS	24.0	14.4	11.1	NS
CV (%)	13.6	15.3	12.4	13.0	3.95

Table AS 42.18.2: Effect of mid- late promising genotypes of sugarcane and levels of nitrogen on growth, yield and quality of sugarcane

Treatment	Germination (%)	Plant population ('000/ha)	NMC ('000/ha)	Cane yield (t/ha)	Pol in juice (%)
Midlate promising genotype					
CoP 123	33.1	170.6	124.6	92.3	16.76
CoP 092	35.0	194.8	132.2	103.0	16.85
BO 155	34.4	141.4	111.2	82.9	16.64
SEm ±	1.96	9.39	5.09	4.30	0.18
CD (P = 0.05)	NS	28.1	15.3	12.9	NS
Level of nitrogen (% RDN)					
75%	33.3	131.4	103.8	77.5	16.86
100%	34.4	171.3	124.7	94.2	16.77
125%	34.9	204.3	139.5	106.4	16.62
SEm ±	1.96	9.39	5.09	4.30	0.18
CD (P = 0.05)	NS	28.1	15.3	12.9	NS
CV (%)	17.3	16.7	12.5	13.9	3.3

19. SHEORAHI

The soil of experimental field was medium in organic carbon (0.41), low in available phosphorus (15.0 kg/ha) and potash (70.19 kg/ha) with pH 8.44. Experimental crop was planted on March, 14, 2014 and harvested on March, 25, 2015.

Experimental results showed that significantly higher cane yield was found in genotype CoSe 011453 (97.62 t/ha) than that of genotype CoSe 011451 (88.45 t/ha) and CoSe 011454 (84.17 t/ha). Application of 125 % recommended dose of N produced significantly higher cane yield than that of 75 % of recommended dose of N, but at par with 100 % recommended N (180 kg/ha).

Summary

Genotype CoSe 011453 produce significantly higher cane yield (97.62 t/ha) followed by genotype CoSe 011451 (88.45 t/ha) and CoSe 011454 (84.17 t/ha). Cane yield increased significantly upto 100 % recommended dose of N.

Table AS 42.19.1: Effect of treatments on germination, shoots, millable canes, cane yield and sucrose % (Plant cane)

Treatments	Germination(%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Sucrose (%)
(A) Genotypes					
V_1-CoSe 011451	39.77	185	156	88.45	16.64
V_2-CoSe 011453	44.60	198	160	97.62	16.68
V_3-CoSe 011454	38.62	179	143	84.17	17.04
SE±	1.17	3.03	5.11	2.81	0.27
CD 5%	2.48	6.43	10.83	5.95	NS
(B) Fertilizer levels					
N_1-75% of recommended dose of N	40.39	173	142	84.41	16.87
N_2-100% of recommended dose of N	39.74	192	155	90.62	16.84
N_3-125% of recommended dose of N	42.86	197	162	95.11	16.66
SE±	1.17	3.03	5.11	2.81	0.27
CD 5%	2.48	6.43	10.83	5.95	NS

NORTH EASTERN ZONE

20. BURALIKSON

Early group

Plant crop

The genotypes were planted on 22st March, 2014and harvested on 25th January, 2015. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93.

The data on 1st year trial on agronomic evaluation of four early maturing promising sugarcane genotypes under three fertilizers levels revealed that the check variety CoBln 9103 recorded the higher cane yield of 62.37 t/ha which is statistically at par with the yield recorded by the genotypes CoBln 14501(60.70 t/ha) and CoBln 14503 (59.27 t/ha), respectively but significantly superior than the yield recorded by CoBln 14502 (50.14 t/ha). However all the genotypes were statistically at par in terms of juice quality parameters such as CCS% and sucrose%.

Among the three fertilizer levels, application of 125%of the recommended dose of NPK recorded significantly the higher cane yield (65.82 t/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (50.83 t/ha) and 100% of the recommended dose of NPK (57.71 t/ha), respectively. Moreover, application of 125%of the recommended dose of NPK also improved the juice quality parameters than other two fertilizer doses.

Table AS 42.20.1: Effect of genotypes (early group) and fertilizer levels on performance of Sugarcane (Plant crop)

Treatment	Germ-ination (%)	No.of shoots (000/ha)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes								
CoBln 14501	31.34	51.36	53.96	2.76	2.58	19.51	60.70	12.49
CoBln14502	25.33	49.39	47.95	2.67	2.50	19.14	50.14	12.15
CoBln 14503	29.89	56.96	58.50	2.75	2.56	19.75	59.27	12.56
CoBln 9103 (check)	33.34	55.25	55.90	2.77	2.57	19.45	62.37	12.44
CD (0.05)	3.49	3.68	4.25	NS	NS	NS	5.60	NS
Fertility Levels								
F_1 (75% of RD of NPK)	28.53	46.90	47.90	2.63	2.48	18.73	50.83	11.73
F_2 (100% of RD of NPK)	30.39	53.21	53.95	2.74	2.56	19.70	57.71	12.60
F_3 (125% of RD NPK)	31.19	59.62	60.39	2.85	2.62	19.96	65.82	12.91
CD (0.05)	NS	3.19	3.68	0.07	0.06	0.45	4.85	0.29

Mid-late Group

The genotypes were planted on 21st March, 2014and harvested on 25th March, 2015. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93

The data on 1st year trial on agronomic evaluation of four mid-late maturing promising sugarcane genotypes under three fertilizers levels revealed that all the genotypes performed better than the check variety in terms of cane yield. The genotype CoBln 14505 recorded the higher cane yield (64.21 t/ha) which is statistically at par with the yield recorded by CoBln 14504 (60.50 t/ha) but significantly superior than the yield recorded by CoBln 14506 (45.65t/ha). However no significant differences were observed in terms of juice quality parameters among the four genotypes.

Among the three fertilizer levels, application of 125%of the recommended dose of NPK recorded significantly the higher cane yield (63.54t/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (44.61t/ha) and 100% of the recommended dose of NPK (53.54 t/ha), respectively.

Table AS 42.20.2: Effect of genotypes (Mid-late group) and fertilizer levels on performance of Sugarcane. (Plant crop)

Treatment	Germ-ination (%)	No.of shoots (000/ha)	NMC (000/ha)	Cane length (mm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes								
CoBln 14504	28.20	54.33	51.88	2.61	2.78	19.25	60.50	12.58
CoBln 14505	31.70	56.60	54.69	2.63	2.64	19.19	64.21	12.39
CoBln 14506	28.60	45.66	42.16	2.60	2.59	18.96	45.65	12.56
CoBln 94063	35.70	46.94	43.39	2.76	2.66	19.02	45.21	12.74
CD at 5%	3.61	7.38	6.94	NS	NS	NS	5.53	NS
Fertility Levels								
F_1 (75% of RD of NPK)	29.71	45.96	43.54	2.50	2.70	18.32	44.61	12.00
F_2 (100% of RD of NPK)	32.30	52.54	49.58	2.68	2.66	19.24	53.54	12.60
F_3 (125% of RD NPK)	31.16	61.65	58.47	2.77	2.65	19.76	63.54	13.11
CD at 5%	NS	6.38	6.01	0.15	NS	0.45	4.78	0.37

PROJECT NO. : AS 64

Title	:	**Response of sugarcane crop to different plant nutrients in varied agro-ecological situations**
Objective	:	To study differential response of sugarcane crop to different nutrients.
Year of start	:	2012-13 (with modified treatments)
Year of completion	:	2014-15
Locations	:	All participating centres.
Treatments	:	i) Control (No fertilizer) ii) N iii) NP iv) NPK v) NPK+S vi) NPK+Zn vii) NPK+Fe viii) NPK+Mn ix) NPK+S+Zn x) NPK+S+Zn+Fe xi) NPK+S+Zn+Fe+Mn xii) Soil test based fertilizer application. xiii) FYM@ 20t/ha.
Design	:	RBD
Replications	:	Three
Plot size	:	6 rows; 8m length.
Date of planting	:	Sub-tropical: February – March Tropical : December – January

Note S **:** 40/60 kg/ha elemental sulphur (subtropical/ tropical).
Zn **:** 25/50 kg/ha $ZnSO_4$/ha (subtropical/ tropical).
Fe **:** Foliar spray @ 1% $FeSO_4$ thrice at weekly interval during vegetative stage.
Mn **:** 5/10 kg $MnSO_4$/ha (subtropical/ tropical).
NPK **:** As per recommendations.

Observations to be recorded :

i) Germination count at 35 DAP.
ii) Tiller population at 90, 120 and 180 DAP.
iii) Plant height at 120 & 180 DAP.
iv) Juice sucrose at one month prior to harvest and harvest.
v) Number of millable canes, length and girth of the ca at harvest.
vi) Cane and sugar yield.
Vi) Soil analysis: Initial and final Soil O.C., Soil pH, EC, N,P,K, Fe, Mn, Zn, S.
vii) Analysis of FYM for chemical properties.

SUMMARY OF THE RESULTS FOR LAST YEAR (2013-14)

1. FARIDKOT

Cane yield with soil test based fertilizer application (190 kg N and 30 kg P_2O_5/ha) was the highest (123.2 t/ha) and was at par with additional application of Zn, Fe, Mn and their combination to recommended NPK i.e. T_7 to T_{11} and was significantly better than control (T_1), application of FYM @20 t/ha (T_{13}), Application of N (T_2), NP (T_3), NPK (T_4) and NPK+S (T_5).

2. KOTA

Application of NPK+ Zn +S (200+60+40+40+5 kg/ha) was found suitable for increasing cane yield and CCS yield, which was significantly superior to control, N, NP, NPK,FYM treatments, soil test based fertilizer application and NPK + Mn.

3. KAPURTHALA

Soil test based fertilizer application should be followed for attaining optimum cane yield. In the absence of fertility report of the field, one should only apply the nitrogenous fertilizer at recommended dose of 150 kg ha^{-1} to get the optimum yield.

4. LUCKNOW

Cane yield (t/ha) was influenced by various nutrient management treatments, however they were non-significant. Higher cane yield (57.06 t/ha) was recorded with treatment T9 (NPK + S + Zn) followed by the treatment T11 (NPK+S+Zn+Fe+Mn) with cane yield (51.31 t/ha) and T6 (NPK+Zn), cane yield (50.49 t/ha) as compared to other treatments. Lowest cane yield was recorded with control plot (41.96 t/ha).

5. PANTNAGAR

Highest cane yield 84.3 ton/ha was recorded in treatment T_9(NPK+S+Zn applied 120+6o+40+40+25 kg/ha). Almost similar cane yield 84.1 ton/ha was recorded in T_{10} (in which NPK+S+Zn along with Fe 1.0 %) spray was done thrice at vegetative growth stage at weekly interval. The cane yield was non-significant in T_9, T_{10} and T_{11}. Data revealed that higher S (available) was recorded in T_{11} (54.8 kg/ha) which was significantly higher over T_1, T_2, T_3, T_4 and T_{12}. Available Zn was highest in T_{10} (1.05 mg/kg) soil.

6. SHAHJAHANPUR

Application of NPK + S + Zn + Fe + Mn produced significantly higher cane yield (91.67 t/ha) than that of N, NP, NPK and control treatment. Plant nutrient did not influence CCS percent in cane.

7. UCHANI

The application of individual micronutrient (Fe, Mn and Zn) in combination NPK did not significantly increase cane yield over NPK. However, the combined application of these micro nutrients significantly increased cane yield over NPK alone. The application of N over control, NP over N alone, NPK over NP, and NPKS over NPK significantly increased cane yield.

8. SRIGANGANAGAR

The maximum cane yield of 98.38 t/ha was obtained with the combined application of sulphur, Zn, Fe and Mn along with recommended NPK (T_{11}) which was closely followed by T_{10} (NPK, S, Zn, Fe), T_9 (NPK, S, Zn), T_6 (NPK, Zn) and T_7 (NPK, Fe). The combined application of micronutrients and NPK fertilizers significantly increased over T_2 (N) and T_3 (NP) but at par with the rest of the treatments.

PENINSULAR ZONE

9. KOLHAPUR

The data pertaining to cane and CCS yield indicated that different treatments affected the cane and CCS yield significantly. The treatment T_{11} (N: P_2O_5:K_2O+S+Zn+Fe+Mn) recorded significantly higher cane yield (120.83 t ha^{-1}) and CCS yield (17.84 t ha^{-1}).

10. PADEGAON

Application of NPK + Zn + S+ Fe+ Mn to sugarcane recorded significantly higher yields of cane and commercial cane sugar and it is comparable with application of fertilizers based on soil test.

11. PUNE

The effect of differential response of sugarcane crop to different nutrients on yield and quality of pre-seasonal sugarcane was studied in medium black soil. There was no individual response observed to S, Zn and Fe nutrients, however, RDF along with S+ Zn+ Fe combination gave maximum cane yield of 137.29 t ha^{-1} followed by 136.47 t ha^{-1} in RDF with S+Zn+Fe+Mn combination and 136.00 t ha^{-1} RDF with S+ Zn which were found at par and significant over only RDF (124.41 t ha^{-1}). It reveals that application of RDF (400:170:170) along with sulphur @ 60 kg/ha and ZnSO4@ 20 kg/ha increased cane yield by 9.31% cane yield.

The effect of differential response of sugarcane crop to different nutrients on yield and quality of sugarcane ratoon crop was studied the results showed similar insignificant results to individual sulphur, Zn, Fe and Mn nutrients. However, cane yield responses to RDF with S+Zn+Fe combination gave maximum cane yield of 118.48 t ha^{-1} which was significant over RDF (104.92 t ha^{-1}).

12. POWARKHEDA

The cane yield and yield attributes increased significantly due to application of major plant nutrients viz. N, NP and NPK than control (without fertilizers). Application of micronutrients with NPK although showed beneficial effects on crop growth and yield of the crop but increase in cane yield did not differ significantly.

13. SANKESHWAR

Application of balanced recommended fertilizers (RDF NPK 250; 75; 190; kg/ ha) along with Sulphur 60 kg /ha+ Zinc 50kg /ha + Ferrous12.5 kg /ha will give higher cane yield and CCS yield.

14. NAVSARI

There was no significant difference was observed due to various nutrients on soil pH, OC % and available nitrogen. Lowest EC was noticed with T_{10} and was at par with T_6 and T_{11}. Available P_2O_5 was observed significantly highest in T_3; K_2O with T_6; S with T_{10}; Fe with T_7; Mn with T_{13} and Zn with T_{10} over control plot.

15. THIRUVALLA

It can be concluded that for obtaining higher cane and sugar yield ,fertilizer application as per soil test based recommendations and recommended dose of NPK+Zn (50 kg $ZnSO_4$ /ha) were found to be the best .

EAST COAST ZONE

16. ANAKAPALLE

The results of the study indicated that, application of N,P and K along with micronutrients on soil test basis (91.6 t/ha) registered significantly higher cane yield as compared to application of N alone (80.7 t/ha) or N and P (82.0 t/ha) or application of

FYM @ 20 t/ha (73.3 t/ha), but found on par with application of N, P, K + S + Zn + Fe +Mn (91.0 t/ha) or NPK +S+Zn (90.7 t/ha) or N,P,K + Fe (90.5 t/ha) or N, P, K + S + Zn + Fe (90.3 t/ha) or NPK + Mn (89.7 t/ha) or NPK + Zn (89.1 t/ha) or N, P, K + S (87.5 t/ha) or N,P and K (87.2 t/ha). No fertilizer applied plot registered significantly lower cane yield of 55.0 t/ha.

17. CUDDALORE

The treatment (T_{11}) NPK + S + Zn + Fe + Mn registered significantly higher growth and yield parameters and it was comparable with the treatment T_{10} and T_{12}.

18. NAYAGARH

Application of soil test based fertilizer dose *i.e*.315:100:60 kg N: P_2O_5:K_2O + 60 kg elemental S/haresulted in higher number of tillers at different growth stages of sugarcane genotype "Sabita" leading to higher cane (85.65 t/ha) and CCS yield (8.84 t/ha).

NORTH CENTRAL ZONE

19. PUSA

The application of fertilizers on soil test basis i.e. (200kg N, 100kg P, 100 kg K, 25 kg $ZnSO_4$& 40 kg S) was found suitable for maintaining soil fertility, enhancing yield and quality of cane in calcareous soil of Bihar.

20. SHEORAHI

Application of S, Zn and Mn along with N P K (T11) gave significantly higher cane yield than other treatments except T9 and T10 treatments. Sucrose was not effected significantly with different treatments.

NORTH EASTERN ZONE

21. BURALIKSON

The maximum cane yield (98.6 t/ha) was obtained when S, Zn, Fe, Mn was applied along with the recommended dose of fertilizer (T_{11}) which is statistically at par with the soil test based fertilizer application (97.6 t/ha).

Centres allotted : All the participating centres
Centres Reported : 21

A. **N.C.Zone** : 8, All allotted centres.
B. **Peninsular Zone** : 7, All but Coimbatore and Akola
C. **E.C. Zone** : 3, Anakapalle, Nayagarh and Cuddalore.
D. **N.C.Zone** : 2, Pusa and Seorahi.
E. **N.E.Zone** : 1, Buralikson.

CURRENT YEAR (2014-15) REPORT

NORTH WEST ZONE

1. FARIDKOT

The experiment was planted on 22.02.2014 using sugarcane variety CoH 119. Initial Soil Status was determined to be pH: 9.2, EC: 0.18 dsm-1, OC= 0.39 % (low), P =5.0 kg/acre, K= 302 kg/acre, S= ppm, Zn= 1.33 ppm, Fe=2.25 ppm, Mn=5.8 ppm. Cane yield with soil test based fertilizer application was the highest (134.9 t/ha) and was at par with all treatments except control (T_1), application of only N (T_2), application of NP (T_3) and application of FYM @20 t/ha (T_{13}). Same is the case with number of millable canes and single cane weight.

On the basis of three year data it can be concluded thatcane yield with soil test based fertilizer application and with additional application of Zn, Fe, Mn and their combination to recommended NPK i.e. T_7 to T_{11} (Table 3b) was better than control (T_1), application of FYM @20 t/ha (T_{13}), Application of N (T_2), NP (T_3), NPK (T_4) and NPK+S (T_5).

Table AS 64.1.1: Growth, yield and quality of sugarcane during 2014-15 under various treatments

Treatments	Germination (%)	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)
T_1: No fertilizer	32.6	127.6	73.3	210	2.62	1183	84.7	14.97
T_2: N (150 kg/ha)	35.9	153.3	89.7	231	2.84	1520	107.3	14.84
T_3: NP	34.2	154.9	93.7	235	2.86	1598	115.5	14.79
T_4: NPK	32.8	157.6	92.9	241	3.07	1629	117.1	14.89
T_5: NPK +S	35.6	178.8	92.5	247	3.21	1746	119.6	14.90
T_6: NPK +Zn	36.6	168.2	91.3	246	3.00	1717	119.3	14.61
T_7: NPK +Fe	34.1	169.9	96.8	258	3.21	1771	119.6	14.81
T_8: NPK +Mn	32.2	167.1	94.3	267	3.03	1753	117.1	14.70
T_9: NPK +S +Zn	32.3	165.1	95.9	252	2.96	1745	118.5	14.92
T_{10}: NPK +S + Zn + Fe	33.5	163.2	97.2	261	2.83	1713	123.2	14.42
T_{11}: NPK +S + Zn + Fe + Mn	34.2	166.2	98.0	254	2.99	1745	130.9	14.68
T_{12}: Soil test based (190 kg N and 30 kg P_2O_5/ha)	34.5	169.3	100.6	267	3.12	1847	134.9	14.68
T_{13}: FYM 20 t/ha	35.1	157.8	89.9	248	2.84	1528	108.0	14.95
CD (5%)	NS	22.3	10.2	NS	NS	152	19.3	NS

Table AS 64.1.2: Yield of sugarcane during 2012-13, 2013-14 and 2014-15 under various treatments

Treatments	Cane yield (t/ha)			
	2012-13	2013-14	2014-15	Mean
T_1: No fertilizer	81.2	95.6	84.7	87.2
T_2: N (150 kg/ha)	103.8	106.2	107.3	105.8
T_3: NP	109.1	106.8	115.6	110.5
T_4: NPK	113.5	108.1	117.1	112.9
T_5: NPK +S	114.3	109.5	119.6	114.5
T_6: NPK +Zn	123.2	116.8	119.3	119.8
T_7: NPK +Fe	123.6	112.7	119.6	118.6
T_8: NPK +Mn	126.9	108.4	117.1	117.5
T_9: NPK +S +Zn	131.3	117.3	118.5	122.4
T_{10}: NPK +S + Zn + Fe	132.5	115.6	123.2	123.8
T_{11}: NPK +S + Zn + Fe + Mn	131.3	113.9	130.9	125.4
T_{12}: Soil test based (190 kg N and 30 kg P_2O_5/ha)	122.4	123.2	134.9	126.8
T_{13}: FYM 20 t/ha	107.1	101.3	108.0	105.5
CD (5%)	16.7	11.8	19.3	

2. KOTA

A field experiments were planted on 5th March, 2011, 10th March, 2012, 15th March, 2013, and 22.2.2014 to study the response of sugarcane to different nutrients. Sugarcane variety CoPK-05191 was planted at 75 cm row distance, keeping 3 budded 4 setts per meter row length. Fertilizer was applied as per treatment (phosphorus, potassium, sulphur, zinc, and manganese) along with ¼ doses of the nitrogen as basal. Remaining N was given in three splits within 120 days after planting. Cultural operations were followed as per recommendation as and when desired. Foliar spray of 1 % FeSO4 was done as per the treatment. Initial soil was medium in organic carbon (0.54), available nitrogen (362 kg/ha), phosphorus (23.50 kg/ha) and high in potassium (283 kg/ha), iron (13.24 ppm), manganese (20.78 ppm) and low in sulphur(9.60 ppm) and zinc(0.55 ppm) contents.

During 2011-12 results indicated that germination (%) was almost equal in all the treatments (varied from 34.4 to 41.5 %). The observation recorded on tiller count at 120 and 180 DAP reveals that significantly difference was observed under all treatment over control.The T7 treatment having high tiller count (167200 and 160000/ha) over absolute control (147700 and 134200 /ha) respectively. The highest cane length, cane girth and number of millable canes (225.9 cm, 9.8 cm & 126.8 000/ha) respectively were observed in T9 treatment combination and lowest was recorded in absolute control (134.2cm, 7.0 cm and 108 000/ha) which ultimately increased significantly cane yield with respect to T9 treatment combination over T1 treatment.

During 2012-13 sugarcane variety CoPK 05191 was planted. Germination percentage of sugarcane crop was recorded highest (49.2 %) in T9, which was significantly higher over rest of the treatments except T10 and T11 treatment at 35 DAP stage of the crop growth. Tiller population was also significantly higher in T9 which was superior over rest of the treatment at 80 and 120 DAP stage of the crop growth, except T10 and T11 at stages of crop growth. Lowest tiller population was recorded in control at 80 and 120 DAP crop growth stage. Cane yield was recorded highest (95.38 t/ha) in T9 treatment which was at par with treatment T5, T6, T7, T8, T10 and T11 and significantly higher than rest of the treatments. The higher cane yield in these treatments was due to higher cane length, cane girth and NMC/ha. CCS yield was highest in T9 (13.46 t/ha) which was significantly higher over T1, T2, T3, T4, T12 and T13 treatments and at par with rest of the treatments.

During 2013-14 germination percent (51.00) at 35 DAP and cane length (264.43 cm) at harvest was recorded highest in T10 which was significantly higher over rest of the treatments except T9 and T11.Tiller population at 90 (1, 63,530.00/ha) and 120 (1, 76,870.00/ha) DAP stage of crop growth was recorded maximum in treatment T9 which was significantly higher over remaining of the treatments and at par with T10 and T11. Cane girth, millable cane (1, 27,200.00/ha), cane yield (97.33 t/ha) and CCS (12.86 t/ha) were recorded significantly higher by application of NPK+ S+ Zn (T9) over T1,T2 , T3 and T4 except the rest of treatments. The higher cane yield was the cumulative effect of higher cane length, girth and NMC/ha which were higher in this treatment over the rest. CCS % was also highest (13.22) in T9 which was found significantly superior over control but at par with the rest of treatment which was due to higher juice sucrose percent in cane at harvest during 2013-14.Initial medium organic carbon content, available nitrogen and high potassium nutrients affected cane yield in treatment, where nutrients were applied alone (N or NP or NPK) as well as in combination of NPK with other nutrients like S, Zn,Fe and Mn. The highest available NPKS in soil was recorded in the treatment T9 (322, 25.15, 252 and 12.20 kg/ ha), respectively which was significantly higher over T1, T2 and T3 in nitrogen except rest, phosphorus in rest of treatments except T5 and T6, potassium in T1, T2, T3, T10 and T11 except rest and sulphur in T1, T2, T3, T7 and T8 except rest of the treatments. Available Zn,Fe and Mn were found highest in T6(0.62 mg/kg), T7 (20.40 mg/kg), and T6 (28.10mg/kg),

respectively treatment soil which was significantly higher over T1treatment except rest of the treatments. However, Zn value of the best treatment at par with T7 and T8, Fe value with T6 T3 and T8 and Mn value with T3. Non-significant variation in residual soil nutrient status might be the fact that all the treatments received same amount of NPK (AS 64.9).

During 2014-15, revealed that same treatment effects were also reported in respect of growth, yield attributes yield, quality and soil properties.

Summary:

Application of NPK+S+ Zn (200+60+40+40+5 kg/ha) was found suitable for increasing millable cane, cane yield and CCS which was significantly superior to control, N, NP, NPK,FYM treatments and NPK +Mn and at par with rest of the treatments.

Table AS 64.2.1: Effect of different plant nutrients of sugarcane with respect to yield attributing, yield and quality during 2014-15 at Kota

Treatment	Germination at 35 DAP (%)	Tillers (000/ha)		NMC (000/ha)	Cane yield (t/ha)	Sucrose (%)	CCS (t/ha)
		90 DAP	120 DAP				
T1 – Control (No fertilizer)	32.17	109.27	125.80	90.47	60.53	14.67	5.97
T2 – N	41.50	128.57	143.60	112.83	72.70	15.60	7.73
T3 – NP	42.17	135.17	151.33	116.30	75.47	16.04	8.25
T4 - NPK	42.70	136.90	151.80	116.67	81.50	16.80	9.41
T5 – NPK+S	43.23	137.90	154.37	119.73	85.63	17.01	9.99
T6 – NPK+Zn	44.20	146.67	153.87	117.03	84.57	16.80	9.74
T7 – NPK+Fe	42.53	145.53	154.37	120.80	83.87	15.53	8.91
T8 – NPK+Mn	42.73	137.73	148.73	116.57	78.97	15.60	8.42
T9 – NPK+S+Zn	50.17	160.70	175.33	130.40	93.90	17.38	11.15
T10 - NPK+S+Zn+Fe	48.07	157.47	174.50	124.60	89.67	16.18	9.91
T11 - NPK+S+Zn+Fe+Mn	47.73	157.40	170.40	121.40	90.30	16.29	10.05
T12 - Soil test based fertilizer application	45.23	155.87	167.00	123.87	87.73	16.63	10.00
T13- FYM @ 20 t/ha	40.00	146.03	155.67	110.40	75.53	16.08	8.26
SEm ±	2.14	5.23	5.10	6.43	5.11	0.49	0.58
CD (P=0.05)	6.49	15.86	15.46	19.51	15.49	1.48	1.76
CV	8.56	6.35	5.66	9.52	10.84	5.22	11.10

Table AS 64.2.2: Effect of different plant nutrients to cane girth, cane yield and quality in sugarcane in 4 consecutive years (2011-12, 2012-13, 2013-14 and 2014-15) at Kota

Treatment	Cane girth (cm)		Cane yield (t/ha)		CCS (t/ha)	
	2014-15	Pooled of 4 year	2014-15	Pooled of 4 year	2014-15	Pooled of 4 year
T1 – Control (No fertilizer)	6.47	6.87	60.53	59.32	5.97	6.48
T2 – N	7.70	8.17	72.70	73.42	7.73	8.64
T3 – NP	8.05	8.42	75.47	76.64	8.25	8.92
T4 - NPK	8.37	8.99	81.50	80.93	9.41	9.83
T5 – NPK+S	8.63	9.18	85.63	85.18	9.99	10.59
T6 – NPK+Zn	8.10	8.72	84.57	85.14	9.74	10.33
T7 – NPK+Fe	8.63	9.27	83.87	84.36	8.91	9.93
T8 – NPK+Mn	8.62	9.16	78.97	79.22	8.42	9.45
T9 – NPK+S+Zn	9.33	9.75	93.90	92.80	11.15	11.56
T10 - NPK+S+Zn+Fe	9.15	9.34	89.67	88.93	9.91	10.53
T11 - NPK+S+Zn+Fe+Mn	8.50	9.06	90.30	89.50	10.05	10.59
T12 - Soil test based fertilizer application	9.07	9.35	87.73	83.31	10.00	10.06
T13- FYM @ 20 t/ha	7.73	7.73	75.53	75.35	8.26	8.93
SEm ±	0.51	.36	5.11	4.44	0.58	0.69
CD (P=0.05)	1.55	1.00	15.49	12.45	1.76	1.94
CV	10.60	10.15	10.84	10.50	11.10	10.50

3. KAPURTHALA

The experiment was conducted on loamy sand soil, tested low in organic carbon (0.30 %), medium in available P (30.8 kg/ha) and low in available K (125 kg/ha). The data showed that the germination, internodes per cane and quality parameters were not significantly influenced by different treatments.

It was observed that whensulphur & Zinc was applied along with recommended Nitrogen, Phosphorus & potassium highest cane yield of 78.0 t ha^{-1} was obtained which showed a significant increase of 83 % over the control plot where no nutrient was applied and was at par with the treatments where S was applied along with NP&K (76.4 t $ha^{-1)}$ or in combination with N, P, K, and Fe/ Zn/ Mn .The soil test based fertilizer application also recorded statistically similar cane yield (75.2 t ha^{-1}) . The highest number of tillers were recorded with application of NPK +S+ Zn which were significantly higher to control and FYM only treatment and was closely followed by other treatments where S was applied with combinations of Zn ,Fe &Mn. Similar trend was observed in single cane weight. Millable canes were also significantly high in the treatments where S was applied along with NPK and other micro nutrients.Application of nitrogen alone sustained similar level of productivity as that of other treatments. Even with application of all the nutrients in T_{11} i.e. NPK + S + Zn + Fe + Mn, no additional yield could be obtained. Hence, the results indicate that addition of P,K and other micronutrients except S did not show any increase in cane yield whereas significant increase in cane yield was observed with addition of 40 kg sulpher /ha. So if the soil test report shows S defficiency the Punjab farmers can go for the application of 40 kg/ha S along with recommended dose of nitrogenous fertilizer i.e. 150 kg N ha^{-1}. Applying additional nutrients like P, K, Zn, Mn, and Fe failed to show any appreciable effect in the cane yield and

seemed to increase only the cost of production. Applying different nutrients in variable combinations could not influence the quality aspects in terms of Pol%.

Summary:

Soil test based fertilizer application should be followed to obtain an optimum cane yield. In the absence of soil test report, one should only apply the nitrogenous fertilizer at recommended dose of 150 kg ha^{-1} to get the optimum yield.

Table AS64.3.1 : Effect of application of different plant nutrients on productivity of sugarcane

Treatments		Germination %	Tiller Count (000/ha)	Cane length (cm)	Internodes / cane	Single Cane wt. (g)	Millable canes (000/ha)	Cane yield (t/ha)	Pol % juice
T_1	Control	38.0	109.0	146.0	28.3	563.7	85.2	42.6	19.33
T_2	N	39.3	140.5	161.0	29.3	748.7	105.7	64.1	19.99
T_3	NP	36.9	145.4	162.7	26.7	757.3	103.0	64.4	20.07
T_4	NPK	38.0	136.2	159.3	25.7	736.0	106.6	62.7	20.22
T_5	NPK + S	37.6	146.7	178.3	25.3	770.0	117.3	76.4	19.92
T_6	NPK + Zn	36.2	138.4	165.7	30.0	781.7	100.7	69.3	20.03
T_7	NPK + Fe	34.1	146.4	163.0	28.3	702.0	101.8	61.3	20.05
T_8	NPK + Mn	35.6	145.3	159.3	32.0	756.7	108.3	64.1	19.85
T_9	NPK + S + Zn	35.9	149.6	173.0	26.7	791.7	121.7	78.0	19.86
T_{10}	NPK + S + Zn + Fe	35.6	143.4	171.3	30.0	787.3	116.5	77.4	20.08
T_{11}	NPK + S + Zn + Fe + Mn	37.3	140.9	171.0	25.3	793.7	120.0	76.6	19.93
T_{12}	Soil Test Based fert. appln	38.3	143.0	166.3	28.0	771.3	117.6	75.2	19.90
T_{13}	FYM @ 20 t/ha	36.2	117.3	144.0	28.0	678.7	88.7	48.0	19.77
CD (0.05)		**NS**	**21.1**	**9.8**	**NS**	**66.4**	**10.2**	**9.6**	**NS**

4. LUCKNOW

Spring planted sugarcane in a sandy loam soil, neutral in reaction (pH 7.45), medium in available nitrogen (225.8 kg/ha)and potassium (191.00 kg K_2O/ha), low in organic carbon (0.40%) and phosphorus (17.24 kg P_2O_5/ha) contents responded significantly to application of NPK +S + Zn + Fe (150:60:60 + S 40+ $ZnSO_4$ 25+ $FeSO_4$ @ 10kg/ha). The treatment recorded significantly highest NMC (110476/ha) and cane yield (89.21 t/ha) over the control (72169 NMC and 63.07 t/ha, respectively), which was 34.6 % and 29.3 % higher and was closely followed by NPK + S + Zn with NMC (106561) and cane yield (83.81 t/ha).

TableAS 64.4.1 : Effect of plant nutrient combinations on growth, yield and juice quality of sugarcane

Treatment	Germ.	NMC	Cane yield	Juice quality parameters at harvest		
	(%)	('000/ha)	(t/ha)	Brix	Sucrose (%)	Purity (%)
T1 Control	51.4	72.169	63.07	18.89	16.23	85.95
T2 N	47.7	81.058	63.59	18.55	15.99	85.81
T3 NP	53.4	82.327	69.73	18.05	15.25	84.31
T4 NPK	59.0	91.852	71.22	17.69	14.99	84.76
T5 NPK + S	54.4	96.508	81.37	18.49	15.81	85.52
T6 NPK + Zn	56.3	105.185	82.75	17.33	14.45	83.33
T7 NPK + Fe	53.4	95.767	77.14	18.40	15.69	85.24
T8 NPK + Mn	56.3	96.084	75.02	18.33	15.61	85.12
T9 NPK +S+ Zn	57.7	106.561	83.81	18.04	15.33	84.85
T10 NPK + S+ Zn+ Fe	55.7	110.476	89.21	16.95	13.71	80.71
T11 NPK +SZnFeMn	58.5	100.423	82.01	17.13	14.07	82.12
T12 STF	55.5	98.518	79.68	18.85	16.11	85.41
T13 FYM 20 t/ha	67.5	101.058	80.74	18.04	15.20	84.26
CD (5%)	9.9	16.325	13.29	NS	NS	NS

DAP: Days after planting

5. PANTNAGAR

Three budded sugarcane setts of variety Co Pant 99214 were planted on March 22, 2014 in 10 cm deep furrows after treatment with carbendazim @ 0.25 % for 10 minutes to prevent the setts from fungal infection, if any. Fertilizer was applied as per treatment. Full dose of phosphorus, potassium, sulphur, zinc and manganese were applied along with half dose of N as basal. Remaining N (half) was applied within 90 days of sowing (before monsoon). Iron (Fe) was applied @ 1.0 % spray in weekly interval at vegetative stage (tillering). Total 5 (five) irrigations were given. Cultural operations were performed as per recommendation and need of the crop. Crop was harvested on March 23, 2015.

Data revealed that higher germination was recorded in the treatment T_6 - (NPK + Zn; 120:60:40:25 kg/ha) which was significantly higher over T_1- (control), T_2 - (N; 120 kg/ha), T_3 - (NP ; 120 : 60 kg/ha), T_{12} - (FYM @ 20 t/ha) and T_{13} - (soil test based fertilizer application ; 150:60:60 kg N, P_2O_5 and K_2O/ha). Cane yield was recorded highest in T_9 (NPK+S+Zn) which was found significantly higher over rest of the treatments except T_{10} - (NPK+S+Zn+Fe) and T_{11} - (NPK+S+Zn+Mn+Fe). Higher cane yield in these treatments was the cumulative effect of higher shoot population at 150 DAP, cane girth, cane length, cane weight and NMC. Sucrose % was also recorded higher in these treatments which was reflected in CCS (ton/ha) because CCS yield was also recorded highest in T_9 - (NPK+S+Zn) which was significantly higher over rest of the treatments except T_{10} and T_{11}.

Summary: Germination % at 45 DAP recorded highest in T_9 - (NPK+Zn+S) which was significantly higher over T_1, T_2, T_3, T_8, T_{12} and T_{13}. Cane yield was also recorded highest in T_9 which was significantly higher over rest of the treatments except T_{10} and T_{11}. Sucrose % and CCS yield were also higher in T_9, T_{10} and T_{11}. However sucrose % and CCS yield NMC and cane yield were improved in different treatments over control. FYM alone @ 20 ton/ha could not performed better. Higher cane yield in T_9, T_{10} and T_{11} was the result of higher

NMC, cane length and cane girth. Higher net returns were also calculated in T_9 followed by T_{10} and T_{11}.

Table AS64.5.1: Performance of sugarcane under different nutrient management regimes at Pantnagar

Treatments	Germination % at 45 DAP	Cane length (cm)	Cane weight (g)	NMC (000/ha)	Cane yield (t/ha)	CCS (t/ha)
T_1- Control (no fertilizer)	21.8	280.0	800.0	62.5	58.0	5.6
T_2- N (120 kg/ha.)	25.6	291.7	850.0	66.2	64.5	6.9
T_3- NP (120+60kg/ha.)	26.7	301.7	900.0	67.7	65.0	6.8
T_4-NPK (120+60+40kg/ha.)	33.7	335.7	966.7	71.0	69.0	6.9
T_5-NPK+S (120+60+40+40 kg/ha.)	32.7	340.7	933.3	76.4	75.7	8.5
T_6-NPK+Zn (120+60+40+25 kg/ha.)	36.8	351.7	1133.3	80.7	79.5	9.7
T_7-NPK+Fe (120+60+40 kg/ha + 1% spray thrice in weekly interval at vegetative stage)	33.8	355.3	1100.0	79.7	78.9	8.8
T_8-NPK+Mn (120+60+40+50 kg/ha.)	27.3	300.7	816.7	67.6	66.2	7.8
T_9-NPK+S+Zn (120+60+40+40+25kg/ha.)	37.3	341.7	1200.0	94.5	91.5	11.6
T_{10}-NPK+S+Zn+Fe (120+60+40+40+25 kg/ha+1% spray thrice in Weekly interval at vegetative stage)	36.1	335.3	1266.7	93.0	91.0	10.7
T_{11}-NPK+S+Zn+Mn+Fe (120+60+40+40+25+50 kg/ha+1% spray thrice in weekly interval at vegetative stage)	34.8	331.7	1166.7	92.2	90.5	10.8
T_{12}-FYM @ 20 t/ha.	29.7	286.7	883.3	61.2	60.8	6.7
T_{13}-Soil test based fertilizer application (150 kg N + 60 kg P_2O_5+ 60 kg K_2O)	28.2	307.0	916.7	71.1	70.7	8.2
SEm±	1.4	1.6	32.12	0.84	0.81	0.3
CD at 5 %	4.2	4.7	93.8	2.45	2.39	0.9

Pooled analysis: The experiment was conducted in Randomized block design in three replications having thirteen (13) treatments during 2012-13, 2013-14 and 2014-15. Pooled analysis shows that sugarcane yield was significantly higher in the treatmentT_9 - (NPK+S+Zn; 120+60+40+40+25 kg/ha) over rest of the treatments except T_{10} - (NPK+S+Zn+Fe; 120+60+40+40+25 kg/ha + 1% spray of Fe thrice in weekly interval at vegetative stage). However, all the treatments increased cane yield in various treatments over control (no fertilizer). FYM @ 20 ton/ha alone could not produce higher yield as compared to various nutritional combinations. FYM @ 20 ton/ha produced cane yield almost equivalent to 120 kg N/ha. Role of S, Zn and Fe application was also seen positive in combination with NPK (at recommended dose) which produced higher cane yield over soil test based fertilizer application (150 kg N + 60 kg P_2O_5 + 60 kg K_2O/ha). Higher cane yield was the result of higher NMC in different treatments and CCS yield was also affected by higher cane yield and quality of juice.

Summary: On the basis of pooled analysis of the experiment conducted three years in randomized block design it may be concluded that-

(i) Along with recommended dose of NPK (120: 60: 40 kg/ha), S (40 kg/ha) and Zn (25 kg/ha) application increased cane yield.
(ii) Beneficial effects of the 1 % Fe spray (thrice at weekly interval) at vegetative stage were recorded for the better cane yield and juice quality.
(iii) FYM (20 ton/ha) alone produced cane yield similar to 120 kg N/ha application.

Table AS 64.5.2: Effect of various nutrient management regimes on sugarcane yield over the years

Treatments	Cane yield (t/ha)				CCS (t/ha)			
	2012-13	2013-14	2014-15	Pooled	2012-13	2013-14	2014-15	Pooled
T_1- Control (no fertilizer)	67.0	60.4	58.0	61.8	7.2	7.8	5.6	6.9
T_2- N (120 kg/ha.)	84.4	67.5	64.5	72.1	9.6	7.4	6.9	7.8
T_3- NP (120+60kg/ha.)	88.5	67.9	65.0	73.9	11.0	9.2	6.8	9.0
T_4-NPK (120+60+40kg/ha.)	90.6	68.4	69.0	76.0	12.1	9.5	6.9	9.5
T_5-NPK+S (120+60+40+40 kg/ha.)	98.6	70.1	75.7	81.4	12.4	9.6	8.5	10.2
T_6-NPK+Zn (120+60+40+25 kg/ha.)	101.0	72.1	79.5	84.2	13.3	8.9	9.7	10.7
T_7-NPK+Fe (120+60+40 kg/ha + 1% spray thrice in weekly interval at vegetative stage)	100.3	71.7	78.9	83.6	13.0	9.5	8.8	10.4
T_8-NPK+Mn (120+60+40+50 kg/ha.)	90.8	67.2	66.1	75.1	12.1	9.6	7.8	9.8
T_9-NPK+S+Zn (120+60+40+40+25kg/ha.)	109.4	84.3	91.5	95.1	15.2	10.6	11.6	12.5
T_{10}-NPK+S+Zn+Fe (120+60+40+40+25 kg/ha+1% spray thrice in Weekly interval at vegetative stage)	106.5	84.2	91.0	93.9	14.9	9.6	10.7	11.7
T_{11}-NPK+S+Zn+Mn+Fe (120+60+40+40+25+50 kg/ha+1% spray thrice in weekly interval at vegetative stage)	102.0	75.4	90.5	89.2	13.6	10.3	10.9	11.6
T_{12}-FYM @ 20 t/ha.	80.0	73.4	60.8	71.4	8.4	11.1	6.7	8.7
T_{13}-Soil test based fertilizer application (150 kg N + 60 kg P_2O_5+ 60 kg K_2O)	92.3	67.9	71.8	77.4	11.1	9.2	8.2	9.5
SEm±	0.6	1.6	1.3	0.9	0.2	0.6	0.4	0.3
CD at 5 %	1.8	4.7	3.8	2.6	0.5	1.7	1.0	0.9

6. UCHANI

The experiment was conducted on clay loam in texture having pH 8.0, EC 0.44 dSm^{-1}, organic carbon 0.38%, available P 11.5 kg/ha and available K 133.0 kg/ha, available S (11.8 kg/ha), available Zn (0.9 ppm) and available Fe (3.8 ppm) and available Mn (7.5 ppm). Sugarcane variety CoH 119 (Mid group) was planted on March 28, 2014 at 75 cm spacing in randomized block design with three replications. Recommended doses of phosphorus (50 kg P_2O_5/ha), potash (50 kg K_2O/ha) and Sulphur (60 kg/ha) were applied at the time of planting whereas recommended dose of nitrogen (150 kg N/ha) was applied in three equal splits as top dressing (April, May & June). Zinc, Fe and Mn were applied thrice (April, May & June)

as foliar spray. The crop was irrigated at 8-10 days intervals during pre-monsoon period and 20 days interval during post monsoon period. The plant crop was harvested on February 26, 2015.

Treatment T_{11}- NPK+Zn+S+Fe+Mn gave highest number of millable canes (88.0 thousands/ha), cane yield (91.2 t/ha). The application of N over control, NP over N alone, NPK over NP, and NPKS over NPK significantly increased cane yield of plant crop (Table 3). The application of individual micronutrient (Fe, Mn and Zn) in combination NPK did not significantly increased cane yield over NPK alone. However, the combined application of these micro nutrients significantly increased the cane yield over NPK alone.

Summary: The application of individual micronutrient (Fe, Mn and Zn) in combination NPK did not significantly increase cane yield over NPK. However, the combined application of these micro nutrients significantly increased cane yield over NPK alone. The application of N over control, NP over N alone, NPK over NP, and NPKS over NPK significantly increased cane yield.

Table AS 64.6.1: Effect of different treatments on sugarcane growth and yield of plant crop

	NMC (000/ha)	Cane height (cm)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
T_1: Control (No fertilizer)	73.7	147.3	47.1	12.31	5.80
T_2: N	77.4	158.5	61.8	12.83	7.93
T_3: NP	78.0	167.0	71.9	13.01	9.35
T_4: NPK	84.1	175.1	80.4	13.45	10.81
T_5: NPK + S	76.3	180.3	84.7	13.53	11.46
T_6: NPK + Zn	84.6	176.4	81.4	13.37	10.88
T_7: NPK + Fe	85.0	168.5	81.3	13.24	10.76
T_8: NPK + Mn	85.3	168.0	80.6	13.27	10.70
T_9: NPK + S + Zn	84.0	184.3	87.0	14.14	12.30
T_{10}: NPK + S + Zn + Fe	87.6	190.1	90.6	14.69	13.31
T_{11}: NPK + S + Zn + Fe + Mn	88.0	196.0	91.2	14.49	13.21
T_{12}: Soil test based fertilizer application	78.5	168.0	80.5	13.41	10.80
CD at 5%	2.3	5.2	2.8	0.35	0.46

7. SRIGANGANAGAR

The field experiment was conducted to study the response of sugarcane crop to different plant nutrients with respect to yield and quality of sugarcane. The soil of the experimental field being sandy loam in texture, alkaline in reaction (8.3), tested low in organic carbon (0.33%), medium in available P_2O_5 (24 kg/ha) and high in available K_2O (362 kg/ha). Early maturing variety Co6617 was planted on 11.02.2014 at 75 cm spacing in randomized block design with three replications and harvested on 18.12.2014. The results are elucidated in the following table.

Table AS 64.7.1: Effect of treatments on growth, yield and quality of sugarcane crop at Sriganganagar during 2014-15

Treatments	Germination (%)	Tiller (000/ha)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Single cane wt (kg)	Cane yield (t/ha)	Sucrose (%) at harvest
T1- Control (No fertilizer)	40.26	125.29	79.24	1.84	2.21		60.39	
T2- N (150 kg/ha)	40.31	136.34	83.36	2.18	2.25	0.91	80.41	17.41
T3- NP (40 kg P_2O_5/ha)	40.72	144.26	89.41	2.26	2.27	0.99	85.62	16.74
T4- NPK (40 kg K_2O/ha)	41.02	153.78	92.56	2.31	2.33	1.13	90.38	17.21
T5- NPK + S (40 kg/ha)	41.20	159.24	93.63	2.33	2.34	1.19	93.46	17.42
T6- NPK + Zn (25 kg/ha)	41.61	160.43	94.72	2.36	2.36	1.21	94.53	17.34
T7- NPK + Fe (1% foliar)	41.16	154.29	92.52	2.28	2.35	1.22	94.14	17.51
T8- NPK + Mn (5 kg/ha)	40.10	152.51	91.62	2.25	2.31	1.19	89.29	17.30
T9- NPK + S + Zn	41.42	159.63	96.43	2.34	2.32	1.21	96.36	17.46
T10- NPK + S + Zn + Fe	41.74	160.49	97.24	2.35	2.33	1.28	100.16	17.57
T11- NPK + S + Zn + Fe + Mn	41.36	164.37	97.98	2.36	2.31	1.28	100.72	17.58
T12- Soil test based Fert.	41.79	160.29	95.43	2.32	2.31	1.14	91.54	17.40
T13- FYM @ 20 t/ha	40.09	131.48	83.42	1.98	2.29	0.96	77.71	17.34
CD at 5 %	NS	6.54	5.12	0.07	NS	0.14	5.29	0.19

PENINSULAR ZONE

8. NAVSARI

The experiment was carried out as per approved technical programme in a soil containing 0.62 % organic carbon. 508 kg available N, 69.5 kg available P and 606 kg/ha available K. Planting of the crop (cv CoN 05071) was done on 18th December 2013. Significantly higher tiller count at 90 DAP was recorded with treatment T_{12} (soil test based fertilizer application) over control and remained at par with T_{11}. At 120 DAP, significantly higher no. of tillers was observed with T_{12} over control and at par with T_{11}, T_{10}, T_9, T_7, T_5, T_4, T_3 and T_1 similarly at 180 DAP also it was found highest with T_{12} over control and was at par with almost the treatments except T_1 and T_{13}. Significantly highest plant height at 180 DAP was noticed with T_{12} over control.

Significantly highest (112.79 thousand ha-1) and lowest (84.51 thousand ha-1) NMC was noticed under T12 and T1 respectively. Significantly highest millable cane length was recorded with T12 over control and remained at par with almost all the treatments except T13 and T14. Difference for cane length and girth were not achieved level of significance.Cane yield (127.04 t ha-1) was recorded significantly highest with T12 and was at par with T4, T5 and T6. CCS yield (17.50 t ha-1) was also noticed significantly highest with T12 and remained at par with T4, T5, T6, T7, T8, T10 and T11. Different juice qualities parameters were not significantly influenced due to various nutrient management treatments.

There was no significant difference was observed due to various nutrients on soil pH, OC % and available phosphorus, potassium, manganese and zinc. Significantly highest OC % and nitrogen was recorded with T5 over T1 and at par with T10, T11 and T12. Available nitrogen was noticed highest with T5 and at par with T1, T2, T6, and T13. Available S was observed significantly highest in T11 over control while available Fe with T1.

Table AS 64.8.1: Growth and yield parameters of sugarcane as influenced by different plant nutrients

Treatment	No. of tillers at 120 DAP 000/ha	Plant height (cm) at 180 DAP	NMC 000 ha^{-1}	Millable length (cm) at harvest	Cane yield (t/ha)	CCS yield (t/ha)
T_1	119.85	129.51	84.51	190.59	53.60	7.43
T_2	148.65	132.30	92.03	236.16	95.62	12.59
T_3	161.43	135.62	100.34	239.90	105.37	14.40
T_4	164.63	151.23	99.09	235.67	120.50	16.63
T_5	154.16	134.87	95.70	227.88	112.74	15.17
T_6	151.20	141.69	94.70	229.94	113.22	15.74
T_7	161.53	153.65	99.33	241.97	109.56	15.20
T_8	152.40	156.48	94.94	239.80	107.64	15.23
T_9	153.18	135.44	99.32	231.92	110.47	14.50
T_{10}	158.51	159.06	94.91	230.83	111.05	14.97
T_{11}	165.77	140.02	99.18	247.02	110.20	15.06
T_{12}	175.30	164.44	112.79	256.96	127.04	17.52
T_{13}	137.75	124.30	96.13	182.84	72.72	10.15
T_{14}	142.77	131.24	91.63	213.94	76.05	10.95
S.Em ±	7.75	8.43	4.28	13.56	4.94	0.94
C.D.at 5%	22.53	24.52	12.44	39.42	14.37	2.73
C.V.%	8.75	10.28	7.66	10.26	8.41	13.04

Table AS 64.8.2: Soil properties after harvest of crop as influenced by different plant nutrients

Treatment	pH	EC (1:2.5) dsm^{-1}	OC %	Available N (kg/ha)	Available P_2O_5 (kg/ha)	Available K_2O (kg/ha)	Available S (ppm)	Available Fe (ppm)	Available Mn (ppm)	Available Zn (ppm)
T_1	7.60	0.16	0.55	286.33	38.88	605.00	5.78	17.41	9.85	1.64
T_2	7.86	0.12	0.54	269.67	41.82	567.67	5.42	16.33	9.42	1.65
T_3	7.80	0.10	0.40	241.33	42.67	503.67	5.88	15.24	9.90	1.72
T_4	7.83	0.12	0.43	239.67	43.71	537.33	6.01	16.91	9.75	1.55
T_5	7.75	0.13	0.78	321.67	45.77	596.00	6.32	14.99	9.55	1.64
T_6	7.73	0.14	0.58	262.00	47.07	491.33	5.57	16.15	9.72	1.45
T_7	7.88	0.10	0.46	221.33	43.67	546.33	6.32	14.97	9.45	1.39
T_8	7.84	0.13	0.51	221.67	47.25	568.67	6.19	16.84	9.45	1.47
T_9	7.85	0.12	0.49	216.00	43.47	514.33	7.16	15.29	9.37	1.22
T_{10}	7.98	0.11	0.63	185.00	44.67	556.33	7.23	16.40	9.27	1.41
T_{11}	7.91	0.12	0.63	228.00	51.61	593.00	7.76	16.01	9.40	1.28
T_{12}	8.04	0.11	0.67	232.33	53.51	571.33	5.42	16.58	9.59	1.35
T_{13}	7.91	0.14	0.58	272.67	51.80	610.67	5.61	14.86	9.62	1.31
T_{14}	7.99	0.15	0.58	202.67	49.07	580.67	4.28	13.84	9.34	1.52
S.Em ±	0.09	0.01	0.06	20.96	3.27	52.21	0.51	0.68	0.17	0.12
C.D.at 5%	0.26	0.04	0.17	60.92	NS	151.76	1.49	1.96	0.51	0.34
C.V. %	1.99	19.25	18.19	14.94	12.29	16.14	14.65	7.38	3.17	13.95
Initial	7.60	0.396	0.62	508	69.52	606	3.36	1.608	0.084	0.102

9. THIRUVALLA

The trial was conducted to study the response of sugarcane crop to different plant nutrients. The crop was planted on 1.2.2014 and harvested on 25.1.2015.

Though germination percentage remained unaffected due to various treatments, tiller population was found affected considerably by them and recorded highest value for T_{12} (soil test based nutrient application). The treatment variation due to different combination of plant nutrients were significant for growth and yield parameters. The maximum cane length (234.27 cm), cane girth (10.19 cm), cane weight (1.55 kg), MCC (94000 / ha) and ultimately cane yield (105.68 t/ha) were obtained when the crop was supplemented with nutrients based on soil test result (T_{12}). Even though there was no significant effect of various treatments on brix %, maximum sugar yield (12.26 t/ha) was also recorded by $T_{12.}$ This was followed closely by T_{11} (NPK+S+Zn+Fe+Mn).

Slight variation in the fertility status of the soil was noticed before and after conduct of the trial. From among the various treatments imposed, the highest BC ratio of 1.42 was also recorded by $T_{12.}$

Table AS 42.9.1: Growth, juice quality and yield as influenced by different plant nutrients

Treatments		Germination (%)		Tiller count (000/ha)		Cane length (cm)	MCC ('000/ ha)	Cane yield (t/ha)	Sugar yield (t/ha)	BC ratio
		30 DAP	45 DAP	120 DAP	150 DAP					
T_1	Control	59.2	63.6	82.25	74.18	205.4	42.69	45.09	5.50	0.85
T_2	N	60.0	64.2	95.70	85.66	207.2	74.98	77.57	9.62	1.25
T_3	NP	60.7	64.5	114.20	102.34	215.3	80.03	85.60	10.28	1.35
T_4	NPK	61.3	66.0	116.18	104.50	217.5	77.61	81.27	9.59	1.30
T_5	NPK+S	59.5	64.6	89.90	80.61	220.2	81.02	87.07	10.10	1.39
T_6	NPK+Zn	60.6	65.1	105.21	96.64	218.4	80.75	86.89	10.43	1.37
T_7	NPK+ Fe	61.2	66.6	110.40	102.71	222.7	81.50	87.24	10.30	1.38
T_8	NPK+ Mn	58.7	62.9	88.80	80.04	224.5	78.64	82.92	9.95	1.33
T_9	NPK+S+Zn	59.4	63.7	89.00	80.11	220.4	74.12	73.66	9.06	
T_{10}	NPK+S+Zn +Fe	60.8	65.2	41.41	100.35	218.7	82.06	87.76	10.54	1.39
T_{11}	NPK+S+Zn +Fe+Mn	59.9	63.8	111.49	108.61	230.1	91.26	100.92	11.51	1.42
T_{12}	Soil test based application	61.5	66.9	121.20	82.19	234.2	94.00	105.68	12.26	1.44
T_{13}	FYM @20 t/ha	59.6	63.8	90.25		220.3	72.36	71.81	8.62	1.10
CD (0.05)		**NS**	**NS**	**9.85***	**8.97***	**4.02***	**3.02***	**5.22***	**0.80***	**NS**

10. MANDYA

Nutrients in isolation and different combinations were tried to identify the role of different nutrients. Sugarcane responded to combination of nutrients comprising all the primary nutrients significantly over the one or two primary nutrients only. Higher cane yield was recorded with application of nutrients based on soil test (109.85 MT ha^{-1}) which was significantly superior over control (58.80 MT ha^{-1}), N alone (76.25 MT ha^{-1}), NP only (88.55 MT ha^{-1})but was on par with application of all the three primary nutrients in combination with secondary and micro nutrients.

Table AS 42.10.1: Yield & yield attributes of sugarcane as influenced by different treatments

Treatment		Germination (%)	Cane weight (kg)	Cane length (m)	Cane girth (cm)	Inter nodal length (cm)	NMC ('1000 ha^{-1})	Cane yield (t/ha)	Purity (%)
T_1	Control (No fertilizer)	55.2	1.24	1.79	2.59	7.96	38.15	58.80	79.67
T_2	N	55.5	1.31	1.89	2.97	8.34	48.57	76.25	78.67
T_3	NP	48.8	1.31	1.92	2.99	9.08	50.31	88.55	81.67
T_4	NPK	49.1	1.42	2.09	3.07	9.55	54.33	97.96	80.00
T_5	NPK + S	57.5	1.50	2.10	3.04	9.45	53.93	97.54	80.33
T_6	NPK + Zn	52.3	1.38	2.23	3.00	10.41	60.99	100.96	81.67
T_7	NPK + Fe	52.6	1.39	2.25	2.98	10.33	61.20	100.15	81.67
T_8	NPK + Mn	53.9	1.44	2.36	3.09	11.25	61.20	102.36	80.67
T_9	NPK + S + Zn	52.3	1.56	2.28	3.07	11.52	56.59	101.39	80.33
T_{10}	NPK + S + Zn + Fe	57.7	1.57	2.32	3.27	11.82	59.95	106.51	80.33
T_{11}	NPK + S + Zn + Fe + Mn	52.1	1.67	2.35	3.38	12.22	61.07	108.79	80.67
T_{12}	Soil test based fertilizer application	53.2	1.70	2.36	3.42	12.43	63.23	109.85	80.67
T_{13}	FYM / CPM	54.9	1.43	1.97	2.79	10.02	49.91	88.12	79.67
S.Em+		**-**	**0.06**	**0.11**	**0.17**	**0.52**	**4.84**	**4.44**	**1.52**
CD @ 5%		**-**	**0.19**	**0.32**	**0.50**	**1.52**	**14.13**	**12.95**	**NS**
CV (%)		**-**	**7.64**	**8.84**	**9.82**	**8.70**	**15.07**	**8.01**	**3.27**

EAST COAST ZONE

11. ANAKAPALLE

Initial soil analysis was done. The soil was low in organic carbon (0.43%), low in available nitrogen (206 kg N /ha), medium in available phosphorus (39.0 kg/ha), high in available potassium (325 kg / K2O /ha), optimum in Sulphur, low in Zinc (0.44 ppm), low in Iron (2.7 ppm) and sufficient in Manganese (2.5 ppm).

Germination was recorded at 35th day after planting. Application of nitrogen, phosphorus and potassium along with other micronutrients Zn, S, Mn and Fe or soil test based fertilizer application registered higher per cent germination (88.7 and 87.6 respectively). Control plot (no fertilizer) registered lesser germination per cent of 76.1 per cent.

Plant height in cm was recorded at 120 day after planting. Significantly higher plant height was recorded in application of N,P and K along with micronutrients on soil test basis (168.3 cm) as compared to control plot (126.2 cm) but found on par with all other treatments. Application of N,P and K along with micronutrients on soil test basis (1,57,440/ha) and application of N, P, K + S + Zn + Fe+ Mn (1,57,143/ha) recorded significantly higher number of tillers. Control plot recorded significantly less number of tillers (1,32,142/ha) at 120 DAP. Application of N,P and K along with micronutrients on soil test basis recorded significantly higher number of millable canes (85,277/ha) and it was on par with application of N P K + S + Zn + Fe + Mn (84,722/ha) than other nutrient treatments. No fertilizer applied plot recorded significantly lower number of millable canes (69,444/ha) at harvest.

Application of nutrients as per soil test basis registered significantly higher cane yield of 79.9 t/ha as compared to application of N alone (68.5 t/ha) or N and P (70.0 t/ha) or

N, P and K (72.8 t/ha) or NPK+S (73.6 t/ha) but found on par with application of macro nutrients (N,P,K) along with Fe, Zn and also Mn and S (78.3 t/ha) or NPK +S+Zn and Fe (76.1 t/ha) or NPK +S+Zn (75.5 t/ha) or NPK + Fe (75.9 t/ha) or NPK + Zn (75.0 t/ha) or NPK + Mn (74.0 t/ha). No fertilizer applied plot registered the lowest cane yield of 55.5 t/ha.

Cane juices were analysed for sucrose content at harvest. Juice sucrose values did not vary significantly due to different nutrient treatments. CCS % varied significantly due to different nutrient treatments. Application of N,P and K along with micronutrients Fe,Zn &Mn and also S recorded significantly higher CCS% (14.4) as compared to other nutrient combinations. Sugar yield was calculated based on CCS% and cane yield. Sugar yield ranged from 8.9 to 11.2 t/ha in different nutrient applied plots. No fertilizer applied plot registered the lowest sugar yield of 7.2 t/ha.

Summary:

Effect of different macro and micro nutrients along with sulphur was studied during 2014-15 season at RARS, Anakapalle. The results of the study indicated that, application of nutrients as per soil test basis registered significantly higher cane yield of 79.9 t/ha as compared to application of N alone (68.5 t/ha) or N and P (70.0 t/ha) or N, P and K (72.8 t/ha) or NPK+S (73.6 t/ha) but found on par with application of macro nutrients (N,P,K) along with Fe, Zn and also Mn and S (78.3 t/ha) or NPK +S+Zn and Fe (76.1 t/ha) or NPK +S+Zn (75.5 t/ha) or NPK + Fe (75.9 t/ha) or NPK + Zn (75.0 t/ha) or NPK + Mn (74.0 t/ha). No fertilizer applied plot registered the lowest cane yield of 55.5 t/ha.

Pooled data:

Pooled data mean (Three plant crops) of number of miilable canes (NMC), juice sucrose %, cane yield and sugar yield was calculated. Three years studies on effect of different macro and micro nutrients along with sulphur revealed that, application of different nutrients as per soil test basis and application of macro nutrients (N,P,K) along with Fe, Zn and also Mn and S registered higher number of mllable canes, cane yield and sugar yield as compared to other nutrient treatments (Table-5). No fertilizer applied plot registered the lowest number of millable canes (62,900/ha), cane yield (53.9 t/ha) and sugar yield (7.01 t/ha).

Application of N alone(T2 treatment) registered 34.8 per cent higher cane yield as compared to control plot i.e no fertilizer applied plot (T1 treatment). Application of N and P (T2 treatment) & N,P and K(T3 treatment) increased the cane yield to the extent of 3.9 % & 4.4% respectively as compared to application of N alone. These results indicating that among three macro nutrients nitrogen play key role in increasing the cane yield than phosphorus and potassium nutrients, further increase in cane yield is higher due to application of potassium rather than phosphorous.

There was 5.5 t/ha increase in cane yield when all macro and micronutrients applied (T11 treatment) as compared to application of only macronutrients (T4 treatment) indicating 7 per cent increase in cane yield due to application of micronutrients viz., Fe, Zn & Mn and also Sulphour. Among different micronutrients, response of sugarcane crop to Fe and Zn found to be more when compared to Mn and sulphour (table-5).

Application of only FYM @ 20 t/ha increased the cane yield to an extent of 26.3 per cent as compared to control treatment i.e no fertilizer applied treatment.

Table AS 64.11.1: Yield attributes, Yield and quality of sugarcane as influenced by different nutrients during 2014-15

Treatments	Germination (%)	Tiller populatio/h a n at 120 DAP	NMC/ha	Cane yield (t/ha)	Sugar Yield (t/ha)
T1: Control (No Fertilizer)	76.7	1,32,142	69,444	55.5	7.2
T2: N	80.7	1,36,607	72,222	68.5	9.3
T3: NP	84.1	1,45,238	75,833	70.0	9.8
T4: NPK	85.6	1,49,107	77,778	72.8	8.6
T5: NPK +S	81.6	1,50,298	78,611	73.6	10.2
T6: NPK + Zn	83.2	1,53,274	80,278	75.0	10.7
T7: NPK + Fe	84.9	1,56,548	80,833	75.9	10.1
T8: NPK +Mn	84.4	1,55,357	79,722	74.0	10.7
T9: NPK + S + Zn	84.9	1,56,250	80,555	75.5	10.4
T10: NPK + S + Zn +Fe	86.9	1,56,250	81,111	76.1	10.5
T11: NPK + S + Zn +Fe + Mn	88.6	1,57,143	84,722	78.3	11.2
***T12: Soil test based fertilizer application**	87.8	1,57,440	85,277	79.9	10.4
T13: FYM @ 20 t/ha	77.1	1,41,667	70,278	66.9	8.9
S.Em±	-	2507	961.4	1.7	-
C.D. (P=0.05)	NS	7317	2806.0	5.0	NS
C.V (%)	10.7	2.9	2.13	4.1	

*T12- FYM- 20 t/ha: N-145 Kg /ha: P_2O_5-100 Kg/ha: K_2O-84 Kg/ha :elemental sulphur- 60 Kg/ha: $ZnSO_4$- 50 Kg/ha :$FeSO_4$-1% spray thrice at weekly interval during vegetative phase

Table AS 64.11.2: Yield attributes, Yield and quality of sugarcane as influenced by application of different nutrients pooled over 3 years from 2012-13 to 2014-15

Treatments	Cane yield (t/ha)				Sugar Yield (t/ha)			
	2012-13	2013-14	2013-14	Mean	2012-13	2013-14	2014-15	Mean
T1: Control (No Fertilizer)	51.3	55.0	55.5	53.9	6.50	7.5	7.2	7.01
T2: N	69.0	80.7	68.5	72.7	8.83	11.0	9.3	9.71
T3: NP	74.4	82.0	70.0	75.5	8.93	11.6	9.8	10.11
T4: NPK	76.3	87.2	72.8	78.8	10.10	11.9	8.6	10.2
T5: NPK +S	78.2	87.5	73.6	79.8	10.40	10.6	10.2	10.4
T6: NPK + Zn	80.5	89.1	75.0	81.5	10.22	12.7	10.7	11.21
T7: NPK + Fe	81.1	90.5	75.9	82.5	10.10	11.9	10.1	10.7
T8: NPK +Mn	79.8	89.7	74.0	81.2	9.70	12.6	10.7	11.0
T9: NPK + S + Zn	80.1	90.7	75.5	82.1	9.61	12.7	10.4	10.9
T10: NPK + S + Zn +Fe	81.4	90.3	76.1	82.6	10.20	13.1	10.5	11.3
T11: NPK + S + Zn +Fe + Mn	83.6	91.0	78.3	84.3	10.50	12.0	11.2	11.2
***T12: Soil test based fertilizer application**	82.9	91.6	79.9	84.8	11.8	13.5	10.4	11.9
T13: FYM @ 20 t/ha	64.0	73.3	66.9	68.1	8.5	10.0	8.9	9.1
S.Em±	1.53	1.69	1.7		-		-	
C.D. (P=0.05)	4.46	4.92	5.0		-		NS	

12. CUDDALORE

The results indicated that, germination was not significant among the treatments. Application of NPK + S + Zn + Fe + Mn through inorganic fertilizers significantly recorded the maximum tiller population of 2,01,240 ha^{-1} at 90 days after planting and is on par with soil test based fertilizer application with the tiller production of 1,93,450 ha^{-1}. The same trend was also recorded at 120 and 180 days after planting with 1,89,140 ha^{-1} and 1,75,240 ha^{-1} of tiller population. The maximum plant height of 156.23 and 201.36 cm was recorded in application of NPK + S + Zn + Fe + Mn through inorganic fertilizers on 120 and 180 days after planting.

Application of NPK + S + Zn + Fe + Mn through inorganic fertilizers significantly recorded the maximum millable cane population of 1,29,350 ha-1 and was on par with the soil test based fertilizer application (T12) and NPK + S + Zn + Fe (T10) which registered the cane population of 1,28,560 ha^{-1} and 1,24,610 ha^{-1} respectively. The same treatment (T11) also registered significantly higher cane length, cane girth and individual cane weight of 290.52 cm, 3.23 cm and 1.95 kg and was comparable with the treatment T10 and T12 which recorded 286.42 cm, 3.15 cm and 1.90 kg and 292.62 cm, 3.09 cm and 1.86 kg respectively.

The result on yield parameters revealed that the treatment (T11) NPK + S + Zn + Fe + Mn registered significantly higher cane yield of 153.23 t ha-1 and it was on par with the treatment T10 and T12 with 147.56 and 150.17 t ha-1 respectively. The result on juice sucrose on 11th and 12th month indicated that the treatment (T11) NPK + S + Zn + Fe + Mn registered the maximum of 17.55 and 18.08 per cent on 11th and 12th month of sugarcane. The treatment T11 registered numerically the maximum of 12.81 per cent CCS and was on par with the treatment T10 and T12 which recorded 12.28 and 12.75 per cent. The sugar yield showed the trend of cane yield T11 significantly produced the maximum sugar yield of 19.63 t ha^{-1} and it was comparable with the treatment T12 which registered 19.15 t ha^{-1}.

The initial soil NPK status of the soil is 195.56 N kg ha-1; 25.46 P2O5 kg ha-1 and 240.35 K2O kg ha^{-1}. The significant variation was observed in post-harvest soil analysis. Application of NPK + S + Zn + Fe + Mn through inorganic fertilizers influenced the postharvest available nutrient status of N, P2O5 and K2O which recorded 159.69, 23.61 and 261.23 kg ha-1 respectively and it was on par with the treatment (T10) which recorded 158.52, 21.15 and 263.32 kg ha-1. The results on micro nutrients availabilityin the postharvest soil sample indicated that the treatment (T11) registered 8.08 ppm of Fe and it was on par with T12 and T13. The treatment T11 recorded higher Mn (8.89 ppm). With regard to Zn availability, T11 registered the maximum of 1.82 ppm of Zn in soil and it was on par with treatment T10 which recorded 1.80 ppm. Regarding sulphur, the treatment T11 registered the maximum of 62.62 kg ha-1and was comparable with the treatments T9, T10 and T12 treatments.

SUMMARY:

The treatment (T11) recommended dose of NPK with S (60 kg ha^{-1}) + Zn (ZnSO4: 50 kg ha^{-1}) + Fe (FeSO4: 1 % foliar spray thrice in weekly interval) + Mn (MnSO4: 100 kg ha^{-1}) produced higher cane yield (153.23 t ha^{-1}) and it was comparable with the treatment T_{10} and T_{12}.

Table AS 64.12.1: Effect of different plant nutrients on yield and quality characteristics of sugarcane (2014-15)

Treatments	OC (%)	EC (dSm^{-1})	pH	N (kg ha^{-1})	P (kg ha^{-1}	K (kg ha^{-1})	S (kg ha^{-1}	Fe (ppm)	Mn ppm	Zn ppı
T_1	0.31	0.34	6.82	130.53	20.15	165.23	49.15	5.45	7.23	0.60
T_2	0.33	0.35	6.91	138.21	21.24	171.25	51.23	5.95	8.90	0.81
T_3	0.35	0.34	6.95	142.42	21.85	182.65	54.52	6.84	7.12	0.84
T_4	0.38	0.36	7.11	146.60	22.44	269.36	55.25	5.50	8.62	0.78
T_5	0.40	0.36	7.12	140.82	21.62	273.52	62.06	6.21	8.30	0.76
T_6	0.42	0.37	7.01	144.55	23.15	264.85	52.69	6.26	7.49	1.98
T_7	0.43	0.36	6.94	149.51	22.60	273.58	53.84	8.04	7.32	0.82
T_8	0.43	0.35	6.90	150.45	21.90	265.23	54.25	5.68	9.45	0.81
T_9	0.42	0.36	7.13	153.23	23.39	261.52	61.65	6.78	9.05	1.96
T_{10}	0.44	0.36	7.09	158.52	21.15	263.32	62.81	7.35	8.34	1.80
T_{11}	0.46	0.38	6.98	159.69	23.61	261.23	62.60	8.08	8.89	1.82
T_{12}	0.44	0.35	7.12	159.56	24.09	268.21	63.62	7.78	8.04	0.89
T_{13}	0.49	0.31	6.78	150.56	23.01	207.65	67.41	8.24	8.23	0.90
CD(P=0.05)	NS	NS	NS	6.05	1.40	11.20	4.82	0.45	0.62	0.06

Table AS 64.12.2: Effect of different plant nutrients on post-harvest soil physical and chemical properties (2014-15)

Treatments	**Juice sucrose (%)**		**CCS (%)**	**Cane Yield (t ha^{-1})**	**Sugar Yield (t ha^{-1})**
	11^{th} month	**12^{th} month**			
T_1	12.56	13.59	11.09	62.63	7.01
T_2	13.41	14.82	11.41	92.77	10.59
T_3	14.78	15.31	11.57	98.25	11.37
T_4	14.83	16.42	11.59	122.36	14.18
T_5	14.90	16.39	12.05	128.45	15.48
T_6	15.23	16.59	12.58	134.52	16.92
T_7	15.85	16.84	12.25	138.65	16.98
T_8	15.29	16.03	12.15	130.36	15.84
T_9	16.40	16.77	12.12	141.25	17.12
T_{10}	17.12	17.52	12.28	147.56	18.12
T_{11}	17.55	18.08	12.81	153.23	19.63
T_{12}	17.39	17.54	12.75	150.17	19.15
T_{13}	14.73	16.01	11.87	108.95	12.93
CD (P = 0.05)	0.84	0.78	0.53	6.85	0.82

13. NAYAGARH

The experimental soil was acidic in reaction with the soil pH ranging from 5.17 to 5.32 with the initial value of 5.26. The soil was low in organic carbon (0.420 to 0.511%), available N (116.3 kg/ha in control plot to 185.5 kg/ha with soil test based fertilizer application), S (1.6 to 2.9 kg/ha) and Zn (0.52 to 0.92 ppm). Available P and K were in medium range of soil fertility, whereas available Fe and Mn content of the soil were in higher range.

Soil test based fertilizer application (315:100:60 kg N: P2O5: K2O + 60 kg elemental S/ha) resulted in higher number of tillers at different growth stages of sugarcane genotype "Sabita" leading to highest cane (81.44 t/ha) and CCS yield (8.79 t/ha). The length (250.0 cm) and girth (2.65 cm) of the canes at harvest were also the higher as compared to all other treatment combinations. Application of NPK+ S+ Zn+ Fe (cane yield of 79.72 and CCS yield of 8.82 t/ha), NPK+ S+ Zn+ Fe+ Mn (cane yield of 78.14 t/ha and CCS yield of 8.47t/ha) NPK+ S+ Zn (cane yield of 77.33 and CCS yield of 8.34 t/ha), were next in order. The crop responded well to micronutrient application.

AS 64.13.1: Effect of different plant nutrients on juice quality and yield of sugarcane

Treatments		Brix % 1 month prior to harvest	Brix % at harvest	CCS % at harvest	NMC (000/ha)	Cane yield (t/ha)	CCS (t/ha)
T_1	Control	15.47	17.86	10.34	33.24	43.42	4.47
T_2	N	16.13	18.04	10.76	45.04	58.00	6.25
T_3	NP	15.73	17.94	10.90	49.78	67.33	7.36
T_4	NPK	15.77	18.29	10.71	63.14	71.33	7.64
T_5	NPK+S	16.23	18.71	10.76	64.06	75.63	8.14
T_6	NPK+ Zn	15.53	17.76	11.06	63.88	76.00	8.42
T_7	NPK+ Fe	15.67	18.20	10.83	66.95	72.78	7.87
T_8	NPK+ Mn	16.13	18.41	10.69	55.34	69.33	7.40
T_9	NPK+ S+ Zn	15.37	17.85	10.77	66.81	77.33	8.34
T_{10}	NPK+ S+ Zn+ Fe	15.90	18.27	11.07	66.95	79.72	8.82
T_{11}	**NPK+ S+ Zn+ Fe+ Mn**	**15.80**	**18.29**	**10.85**	**68.08**	**78.14**	**8.47**
T_{12}	Soil test based fert. Appln.	16.03	18.39	10.78	69.47	81.44	8.79
T_{13}	FYM @ 20 t/ha	15.37	17.92	10.89	44.90	54.65	5.95
	SEm ±	0.35	0.19	0.19	3.97	7.58	0.84
	CD at 5 %	NS	0.55	NS	11.60	22.13	2.45
	CV%	3.54	1.66	2.81	10.90	11.45	14.79

AS 64.13.2: Effect of different plant nutrients on soil fertility status after harvest of sugarcane crop

Treatments		pH	EC(ds m^{-1})	OC (%)	Available (Kg/ha)				Available(ppm)		
					N	P	K	S	Fe	Mn	Zn
T_1	Control	5.11	0.241	0.463	116.3	16.5	135.4	2.1	23.27	55.36	0.61
T_2	N	5.31	0.225	0.501	146.6	22.6	143.6	2.5	22.00	58.21	0.55
T_3	NP	5.32	0.251	0.472	140.3	26.4	148.4	2.0	23.20	69.85	0.52
T_4	NPK	5.24	0.209	0.436	141.7	25.4	137.2	2.2	26.60	75.69	0.69
T_5	NPK+S	5.12	0.201	0.448	153.0	23.6	149.2	2.9	22.25	57.30	0.76
T_6	NPK+ Zn	5.16	0.189	0.511	145.0	24.3	165.9	2.3	25.01	55.61	0.84
T_7	NPK+ Fe	5.20	0.212	0.466	150.6	28.6	158.3	1.6	24.80	61.23	0.76
T_8	NPK+ Mn	5.28	0.186	0.501	149.3	27.6	153.8	1.9	24.11	67.56	0.81
T_9	NPK+ S+ Zn	5.17	0.194	0.523	139.0	26.5	154.6	2.8	22.40	56.56	0.92
T_{10}	NPK+ S+ Zn+ Fe	5.25	0.208	0.466	141.6	18.6	156.8	2.7	23.75	56.33	0.91
T_{11}	NPK+ S+ Zn+ Fe+ Mn	5.21	0.183	0.420	145.5	22.6	166.2	2.5	25.30	60.38	0.88
T_{12}	Soil test based fert Appln	5.23	0.197	0.429	185.5	25.6	177.5	2.8	26.75	56.33	0.72
T_{13}	FYM @ 20 t/ha	5.28	0.208	0.431	130.7	18.8	139.6	2.0	24.61	50.33	0.68
Initial		5.26	0.226	0.451	190.7	29	239.3	3.6	28.03	67.59	0.59

NORTH EASTERN ZONE

14. BURALIKSON

The experiment was laid out with the objective to study the differential response of sugarcane crop to different nutrients. The experimental crop var. Borak (CoBln 9103) was planted on 12th March, 2014 and harvested on 15th March, 2015. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93. The available Fe, Mn and Zn in experimental plot were 71.4 ppm, 5.6 ppm and 0.61 ppm respectively.

Application of different plant nutrients showed significant variances in number of shoots, number of millable canes (NMC), cane diameter, cane yield. Application of Zn along with recommended dose of NPK recorded the highest cane yield (106.8 t/ha) which is statistically at par with the yield recorded by application of fertilizers based on soil test (103.70 t/ha) followed by application of S, Zn, Fe, Mn along with the recommended dose of fertilizer (95.80 t/ha).

Table AS 64.14.1: Effect of different nutrients on growth and yield of sugarcane

Treatments	Germ-ination (%)	No.of shoots (000/ha)	NMC (000/ha)	Cane length (mm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
T_1: Control	44.5	67.70	77.70	2.8	2.6	18.4	57.30	12.1
T_2: N	51.0	90.40	95.00	2.9	2.6	18.7	65.40	12.6
T_3: NP	48.7	90.21	89.51	2.9	2.7	19.1	73.00	12.6
T_4: NPK	42.6	114.00	106.40	2.9	2.7	19.6	80.10	12.9
T_5: NPK+ S	52.8	103.41	109.66	2.9	2.7	19.3	78.60	12.9
T_6: NPK+ Zn	50.0	123.20	122.50	2.7	2.6	19.4	106.80	13.2
T_7: NPK+ Fe	48.0	108.3	92.50	2.9	2.5	18.8	69.30	12.8
T_8: NPK+ Mn	48.8	95.50	94.30	2.9	2.8	19.5	76.70	13.0
T_9: NPK++ S + Zn	41.2	91.00	92.70	3.0	2.7	18.7	87.70	12.0
T_{10}: NPK + S + Zn + Fe	55.4	106.20	104.60	2.9	2.7	18.8	83.20	12.2
T_{11}: NPK + S + Zn + Fe + Mn	49.8	114.70	110.70	3.0	2.7	19.4	95.80	12.7
T_{12}: Soil test based fertilizers	43.4	118.71	108.60	3.0	2.8	19.9	103.7	13.0
T_{13}: FYM @ 20 t/ha	46.9	84.10	90.40	3.0	2.7	19.3	80.13	12.4
SEM(±)	3.08	6.18	4.97	0.06	0.03	0.15	5.06	0.16
CD (5%)	NS	18.04	14.5	NS	0.11	0.43	14.78	0.47

PROJECT NO. : AS 65

Title	:	**Enhancing sugarcane productivity and profitability under wheat-sugarcane cropping system**
Objective	:	To enhance the productivity of sugarcane under wheat-sugarcane cropping system
Year of start	:	2012-13
Year of completion	:	Three crop cycles.
Locations	:	Subtropical centres (Faridkot, Ludhiana, Uchani, Lucknow, Pantnagar, Modipuram, Pusa and Bethuadhari.
Treatments	:	T_1 : Autumn planted sugarcane T_2 : T_1 + Wheat (1:2) T_3 : T_1 + Wheat (1:3) T_4 : Wheat sown on 15th Nov.- late sugarcane. T_5 : Wheat sown on 15th Dec.- late sugarcane. T_6 : FIRB sowing of wheat 15th Nov. (75cm with 3 rows of wheat) + sugarcane in furrow in 3rd week of February. T_7 : FIRB sowing of wheat 15th Nov. (75cm with 3 rows of wheat) + sugarcane in furrow in 3rd week of March. T_8 : T_6 with 15th December sowing of wheat. T_9 : T_7 with 15th December sowing of wheat.
Design	:	RBD
Replications	:	Three
Plot size	:	6 rows; 8m length.
Date of sowing	:	As per treatments.
Observations to be recorded	:	**Wheat:** i) Germination count. ii) Number of tillers at 30,60 and 90DAS. iii) Days to maturity. iv) Straw and grain yield. **Sugarcane:** i) Germination count at 45DAP. ii) Tiller population at 90,120 and 180DAP. iii) Plant height at 120 & 180DAP. iv) Juice sucrose at harvest. v) Number of millable canes, length, diameter a weight of cane at harvest. vi) Cane and sugar yield. vii) Cane equivalent yield. viii) B: C ratio.

SUMMARY OF LAST YEAR'S REPORT (2013-14)

PROJECT: AS 65

For the year 2013-14 the trial was allotted to 09 centres, however Padegaon and Powarkheda voluntarily carried out the trial. Among allotted centres Sriganganagar, Modipuram and Bethuadhari failed to conduct the trial and report the progress. In all 08 centres carried out the trial during the year.

NORTH WEST ZONE

1. FARIDKOT

Wheat sown in November was significantly better than December sowing. The sugarcane sown in furrows of FIRB sown wheat in the February and March was significantly better than sugarcane planted after wheat harvest and was at par with autumn sole sugarcane. Same was case for germination, number of shoots, number of millable canes and cane weight.

2. KAPURTHALA

The highest cane equivalent yield of 90.5 t/ha was obtained in the treatment T_2 having autumn sugarcane + wheat (1:2) and was at par with relay cropping in standing wheat crop and significantly better than sole sugarcane crop and where sugarcane was planted after wheat harvest.

3. LUCKNOW

The cane yield was the highest (89.0 tonnes/ha) in autumn planted sole sugarcane. Sugarcane planted in 3rd week of February in standing wheat under FIRB method (82.5 tonnes/ha) was significantly higher than sugarcane planted in 3rd week of March in wheat under FIRB and sugarcane + wheat (1:2) due to higher NMC, cane length, cane weight and number of internodes. The lowest cane yield was recorded in wheat – sugarcane system (59.3 tonnes/ha) and sugarcane + wheat in1:3 row ratio (60.3 tonnes/ha).

4. PANTNAGAR

On the basis of equivalent yield, it was recorded that pure autumn planted sugarcane without wheat sowing was not profitable. However, planting of 2 rows of wheat in betweentwo rows of sugarcane were more profitable than that of 3 rows of wheat. It was also found better that wheat sown on FIRB in the month of November 15 and sugarcane be planted in furrow in 3rd week of March. Late sowing of wheat in 15 December on FIRB and sugarcane planted in furrow either 3rd week of February or March. Late planting of sugarcane after wheat harvest was not found good.

5. UCHANI

Wheat sown with autumn cane on Oct. 24, 2012 in 1:2 and 1:3 ratio and 15th November on bed or by conventional method produced higher grain yield of (56.6-58.2 q/ha) as compared to wheat sown on 15th December (49.4-50.6 q/ha). Autumn planted cane as sole or intercropped with wheat in 1:2 and 1:3 ratio recorded significantly cane yield as compared to spring and late planting. Lowest germination was recorded in late planting of sugarcane after wheat harvest. There was a yield reduction of 40.3% with late planting of sugarcane after wheat harvesting as compared to planting of sugarcane in February or March in standing crop of wheat. Maximum cane equivalent yield was recorded in autumn sugarcane + wheat intercropping system of 1:2 (128.8 t/ha)and 1:3 ratio (127.5 t/ha) and closely followed by FIRB sowing of wheat on 15th

November or 15th December + sugarcane in furrows in 3rd week of February or March (106.1-108.8 t/ha) and lowest in T_4 and T_5 treatments.

PENINSULAR ZONE

6. POWARKHEDA

The significantly highest sugarcane equivalent yield (98.59 t/ha) obtain with autumn planted Sugarcane + Wheat (1:2) followed by autumn planted Sugarcane + Wheat (1:3) (96.42 t/ha) intercropping systems. Among these treatment the equivalent yield recorded at par.

7. PADEGAON

The autumn planted sugarcane produced significantly higher cane yield and CCS yield (143.61 t ha^{-1} and 20.24 t ha^{-1}, respectively). Under intercropping system, autumn planted sugarcane + wheat (1:2) produced significantly higher cane yield and CCS yield (134.02 t ha^{-1} and 17.93 t ha^{-1}, respectively). The intercropping of autumn planted sugarcane + wheat (1:2) was found to be more remunerative.

NORTH CENTRAL ZONE

8. PUSA

In the system maximum cane yield of 83.7 t/ha was recorded in the sole autumn planted cane which was on par with that of sugarcane + wheat (1:2) and FIRB sowing wheat on 15th November and sugarcane in 3rd week of February. The reduction in yield on an average due to intercropping of wheat, planting of sugarcane after harvest of wheat, relay cropping of sugarcane in the 3rd week of February and March was 9.4 %, 31.0 %, 14.0 % and 15.9 %, respectively. In case of cane equivalent yield maximum value of 100.0 t/ha was recorded in intercropping of wheat 1:3 row ratios.

CURRENT YEAR (2014-15) REPORT

NORTH WEST ZONE

1. FARIDKOT

Wheat crop sown in November is significantly better than December sowing. The sugarcane sown in furrows of FIRB sown wheat in the February and March was significantly better than sugarcane planted after wheat harvest and was at par with autumn sole sugarcane. Same was case for germination, number of shoots, number of millable canes and cane weight. On the basis of three years data it can be concluded that sugarcane sown in furrows of FIRB sown wheat in the February and March was better than sugarcane planted after wheat harvest. So, it can be concluded that in wheat and sugarcane based cropping system higher productivity of wheat and sugarcane can be obtained by planting the sugarcane in furrows of standing FIRB sown wheat instead of planting the sugarcane after harvesting the wheat.

Table AS 65.1.1: Growth, yield and quality of sugarcane during 2013-15 under various treatments

Treatments	Cane yield (t/ha)				Wheat yield (q/ha)			
	2011-13	2012-14	2013-15	Mean	2011-13	2012-14	2013-15	Mean
T_1	89.3	80.2	97.7	89.1	-	-	-	-
T_2	74.7	65.9	83.9	74.8	30.6	39.6	42.7	37.6
T_3	71.2	64.9	79.2	71.8	34.5	44.8	47.6	42.3
T_4	47.6	51.4	49.1	49.4	47.7	51.4	48.5	49.2
T_5	47.0	53.1	50.1	50.1	27.2	44.6	41.5	37.8
T_6	89.8	74.1	82.0	82.0	47.0	51.0	50.9	49.6
T_7	85.7	72.8	81.7	80.1	48.9	50.3	50.1	49.8
T_8	85.7	74.3	80.2	80.1	30.3	44.1	42.4	38.9
T_9	87.3	71.9	82.0	80.4	30.9	44.6	40.0	38.5
CD (5%)	9.8	9.5	12.4		6.4	5.2	3.9	

DOS of Wheat: 18.11.2013, 15.12.2013; Sugarcane date of planting:T1-T3: 11.10.2013, T4-T5: 02.05.2014, T6, T8: 23.02.2014, T7, T9: 25.03.2014

Table AS 65.1.2: Effect of various treatments over the years.

Treatments	Germination (%)	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)	Wheat yield (q/ha)
T_1	32.1	96.7	84.7	214	2.57	1019	91.6	17.7	-
T_2	32.1	116.8	86.3	195	2.37	898	83.9	17.3	42.7
T_3	31.7	133.8	81.3	191	2.43	917	79.2	17.5	47.6
T_4	32.5	95.7	77.3	170	2.41	672	49.1	16.3	48.5
T_5	27.9	88.7	76.7	173	2.34	683	50.1	16.2	41.5
T_6	28.0	169.3	92.5	190	2.44	792	82.0	17.1	50.9
T_7	37.7	163.2	105.5	187	2.32	726	81.7	17.0	50.1
T_8	33.7	153.1	99.2	180	2.24	783	81.9	17.0	42.4
T_9	35.8	111.9	93.9	179	2.31	797	82.0	17.1	40.0
CD (5%)	4.3	30.5	15.9	17	NS	172	10.5	0.6	3.9

2. KAPURTHALA

The soil of the experimental field was loamy in nature, tested medium in organic carbon (0.66 %), very high in available P (59.5 kg/ha) and very high in available K (925 kg/ha). The data showed non-significant differences for germination, and cane girth of sugarcane under different methods of wheat- sugarcane intercropping and relay cropping. However, different ways of intercropping wheat in sugarcane and its relay cropping recorded significant differences in terms of tiller count, cane length, no. of millable canes and cane yield. The tiller count and cane length was significantly reduced when sugarcane was planted late i.e. after harvesting of wheat crop (both Nov. and Dec. sown crop). Sole sugarcane planted in autumn recorded significantly highest cane length (209.4 cm) and millable canes (112.2 th/ha) when compared to sugarcane after harvest of 15 Nov. & 15 Dec. sown wheat and were at par with all other treatments where sugarcane was planted in standing wheat crop either in Feb. or in March.

Autumn planted sole sugarcane crop produced significantly higher cane yield than the crop planted after harvesting of 15 Nov., 15 Dec, sown wheat crop and autumn crop where three rows of wheat were planted.The cane yield of autumn sown sole crop was at par with autumn sown crop with wheat as intercrop and the treatments where sugarcane was planted in standing wheat crop indicating the possibility of timely planting of sugarcane in furrow irrigated raised bed wheat. The yield of wheat was maximum in the treatment T4 where wheat was sown on 15 Nov. and sugarcane was planted after harvest of wheat crop. It was at par with all others treatments where wheat was sown on 15 Nov. but was significantly better than the treatments where wheat was sown on 15 Dec. The cane equivalent yield was also significantly less when sugarcane was planted after harvesting of 15 Nov. & 15 Dec. sown wheat crop.So highest cane equivalent yield was achieved when autumn crop was intercropped with two rows of wheat (90.7 t/ ha) and was at par with sugarcane relay cropped in Feb. and Mar. in 15 Nov. FIRB wheat but was significantly superior to the sole sugarcane planted in autumn. The cane quality of autumn sown and relay cropped sugarcane was significantly superior to the crop planted late after harvesting of wheat.

Summary

The highest cane equivalent yield of 90.7 t/ha was obtained in the treatment T2 having autumn sugarcane + wheat (1:2) and was at par with relay cropping in standing wheat crop and significantly better than sole sugarcane crop and where crop was planted after wheat harvest.

Table AS 65.2.1: Effect of FIRB method of sugarcane/ wheat planting on yield and quality

Treatments		Germi-nation %	Tiller Count (000/ha)	Cane length (cm)	Millable canes (000/ha)	Cane yield (t/ha)	Single cane wt.(g)	Wheat Yield (q/ha)	Cane equivalent yield (t/ha)	Pol % juice
T_1	Autumn Sugarcane	44.8	149.8	209.4	112.2	82.6	738.2	-	82.6	18.55
T_2	Autumn Sugarcane + Wheat (1:2)	43.2	148.5	200.2	106.9	73.9	702.0	33.6	90.7	18.89
T_3	Autumn Sugarcane + Wheat (1:3)	44.0	150.6	203.2	105.7	71.8	683.2	35.9	89.8	19.05
T_4	Sug. after harvest of 15 Nov.Wheat	33.9	112.0	169.9	92.2	59.9	611.6	38.0	78.9	17.41
T_5	Sug. after harvest of 15 Dec Wheat	35.8	109.8	170.2	88.9	57.9	610.2	28.9	72.4	17.48
T_6	Feb. cane in furrows of 15 Nov. FIRB Wheat	42.2	151.4	203.4	100.2	74.0	690.8	32.8	90.4	18.52
T_7	Mar. cane in furrows of 15 Nov.FIRB Wheat	42.9	150.0	202.8	98.5	73.6	685.8	32.9	90.0	18.79
T_8	Feb. cane in furrows of 15 Dec. FIRB Wheat	42.2	152.5	199.9	98.9	74.4	689.8	26.2	87.5	18.22
T_9	Mar. cane in furrows of 15 Dec. FIRB Wheat	42.0	150.6	198.6	97.0	73.2	699.6	26.8	87.6	18.46
CD (0.05)		**NS**	**25.4**	**14.9**	**9.8**	**11.5**	**68.3**	**6.0**	**9.3**	**0.58**

3. UCHANI

Sugarcane variety CoH 150 and wheat variety HD 2967 were planted as per treatment in different dates of planting in randomized block design with three replications. The soil of the experimental field was clay loam in texture having pH 7.9, EC 0.4 dsm^{-1}, organic carbon 0.38%, available P 12.3 kg/ha and available K 156 kg/ha. Recommended doses of phosphorus (50 kg P_2O_5/ha) and potash (50 kg K_2O/ha) were applied at the time of planting whereas nitrogen (150 kg N/ha) was applied in three equal splits in case of sugarcane crop Whereas in wheat crop full dose of phosphorus (60 kg/ha) and potash (60 kg/ha) were applied at the time of planting and nitrogen (150 kg/ha) was applied in two equal splits (21 and 42 days after sowing). Crops were irrigated as per the requirement of wheat crop upto harvesting of wheat and later on sugarcane was irrigated at 8-10 days intervals during pre-monsoon period and 20 days interval during post monsoon period. Wheat crop was harvested on April 15, 2014.Planting of sugarcane (after wheat harvest) in treatment T_4 and T_5 was done as per dates mentioned in the following table.

Tr. No.	Planting of sugarcane	Harvesting of sugarcane
1	25-10-2013	10-01-2015
2	25-10-2013	10-01-2015
3	25-10-2013	10-01-2015
4	20-04-2014	20-03-2015
5	20-04-2014	20-03-2015
6	20-02-2014	18-3-2015
7	20-3-2014	18-3-2015
8	20-2-2014	18-3-2015
9	20-3-2014	18-3-2015

Wheat crop:

Data revealed that wheat sown with autumn cane on October 25, 2013 in 1:2 and 1:3 ratio and 15th November on raised bed or by conventional method produced higher grain yield of (56.6-58.2 q/ha) as compared to wheat sown on 15th December (49.4-50.6 q/ha).

Sugarcane

Autumn planted cane recorded significantly higher germination, tillers, millable canes and cane yield as compared to spring and late planting. Lowest germination was recorded in late planting of sugarcane after wheat harvest. Treatments T_1, $T_2$and T_3being at par recorded significantly higher number of tillers, millable canes, cane weight ,cane yield and sugar yield as compared to rest of the treatments. FIRB sowing of wheat on 15th November + planting of sugarcane in standing crop of wheat in February or March (T_6, T_7) and FIRB sowing of wheat on 15th December + planting of sugarcane in standing crop of wheat in February or March (T_8, T_9) being at par produced significantly higher number of tillers, NMC, cane weight, cane yield and sugar yield as compared to late planting of sugarcane after wheat harvesting (T_4 and T_5). There was a yield reduction of 40 % with late planting of sugarcane after wheat harvesting as compared to planting of sugarcane in February or March in standing crop of wheat (Table 5). Wheat sown with autumn cane on Oct. 25, 2013 in 1:2 and 1:3 ratio and 15th November on bed or by conventional method produced higher grain yield of (53.0-55.2 q/ha) as compared to wheat sown on 15th December (44.2-44.4 q/ha). Autumn planted cane as sole or intercropped with wheat in 1:2 and 1:3 ratio recorded significantly cane yield as compared to spring and late planting. Lowest germination was recorded in late planting of sugarcane after wheat harvest. There was a yield reduction of about 40% with late planting of sugarcane after wheat harvesting as compared to planting of sugarcane in February or March in standing crop of wheat. Maximum cane equivalent yield was recorded in autumn sugarcane + wheat intercropping system of 1:2 (127.0 t/ha) and 1:3 ratio (126.0 t/ha) and closely followed by FIRB sowing of wheat on 15th November or 15th December + sugarcane in furrows in 3rd week of February or March (104.2-109.2 t/ha) and lowest in T_4 (75.0 t/ha)and T_5 (70.3 t/ha)treatments.

Summary: Wheat sown with autumn cane on Oct. 25, 2013 in 1:2 and 1:3 ratio and 15th November on bed or by conventional method produced higher grain yield of (53.0-55.2 q/ha) as compared to wheat sown on 15th December (44.2-44.4 q/ha). Autumn planted cane as sole or intercropped with wheat in 1:2 and 1:3 ratio recorded significantly cane yield as compared to spring and late planting. Lowest germination was recorded in late planting of sugarcane after wheat harvest. There was a yield reduction of about 40% with late planting of sugarcane after wheat harvesting as compared to planting of sugarcane in February or March in standing crop of wheat. Maximum cane equivalent yield was recorded in autumn sugarcane + wheat intercropping system of 1:2 (127.0 t/ha) and 1:3 ratio (126.0 t/ha) and closely followed by FIRB

sowing of wheat on 15th November or 15th December + sugarcane in furrows in 3rd week of February or March (104.2-109.2 t/ha) and lowest in T_4 (75.0 t/ha) and T_5 (70.3 t/ha)treatments.

Table AS 65.3.1: Effect of different treatments on wheat and growth parameters of sugarcane

Sr. No.	Treatments	Wheat Grain yield (q/ha)	S. cane germi. (%)	Tillers (000/ha)	NMC (000/ha)	Cane wt.(g)
T_1	Autumn planted sugarcane	---	50.6	138.3	106.3	975
T_2	T_1 + Wheat (1:2)	55.2	48.6	135.6	104.8	971
T_3	T_1 + Wheat (1:3)	54.6	48.1	135.1	104.2	969
T_4	Wheat sown on 15th Nov. followed by sugarcane planting after wheat harvest	53.0	38.2	77.1	76.4	660
T_5	Wheat sown on 15th Dec. followed by sugarcane planting after wheat harvest	44.4	38.4	76.2	76	656
T_6	FIRB sowing of wheat 15th Nov. + Sugarcane in furrows in 3rd week of February	54.2	45.5	126.6	100.3	835
T_7	FIRB sowing of wheat 15th Nov. + Sugarcane in furrows in 3rd week of March	54.1	46.3	127	101.4	836
T_8	FIRB sowing of wheat 15th Dec. + Sugarcane in furrows in 3rd week of February	44.2	45.4	128.8	100.8	834
T_9	FIRB sowing of wheat 15th Dec. + Sugarcane in furrows in 3rd week of March	44.3	46.6	129.5	101.6	832
	CD at 5%	1.8	2.7	5.9	6.5	18

Table AS 65.3.2: Effect of different treatments on cane yield, CCS (%) and sugar yield

Sr. No.	Treatments	Cane yield (t/ha)	Equivalent yield (t/ha)	Total cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
T_1	Autumn planted sugarcane	102.9	--	102.9	12.26	12.62
T_2	T_1 + Wheat (1:2)	100.8	26.2	127.0	12.22	15.52
T_3	T_1 + Wheat (1:3)	100.0	26.0	126.0	12.24	15.42
T_4	Wheat sown on 15th Nov. followed by sugarcane planting after wheat harvest	49.8	25.2	75.0	11.15	8.36
T_5	Wheat sown on 15th Dec. followed by sugarcane planting after wheat harvest	49.2	21.1	70.3	11.18	7.86
T_6	FIRB sowing of wheat 15th Nov. + Sugarcane in furrows in 3rd week of February	82.7	25.8	108.5	11.85	12.86
T_7	FIRB sowing of wheat 15th Nov. + Sugarcane in furrows in 3rd week of March	83.8	25.7	109.5	11.9	13.03
T_8	FIRB sowing of wheat 15th Dec. + Sugarcane in furrows in 3rd week of February	83.2	21.0	104.2	11.88	12.38
T_9	FIRB sowing of wheat 15th Dec. + Sugarcane in furrows in 3rd week of March	83.6	21.1	104.7	11.86	12.42
CD at 5%		3.6			0.10	0.35

4. LUCKNOW

The field experiment was conducted during 2013-15 to enhance the productivity of sugarcane under wheat – sugarcane cropping system. The experiment comprising 9 treatments viz.; T_1: Autumn planted sugarcane, T_2 : T_1+ wheat (1:2), T_3: T_1+ wheat (1:3), T_4: wheat sown on 15th November – late sugarcane, T_5: wheat sown on 15th December – late sugarcane, T_6: wheat sown (three rows) on 15th November under FIRB + sugarcane in furrows at 75 cm in 3rd week of February, T_7: wheat sown (three rows) on 15th November under FIRB + sugarcane in furrows at 75 cm in 3rd week of March, T_8: T_6 with sowing of wheat on 15th December and T_9: T_7 with sowing of wheat on 15th December was laid out in Randomized Block Design with three replications. The findings reveals that wheat grain yield was the highest (46.6 q/ha) in November sown wheat in the treatment T4. Wheat yielded almost the same in flat as well as FIRB method. However, wheat sown in the month of November yielded higher than wheat sown in December due to higher number of ear-heads per running meters, number of grains per ear-head and test weight. Wheat (Nov.) + sugarcane (Feb/March) under FIRB method produced higher wheat yield (41.13 q/ha) over sugarcane (Oct) + wheat (Nov) in 1:3 row ratio (40.48 q/ha) as well as 2:1 row ratio (32.54 q/ha).

Tiller population was the highest in the month of June and thereafter it started declining due to its mortality. The highest tiller count (213.0 thousands/ha) was recorded in the month of June in autumn planted sole sugarcane followed by sugarcane planted in 3rd week of February with wheat under FIRB system (204.8 thousand /ha). Tiller count in autumn planted sole sugarcane and sugarcane planted with wheat in 3rd week of February under FIRB system were statistically the same but higher than sugarcane planted with wheat in 3rd week of March under FIRB. The lowest tiller population (86.3 thousand /ha) was observed in sugarcane planted with wheat (1:3) under flat method followed by wheat – late sugarcane (97.3 thousand /ha) and sugarcane + wheat (1:2) system (102.1 thousand /ha). The cane yield was the highest (77.4 tonnes/ha) in autumn planted sole sugarcane. Sugarcane planted in 3rd week of February in standing wheat under FIRB method (67.7 tonnes/ha) was significantly higher than sugarcane planted in 3rd week of March in wheat under FIRB and sugarcane + wheat (1:2) due to higher NMC, cane length and cane weight. The lowest cane yield was recorded in wheat – sugarcane system (49.0 tonnes/ha) and sugarcane + wheat in1:3 row ratio (49.3 tonnes/ha). Cane equivalent yield (96.5 t/ha) and B: C ratio were the highest in sugarcane planted in 3rd week of February in wheat under FIRB method. Sucrose content in cane juice was significantly higher in autumn, February and/or March planted cane over cane planted after wheat harvest. Other juice quality parameters like brix and purity was not affected by the treatments. CCS % in cane was also statistically the same under all the treatments. However, autumn planted cane recorded the significantly highest CCS (t/ha) over rest of the treatments. Sugarcane planted on 3rd week of February in wheat under FIRB method achieved significantly higher CCS (t/ha) over sugarcane planted in 3rd week of March in wheat under FIRB method, sugarcane + wheat (1:2 or 1:3 ratio) and wheat – sugarcane system. Significantly the lowest CCS (t/ha) was recorded in wheat – sugarcane and sugarcane + wheat (1:3).

Table AS 65.4.1: Effect of different wheat – sugarcane systems on growth and yield of sugarcane

Treatment	Tiller count in June ('000/ha)	Yield attributes at harvest				Cane yield (t/ha)	Wheat Yield (q/ha)	CEY (t/ha)	B:C
		Cane length (cm)	Cane diameter (cm)	Cane weight (g)	NMC (000'ha)				
T1 - Sole cane	213.0	220	2.39	887	110.3	77.4	-	77.4	2.04
T2 - Sugarcane + Wheat (1:2)	102.1	191	2.36	767	85.4	56.0	32.54	78.9	1.79
T3 - Sugarcane + Wheat (1:3)	86.3	190	2.33	757	79.8	49.3	40.48	77.8	1.75
T4 -Wheat (Nov) - Sugarcane	97.3	182	2.09	596	91.4	49.0	41.27	78.0	1.68
T5 - Wheat (Dec) - Sugarcane	92.2	179	2.11	604	90.8	50.6	34.64	75.0	1.62
T6 -Wheat (Nov) + S Cane (Feb) under FIRB	204.8	200	2.23	743	109.7	67.7	40.95	96.5	2.07
T7 -Wheat (Nov) + S Cane (Mar) under FIRB	158.9	193	2.21	703	105.1	57.6	41.30	86.6	1.86
T8 -Wheat (Dec) + S Cane (Feb) under FIRB	199.7	202	2.20	747	112.5	68.8	32.70	92.2	2.00
T9 -Wheat (Dec) + S Cane (Mar) under FIRB	164.6	198	2.20	713	106.7	59.8	33.65	83.5	1.81
SEm ±	4.18	4.07	0.031	6.73	3.34	2.0	-	-	-
CD (P=0.05)	12.5	12.2	0.09	20.17	10.0	6.0	-	-	-

CEY: Cane equivalent yield calculated based on prices for sugarcane: Rs 290/q; wheat grain Rs 1450/q and wheat straw Rs 500/q.

Table AS 65.4.2: Effect of different wheat – sugarcane systems on juice quality parameters of Sugarcane

Treatment	Juice quality parameters			CCS (%)	CCS (t/ha)
	^{0}Brix	Sucrose (%)	Purity (%)		
T1 - Sole cane	20.21	17.21	85.21	11.69	9.06
T2 - Sugarcane + Wheat (1:2)	20.20	17.19	85.16	11.67	6.54
T3 - Sugarcane + Wheat (1:3)	20.18	17.18	85.18	11.67	5.76
T4 -Wheat (Nov) - Sugarcane	20.06	17.05	85.04	11.57	5.67
T5 - Wheat (Dec) -Sugarcane	20.03	17.00	84.96	11.52	5.83
T6 -Wheat (Nov) + S Cane (Feb) under FIRB	20.19	17.21	85.24	11.69	7.92
T7 -Wheat (Nov) + S Cane (Mar) under FIRB	20.16	17.17	85.20	11.66	6.72
T8 -Wheat (Dec) + S Cane (Feb) under FIRB	20.18	17.19	85.22	11.67	8.08
T9 -Wheat (Dec) + S Cane (Mar) under FIRB	20.17	17.16	85.15	11.65	6.98
SEm ±	0.06	0.05	0.16	0.04	0.24
CD (P=0.05)	NS	0.14	NS	NS	0.73

5. PANTNAGAR

Wheat variety UP 2565 and sugarcane variety Co Pant 90223 were planted as per technical programme (details are given). Wheat and sugarcane crops were raised as per recommended practices and as per need of the crop. The soil of experimental plots was silty loam in texture having organic carbon (1.05 %) and available P_2O_5 (49.0 kg/ha) and K_2O (240.0 kg/ha) and soil was neutral in (pH 6.9).

Wheat: Data revealed that highest grain yield was recorded from the treatment T4 and T5 (November, 15 sown) followed by FIRBS sowing (3 rows of wheat on 75 cm) in treatment T6 and T7. Reduction in grain yield due to late planting was recorded in (15th December sown wheat).

Sugarcane: Highest cane yield was recorded in the treatment T1 - (Autumn planted cane) without (wheat inter crop). Reduction in cane yield by 14 % and 15 % in the treatment T2 and T3 (2 rows of wheat and 3 rows of wheat planted in between two rows of sugarcane, respectively. Cane yield was reduced in T4 and T5 (in late planted sugarcane after wheat harvest irrespective of wheat sowing either in 15th November or 15th December). Reduction in cane yield was recorded 36 % due to late planting of sugarcane. Sugarcane yield was improved in T8 and T9 in which sugarcane was planted in furrows in standing crop of wheat (planted on FIRBS) either on Feb. or March. NMC, sugarcane girth, cane weight were also affected badly in late planted sugarcane and these parameters were improved when sugarcane was planted in furrows in Feb/March in standing crop of wheat.

However, reduction in cane yield was compensated with wheat intercropping with wheat 2 or 3 rows in between two rows of sugarcane over autumn planted alone. Even sugarcane equivalent yield was higher in T6 - (FIRBS sowing wheat 3 rows and sugarcane planted in furrows in 3rd week of February). Highest CCS yield 9.5 ton/ha was recorded in autumn planted sugarcane which was significantly higher over rest of the treatments (Table-8).

Summary: Sugarcane yield, NMC, cane girth, cane length, cane weight, CCS yield and sucrose % at harvesting were higher in autumn planted sugarcane as compared to rest of the treatments. Though, reduction in cane yield (14 % and 15 %) was recorded in wheat planting as intercrop 2 or 3 rows in between of two rows of sugarcane as compared to autumn planted cane without wheat intercropping. However, this reduction in cane yield was compensated by intercrop wheat and thus equivalent yield was higher in 2 rows wheat planted in between two rows of autumn planted sugarcane. Reduction in cane yield was highest in late planted cane after wheat harvest (36 %). The reduction in cane yield was minimized in T6 - (18 %), T7 - (24 %) or T8 and T9 - (25 %) by planting of sugarcane in furrows in standing crop of wheat either in the month of February-March.

Pooled analysis: Experiment was conducted during three consecutive years *i.e.* 2012-13, 2013-14 and 2014-15 in Randomized block design in three replications. Both the crops wheat and sugarcane were grown as per recommended package and practices. On the basis of pooled analysis data given in table - 9 revealed that highest cane yield was recorded in autumn planted crop which was significantly higher over rest of the treatments. Cane yield was affected in 3 rows planted wheat significantly as compared to 2 rows of wheat planted in between two rows of sugarcane. Reduction in cane yield was recorded higher 26.1 % in late planted sugarcane (sown after wheat harvesting) Sugarcane yield could not affect due to planting of wheat on FIRB and sugarcane planted either in 3rd week of March or 3rd week of February when sugarcane was planted in furrows in between FIRB. Lowest cane yield was recorded when wheat was planted on December 15th (late) and sugarcane was planted after wheat harvesting. The cane yield was directly related to NMC in different treatments. As indicated in (table - 9) that higher cane yield in different treatments was due to higher NMC in all the three years and pooled analysis also shown the similar results. Lowest NMC/ha were recorded in late planted sugarcane (sown after wheat harvest). NMC were also affected due to wheat intercropping (1: 3 ratio). Ultimately CCS yield was also recorded highest in autumn planted cane which was significantly higher were over rest of the treatments except intercropping of wheat (1: 2). Equivalent yield was recorded highest in the treatment of wheat sown on FIRB on 15thNovember and sugarcane was planted in blank furrows in 3rd

week of March. Late planted sugarcane after wheat harvest was not good and lowest cane yield was recorded.

Summary: On the basis of pooled analysis of three years of the data it may be concluded that-

(i) Autumn planted sugarcane without intercropping of wheat was not economical inspite of highest cane yield over the year.

(ii) In between two rows of sugarcane wheat sown (1: 2) was found economical in terms of higher equivalent yield of sugarcane.

(iii) Sugarcane yield was reduced in the treatment of 1: 3 sown of wheat in between two rows of sugarcane

(iv) Cane yield can be increased if wheat planted on FIRB (timely sown or late sown) and sugarcane planted in blank furrows either in the month of February or March in standing crop of wheat.

(v) Sugarcane planting after wheat harvesting should be restricted as the yield reduction was reduced upto 26 % in sugarcane-wheat cropping system.

Table AS 65.5.1: Effect of FIRB method of sowing on wheat growth and yield

Treatments	Wheat population/m^2 (30 DAS)	Wheat tillers		Wheat straw yield (q/ha)	Wheat grain yield (q/ha)
		60 DAS	90 DAS		
T_1 -Autumn planted sugarcane	0.0	0.0	0.0	0.0	0.0
T_2-T_1 + wheat (1:2)	180.0	191.3	297.3	36.8	33.4
T_3-T_1 + wheat (1:3)	206.0	246.7	315.3	30.2	32.9
T_4-Wheat sown on 15th November – late sugarcane	320.3	337.0	341.0	47.2	43.8
T_5-Wheat sown on 15th December – late sugarcane	174.0	186.0	271.7	29.3	27.3
T_6-FIRB sowing of wheat 15th November (cm with 3 row of wheat) + sugarcane furrow in 3rd week of February	260.7	186.0	281.7	34.1	35.6
T_7-FIRB sowing of wheat 15th November (cm with 3 row of wheat) + sugarcane furrow in 3rd week of March	176.7	187.0	76.7	29.7	30.9
T_8-T_6 with 15th Dec. Sowing of wheat +Sugarcane III_{rd} week of February	172.3	183.7	268.0	27.3	26.3
T_9-T_7 with 15th Dec. Sowing of wheat + Sugarcane III_{rd} week of March	170.0	182.7	263.3	26.3	25.5
SEm±	5.4	6.9	5.8	2.3	2.7
CD at 5 %	16.1	20.9	17.5	6.9	8.1

Table AS 65.5.2: Performance of sugarcane –wheat system under FIRB

Treatments	Sugarcane germination (%) 45 DAS	Plant height (cm)	NMC 000/ha	Cane weigh t (g)	Yield (t/ha)	Sucrose % at Nov.	Sucrose % at harvest	CCS (t/ha)	Equivalent yield of sugarcane (q/ha)
T_1 -Autumn planted sugarcane	22.2	313.3	102.3	1050. 0	95.9	14.3	15.2	9.5	959.0
T_2-T_1 + wheat (1:2)	23.5	310.0	91.4	950.0	82.1	14.4	14.8	7.6	982.0
T_3-T_1 + wheat (1:3)	25.2	301.7	85.0	966.7	81.3	14.2	14.3	7.1	971.6
T_4-Wheat sown on 15th November – late sugarcane	27.4	270.0	63.1	816.6	61.3	13.4	14.2	5.4	824.2
T_5-Wheat sown on 15th December – late sugarcane	27.1	283.3	61.6	783.3	60.1	13.7	13.8	5.1	738.6
T_6-FIRB sowing of wheat 15th November (75 cm with 3 row of wheat) + sugarcane in furrow in 3rd week of February	29.9	290.0	67.7	733.3	79.0	14.2	14.2	6.3	961.6
T_7-FIRB sowing of wheat 15th November (75 cm with 3 row of wheat) + sugarcane in furrow in 3rd week of March	31.7	266.7	76.8	883.3	72.0	14.4	14.4	6.1	869.0
T_8-T_6 with 15th Dec. Sowing of wheat +Sugarcane III_{rd} week of February	29.8	280.0	73.8	850.0	71.7	14.0	14.5	5.1	843.8
T_9-T_7 with 15th Dec. Sowing of wheat + Sugarcane III_{rd} week of March	32.7	280.0	73.3	833.3	71.1	14.0	14.5	6.2	833.9
SEm±	1.4	13.6	2.8	52.7	0.1	0.16	0.10	0.3	-
CD at 5 %	4.2	41.0	8.4	158.2	0.3	0.48	0.30	0.9	-

Table AS 65.5.3: Pooled effect of FIRB treatments on sugarcane yield over the years

Treatments	Cane yield (t/ha)				CCS (t/ha)			
	2012 -13	2013 -14	2014 -15	Pooled	2012-13	2013-14	2014 - 15	Pooled
T_1 -Autumn planted sugarcane	74.7	76.5	95.9	82.4	8.0	8.2	9.5	8.6
T_2-T_1 + wheat (1:2)	70.3	69.1	82.1	73.8	7.1	7.4	7.6	7.4
T_3-T_1 + wheat (1:3)	62.7	63.2	81.3	69.0	6.6	6.5	7.1	6.7
T_4-Wheat sown on 15th November – late sugarcane	60.7	60.8	61.3	60.9	5.3	5.8	5.5	5.5
T_5-Wheat sown on 15th December – late sugarcane	51.3	51.9	60.1	54.4	4.6	4.9	5.1	5.0
T_6-FIRB sowing of wheat 15th November (75 cm with 3 row of wheat) + sugarcane in furrow in 3rd week of February	67.3	67.8	79.0	71.3	6.0	6.8	6.3	6.4
T_7-FIRB sowing of wheat 15th November (75 cm with 3 row of wheat) + sugarcane in furrow in 3rd week of March	69.8	70.4	72.0	70.5	6.1	7.6	6.1	6.6
T_8-T_6 with 15th Dec. Sowing of wheat +Sugarcane III$_{rd}$ week of February	68.8	69.3	71.7	70.0	6.0	6.7	5.1	6.0
T_9-T_7 with 15th Dec. Sowing of wheat + Sugarcane III$_{rd}$ week of March	68.8	69.1	71.1	70.0	6.3	6.9	6.2	6.2
SEm±	1.7	1.0	2.2	1.0	0.9	0.1	0.3	0.4
CD at 5 %	5.1	3.1	6.2	2.9	NS	0.4	0.9	1.3

NORTH CENTRAL ZONE

6. PUSA

The data obtained on growth, yield attributes and yield of sugarcane and wheat and pol percent in juice as affected by different treatments revealed that sole sugarcane (T1) recorded significantly higher plant population (172.1 thousand/ha), millable canes (121.0 thousand/ha) and cane yield (93.3 t/ha) was statistically similar to T2 in case of plant population, T2, T3, and T6 in case of millable canes and T2, T3, T6, T7 and T8 in case of cane yield. The effect of treatments on pol percent juice was found to be non-significant. Maximum wheat grain (5.27 t/ha) and straw yield (6.32 t/ha) were recorded due to wheat sown on 15th Nov. followed by late planted sugarcane (T4) was statistically similar to wheat sown on 15th December followed by late sugarcane (T5) and significantly superior to rest of the combinations. The higher cane equivalent yield of 117.8 t/ha was recorded by T3 which was followed by T4 and T6.

Summary
Accommodation of three rows of wheat between two rows of sugarcane (T3) recorded higher sugarcane equivalent yield (117.8 t/ha) followed in order by wheat sown on 15th Nov. - late sugarcane (T4) and FIRB sowing of wheat on 15th Nov. + sugarcane planted in furrow during 3rd week of February.

Table AS 65.6.1: Yield and yield attributing characters of sugarcane under wheat-sugar cropping system during 2014-15 at Pusa, Bihar

Treatment	Germination %	Plant population ('000/ha)	NMC ('000/ha)	Cane yield (t/ha)	Pol in juice (%)	Germi-nation (%)	Tillers (Row/m)	Grain yield	Straw yield	CEY (t/ha)
	Sugarcane					Wheat				
T_1	34	172.1	121.0	93.3	17.20	-	-	-	-	93.3
T_2	33	152.8	109.2	86.9	17.00	39	85	2.41	3.02	109.1
T_3	33	148.9	106.7	85.3	16.63	40	82	3.55	4.43	117.8
T_4	32	128.8	93.3	68.2	19.90	39	80	5.27	6.32	116.0
T_5	32	122.6	83.1	66.0	16.60	37	79	4.72	5.96	109.5
T_6	30	148.7	103.6	81.6	17.01	39	79	3.43	4.28	113.1
T_7	30	139.1	101.5	80.0	17.15	40	72	3.29	4.27	110.6
T_8	31	141.7	102.4	81.0	16.75	38	68	2.82	3.38	106.6
T_9	31	144.5	100.4	78.8	16.91	38	65	2.73	3.28	103.5
SEm ±	2.21	6.77	5.80	4.70	0.73	2.65	3.73	0.234	0.293	-
CD (P = 0.05)	NS	20.3	17.4	14.1	NS	NS	11.3	0.71	0.89	-
CV (%)	12.1	8.1	9.8	10.2	3.43	11.9	8.5	11.48	11.65	-

PENINSULAR ZONE

7. POWARKHEDA

The results showed that the significantly highest Sugarcane equivalent yield (103.87 t/ha) obtained with autumn planted Sugarcane + Wheat (1:2) followed by autumn planted Sugarcane + Wheat (1:3) (101.68 t/ha) intercropping systems. Among these treatment the equivalent yield recorded at par. The highest net return (Rs.59618/ha) and B:C ratio(1:1.35) was recorded under autumn planted Sugarcane + Wheat (1:2) intercropping systems followed by autumn planted Sugarcane + Wheat (1:3) (Rs.54791/ha.),Net return and(1: 1.32) B : C ratio intercropping system. The percent increase (9.89%) in sugarcane equivalent yield was also obtained higher with autumn planted Sugarcane + Wheat (1:2) intercropping system followed by autumn planted Sugarcane + Wheat (1:3) (7.57 %) intercropping system then sole sugarcane cropping system.

Table AS 65.7.1: Yield and profitability of sugarcane-wheat system at Powarkheda

Treatments	Yield main crop (t / ha)	Yield Intercrop (t / ha)	Sugarcane equivalent yield (t/ ha)	Grass Monitory return (Rs./ ha)	Cost cultivation (Rs/ha)	Net Return (Rs /ha)	B : C Ratio	Increasing equivalent yield (%)
T_1 : Autumn planted Sugarcane	94.52	-	94.52	207944	159990	47954	1.29	-
T_2: T_1 + Wheat (1:2)	91.05	1.82	103.87	228518.6	168900	59618.64	1.35	9.89
T_3: T_1 + Wheat (1:3)	86.88	2.1	101.68	223692	168900	54791.98	1.32	7.57
T_4: Wheat sown on 15 thNov. -late Sugarcane	40.90	2.08	55.55	122209.1	168900	-46690.9	0.72	-41.22
T_5: Wheat sown on 15th Dec. -late Sugarcane	40.43	2.06	54.95	120880.6	168900	-48019.4	0.71	-41.86
T_6: FIRB Sowing of Wheat 15th Nov.(75 cm with 3 rows of wheat}+ S. in furrow in 3rd week of Feb.)	83.20	2.1	98.00	215590	168900	46690.00	1.27	3.68
T_7: FIRB Sowing of Wheat 15th Nov.(75 cm with 3 rows of wheat}+ S. in furrow in 3 rd week of March.)	74.46	2.26	90.38	198841.7	168900	29941.73	1.17	-4.38
T_8: T_6 with 15th Dec. sowing of wheat	81.49	2.28	97.55	214618	168900	45718.00	1.27	3.2
T_9: T_7 with 15thDec. sowing of wheat	75.77	2.26	91.69	201727.5	168900	32827.53	1.19	-2.99
SEm +			**1.86**					
CD at 5 %			**5.57**					

8. PADEGAON

Data revealed that, cane yield and CCS yield (145.21 t ha^{-1} and 20.61 t ha^{-1}, respectively) were significantly higher in treatment T_1 (autumn planted Sugarcane) than the rest of the treatments. Regarding intercropping, autumn planted sugarcane + wheat (1:2) (T_2) produced significantly higher cane yield and CCS yield (135.62 t ha^{-1} and 18.54 t ha^{-1}, respectively) than other treatments except autumn planted sugarcane + wheat (1:3) (T3).

As regards intercrop yield, FIRB sowing of wheat 15th November (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of March (T_7) recorded higher wheat yield (39.1 q ha^{-1}) and found at par with FIRB Sowing of wheat 15th November (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of February (T6).

Data indicated that, the cane girth (10.87) was significantly higher in autumn planted sole sugarcane (T1) over rest of the treatments, however, it was on par with treatment T2, T3 and T4. Also NMC/ha (99208) was found significantly higher in autumn planted sole sugarcane over rest of the treatments. The growth observations germination, tillering ratio millable height, number of internodes cane-1 and weight per cane were found to be non-significant. There were no significant difference found with respect to quality parameters.

Economics

Cane equivalent yield due to different treatments differed significantly. Significantly the highest cane equivalent yield (161.49 t ha^{-1}) was recorded under autumn planted sugarcane + wheat (1:3) (T_3) which was at par with autumn planted sugarcane + wheat (1:2) (T_2) (158.89 t ha^{-1}).The maximum gross monetary returns and net monetary returns were recorded by autumn planted sugarcane + wheat (1:3) (T3) (Rs.363350/- and Rs.245452/-, respectively) which was followed by autumn planted sugarcane + wheat (1:2) (T2) (Rs.357506/- and Rs.242223/-). The benefit: cost ratio was higher in autumn planted sugarcane + wheat (1:2) (3.10) followed by treatment autumn planted sugarcane + wheat (1:3) (3.08).

SUMMARY:

The autumn planted sugarcane produced significantly higher cane yield and CCS yield (145.21 t ha-1 and 20.61 t ha-1, respectively). Under intercropping system, autumn planted sugarcane + wheat (1:2) produced significantly higher cane yield and CCS yield (135.62 t ha-1 and 18.54 t ha-1, respectively). The intercropping of autumn planted sugarcane + wheat (1:2) was found to be more remunerative.

Table AS 65.8.1 : Mean cane, CCS and intercrop yields as affected by various treatments

Treatments	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})	Wheat yield (q ha^{-1})
T_1- Autumn planted sugarcane	145.21	20.61	0.00
T_2-Autumn planted sugarcane + Wheat (1:2)	135.62	18.54	26.18
T_3- Autumn planted sugarcane + Wheat (1:3)	135.48	18.14	29.26
T_4- Wheat sown on 15th November – Late Sugarcane	121.94	16.57	19.52
T_5- Wheat sown on 15th December – Late Sugarcane	112.07	15.52	18.47
T_6- FIRB sowing of wheat 15th November (75 cm with 3 rows of wheat)+ Sugarcane in furrows in third week of February	92.88	12.84	33.02
T_7- FIRB Sowing of wheat 15th November (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of March	87.01	11.86	39.16
T_8- FIRB sowing of wheat 15th December (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of February.	93.58	12.71	30.02
T_9- FIRB Sowing of wheat 15th December (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of March.	86.04	11.75	31.11
SE $\pm$	2.63	0.62	2.16
CD at 5%	7.87	1.86	6.47
G.M.	112.20	15.39	25.19

Table AS 65.8.2: Economics of sugarcane intercropping as influenced by different treatments

Treatments	Cane yield (t ha^{-1})	Inter crop yield (t ha^{-1})	Cane equ. yield (t ha^{-1})	Gross monetary returns (Rs.ha^{-1})	Cost of production (Cost A) (Rs.ha^{-1})	Net returns (Rs.ha^{-1})	B:C ratio
T_1- Autumn planted sugarcane	145.21	0.00	145.21	326717	110033	216684	2.97
T_2-Autumn planted sugarcane + Wheat (1:2)	135.62	26.18	158.89	357506	115283	242223	3.10
T_3- Autumn planted sugarcane + Wheat (1:3)	135.48	29.26	161.49	363350	117908	245442	3.08
T_4- Wheat sown on 15th November – Late Sugarcane	121.94	19.5	139.29	313404	115283	198121	2.72
T_5- Wheat sown on 15th December – Late Sugarcane	112.07	18.47	128.49	289097	115283	173814	2.51
T_6- FIRB sowing of wheat 15th November (75 cm with 3 rows of wheat)+ Sugarcane in furrows in third week of February	92.88	33.02	122.23	275021	117908	157113	2.33
T_7- FIRB Sowing of wheat 15th November (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of March	87.01	39.16	121.82	274086	117868	156218	2.33
T_8- FIRB sowing of wheat 15th December (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of February.	93.58	30.02	120.27	270603	117908	152695	2.30
T_9- FIRB Sowing of wheat 15th December (75 cm with 3 rows of wheat) + Sugarcane in furrows in third week of March.	86.04	31.11	113.69	255803	117918	137885	2.17
SE $\pm$	2.63	2.16	3.31	-	-	-	-
CD at 5%	7.87	6.47	9.92	-	-	-	-
G.M.	112.20	25.19	134.60	-	-	-	-

Selling rate - 1. Sugarcane- Rs 2250 t^{-1}. 2. Wheat- Rs 2000 q^{-1}

PROJECT NO. : AS 66

Title : **Priming of cane node for accelerating germination.**

Objectives :

1. To find out suitable cane node priming technique.
2. To assess the effect of cane node on acceleration of germination.

Year of start : 2012-13

Centres : All participating centres except Sriganganagar.

Treatments : T_1 : Un-primed cane node.

T_2 : Treating cane node in hot water at 50^oC for 2 hours.

T_3 : Treating cane node in hot water (50^oC) urea solution (3%) for 2 hours.

T_4 : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio.

T_5 : Conventional 3-bud sett planting.

*T_6 : Primed and sprouted cane node (Incubated for four days after priming).

*Put the single cane node in the slurry of cattle dung, cattle urine and water for 15 minutes. Take out the buds and put in decomposed FYM and cover it with sugarcane trash for 4-5 days for sprouting.

Design : RBD

Replications : Four

Note:

1. Cane nodes having bud and root bands with 4-5cm length and 10-15 g in weight will be taken up for planting.
2. Normal package of practices will be followed.
3. After planting cane nodes in furrows, these will be covered with 2-3cm soil layer.
4. At the time of planting, there should be 60% available moisture in the soil.
5. Depth of planting at 10cm with soil coverage of 2.5cm. Plant to plant spacing at 30cm.

Observations to be recorded :

i) Germination at 10,20,30 and 40DAP.
ii) Shoot counting at 60,90,120 and 150DAP.
iii) Per clump shoot counting at 60,90,120 and 150DAP.
iv) Number of millable canes, cane length, diameter and weight of cane.
v) Juice quality (brix, pol% juice and purity).
Vi) Cane and sugar yields.

SUMMARY REPORT OF THE LAST YEAR (2013-14)

The project was started during 2012-13 and was repeated in 2013-14 with allotment to all the participating centres. Out of that 18 centres conducted this trial and 7 centres namely, Akola, Coimbatore, Kolhapur, Pune, Mandya, Sriganganagar and Bethuadhari did not conduct it.

NORTH WEST ZONE

1. FARIDKOT

Germination% of single bud was significantly better than three budded setts. Three budded planting was significantly better than all single bud treatments in respect of cane yield. Among single bud treatments priming has some positive effect but not statistically significant.

2. KOTA

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio was found suitable for increasing cane yield which was significantly superior over un-primed cane node, conventional 3- bud sett planting treatment, T_2 and T_3 except T_6.The germination percentage of T_4 was significantly higher over rest of the treatments except T5 at 40DAP.

3. KAPURTHALA

In this experiment the optimum germination was achieved in only T5 where conventional three budded sets were planted whereas all other treatments had very poor germination. Hence the data was not recorded.

4. LUCKNOW

Cane yields obtained under T3,T4,T5 and T6 treatments being statistically at par among themselves were significantly higher to the tune of 12.65 and 11.29% than that of T1 and T2 treatments (un-primed cane nodes or treated with hot water only). Conventional planting with 3-bud setts although produced cane yield at par with primed cane node treatments but with the use of huge seed cane (72 q/ha) whereas only 17.52 q/ha seed cane was used in cane node planting method. CCS% cane did not differ significantly due to different treatments in the test.

5. PANTNAGAR

Sugarcane setts germination at 20 DAP was improved by treating the setts with urea 3.0 % solution + hot water 50 0C for 2 hours and germination was sustained at 30 and 40 DAP. Highest cane yield and NMC were recorded in T5 (conventional 3 budded setts sown). CCS yield was also higher in this treatment.

6. SHAHJAHANPUR

Priming cane node with cattle dung, cattle urine and water 1:2:3 ratio (T4) gave significantly higher germination and cane yield than that of other treatments. T6 and T1 gave poorest germination. CCS % was not affected with different treatments. If cane node primed and planted directly in the field gave better germination than cane node primed and transplanted after sprouting.

7. UCHANI

Three bud planting recorded highest number of shoots (165.5 thousands/ha), millable canes (116.0 thousands/ha), cane weight (812 g), cane yield (92.0 t/ha), CCS (12.12 %) and sugar yield (11.15 t/ha) among all the treatments. Among priming treatments, planting of primed and sprouted cane node (T6) recorded highest germination at 40 DAS (51.5%), number of shoots (90.4 thousands/ha), millable canes (88.0 thousands/ha), cane weight (700 g), cane yield (60.0 t/ha) and sugar yield (7.18 t/ha).

PENINSULAR ZONE

8. PADEGAON

The conventional 3 bud setts planting recorded significantly higher germination per cent (75.54) and it was found at par with rest of the treatments except treating cane node in hot water in 50 0C for 2 hrs. The Priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio for 15 minutes recorded significantly the highest cane and CCS yields (134.68 and 14.33 t/ha), treating cane node in hot water for 50oc and urea solution (3%) for 2 hours was the next superior treatment.

9. POWARKHEDA

The germination percentage, cane yield and yield attributes increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (59.92%) than other treatments.

10. SANKESHWAR

As the germination was affected with hot water treatment in treatment no. T_2 and T_3 and poor germination in T_4 so the trial was vitiated.

11. NAVSARI

There was no significant difference was observed due to various priming techniques on cane length, girth, single cane weight and CCS yield. Significantly highest and lowest cane yield was yield was recorded with T_4 (111.57 t ha^{-1}) and T_5 (91. 80 t ha^{-1}) respectively. Almost all the quality parameters were not influenced due to priming treatment except CCS % and pol % juice which noticed highest with T1 however pol % juice remained at par with T_6.

12. THIRUVALLA

The results revealed that the conventional 3-bud sett planting recorded the highest germination percentage, cane and sugar yield and it was on par with priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio.

EAST COAST ZONE

13. ANAKAPALLE

The results indicated that conventional 3 bud sett planting recorded significantly higher number of millable canes (84,141/ha) and cane yield (84.6 t/ha). Priming cane node with cattle dung, urine and water in 1:2:5 ratio performed better and registered higher cane yield of 79.5 t/ha among different priming cane node treatments and it was on par with the conventional three budded sett planting.

14. CUDDALORE

Planting of sugarcane with three budded setts (T5) recorded significantly better all the growth, quality and yield parameters of sugarcane.

15. NAYAGARH

Conventional method of planting three budded sugarcane setts proved to be the best with highest number of net millable canes (67.50 thousand/ha), cane (81.28 t/ha) and CCS yield (10.18 t/ha). The treatment next in order was T6 where primed and sprouted cane nodes were planted which could produce NMC of 65.50 ('000 /ha) with cane and CCS yield of 77.00 and 10.54 t/ha, respectively.

NORTH CENTRAL ZONE

16. PUSA

The results thus indicated that the conventional 3-bud set planting was superior over primed and unprimed cane node in respect of germination, tillers and cane yield.

17. SHEORAHI

The experiment data were recorded and showed that low germination was there with unprimed cane node, however highest germination was in T4 (priming cane node with cattle dung, cattle urine and water 1:2:3 ratio) treatment. Experiment was planted on March 4, 2013 and harvested on March, 24, 2014. The data also showed that significantly higher cane yield was found in T4 treatment.

NORTH EASTERN ZONE

18. BURALIKSON

Result showed that conventional 3 bud sett planting recorded significantly higher NMC (96.1 thousand/ha), cane diameter (2.5cm) and yield (90.4 tonnes/ha), respectively than all other treatments. However, all other priming technique showed significantly higher yield than the un- primed cane node.

CENTRES ALLOTTED: All the participating centres of AICRP(S)

CENTRES REPORTED:

NORTH WEST ZONE: 7, All except Sriganganagar

PENINSULAR ZONE: 7, All except Coimbatore, Kolhapur and Pune

NORTH CENTRAL ZONE: 2, Pusa and Seorahi

NORTH EASTERN ZONE: 1, Buralikson

EAST COAST ZONE: 3, All the centres

REPORT OF THE CURRENT YEAR (2014-15)

Zone wise and Centre wise reports

NORTH WEST ZONE

PROJECT No. AS 66

1. FARIDKOT

Germination% of single bud was significantly better than three budded setts. Three budded planting (T_5) was significantly better in cane yield (85.4 t/ha) than all single bud treatments. Among single bud treatments of cane nodes (T_2-T_4 and T_6) is significantly better than un-primed cane nodes (T_1).

On the basis of three years data it can be concluded that among single cane node treatments priming treatments were better than control i.e. un-primed cane node. Three budded setts planting were better than all single cane node treatments.

Table AS 66.1.1: Growth, yield and quality of sugarcane during 2014-15 under various treatments

Treatments	Germination (%)		No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)
	30DAS	40DAS							
T_1	60.3	65.4	120.4	77.1	212	2.62	1035	52.7	17.14
T_2	58.1	64.8	141.0	79.6	213	2.63	1025	56.0	17.23
T_3	59.8	65.5	142.8	72.9	196	2.67	1072	61.6	17.04
T_4	45.5	53.0	103.1	73.6	203	2.70	1052	60.6	17.12
T_5	34.9	42.6	175.5	96.5	219	2.72	953	85.4	17.53
T_6	47.5	54.9	107.3	75.9	214	2.74	1100	62.7	17.56
CD (5%)	7.0	7.9	22.8	12.6	NS	NS	NS	7.9	NS

Table AS 66.1.2: Growth, yield and quality of sugarcane during 2014-15 under various treatments

Treatments	Germination (%)				Cane yield (t/ha)			
	2012-13	2013-14	2014-15	Mean	2012-13	2013-14	2014-15	Mean
T_1	45.1	70.7	65.4	60.4	39.3	62.7	52.7	51.6
T_2	48.5	72.1	64.8	61.8	45.6	65.1	56.0	55.6
T_3	55.4	69.7	65.5	63.5	46.7	66.0	61.6	58.1
T_4	56.9	51.0	47.9	51.9	45.0	65.1	60.6	56.9
T_5	38.1	43.9	42.6	41.5	70.2	86.5	85.4	80.7
T_6	59.5	54.5	51.2	55.1	42.8	64.4	62.7	56.6
CD (5%)	11.0	11.3	8.9		6.8	4.5	7.9	

2. KAPURTHALA

The experiment was conducted on loamy sand soil, tested low in organic carbon (0.30 %), medium in available P (30.8 kg/ha) and low in available K (125 kg/ha). The objective was to cut down the seed cost and increase germination percentage of the single cane node.

In this experiment the optimum germination was achieved only T_5 where conventional three budded sets were planted whereas all other treatments did not germinate properly. Hence the data was not recorded.

3. UCHANI

An early maturing variety CoH 160 was planted on clay loam soil in texture having pH 7.9, EC 0.4 dsm^{-1}, organic carbon 0.36%, available P 12.6 kg/ha and available K 160 kg/ha in randomized block design with three replications. The crop was planted at 75 cm row spacing on March 22, 2014. Cane node having buds and root bands with 4-5 cm length were taken for planting. After planting cane nodes in furrows were covered with 2-3cm soil layer. Cane nodes were planted at 10 cm depth with plant to plant spacing of 30 cm. Recommended doses of phosphorus (50 kg P_2O_5/ha) and potash (50 kg K_2O/ha) were applied at the time of planting whereas nitrogen was applied in three equal splits. The crop was irrigated at 8-10 days intervals during pre-monsoon period and 20 days interval during post monsoon period. The harvesting of the experiment was done on February 18, 2015.

No germination was noticed in any treatments at 10 days after planting. Highest germination was recorded in conventional three budded sett planting and planting of primed and sprouted cane node (Incubated for four days after priming) at 20,30 and 40 days after planting. Three bud planting recorded highest number of shoots (159.3 thousands/ha), millable canes (115.3 thousands/ha), cane weight (816 g), cane yield (92.9 t/ha), CCS (12.15 %) and sugar yield (11.29 t/ha) among all the treatments (Table 6 & Table 7). Among priming treatments, planting of primed and sprouted cane node (T_6) recorded highest germination at 40 DAS (53.0%), number of shoots (91.2 thousands/ha), millable canes (89.6 thousands/ha), cane

weight (719 g), cane yield (63.6 t/ha) and sugar yield (7.65 t/ha). Planting of cane node after dipping in hot water (50° C) +urea solution (3%) for 2 hours (T3) was found second best among priming treatments. Unprimed cane node recorded lowest number of number of shoots, millable canes, cane weight, cane yield and sugar yield (Table 6 & Table 7).

Summary: Three bud planting recorded highest number of shoots (159.3 thousands/ha), millable canes (115.3 thousands/ha), cane weight (816 g), cane yield (92.9 t/ha), CCS (12.15 %) and sugar yield (11.29 t/ha) among all the treatments . Among priming treatments, planting of primed and sprouted cane node (T_6) recorded highest germination at 40 DAS (53.0%), number of shoots (91.2 thousands/ha), millable canes (89.6 thousands/ha), cane weight (719 g), cane yield (63.6 t/ha) and sugar yield (7.65 t/ha).

Table AS 66.3.1: Effect of different treatments on germination and no. of shoots of sugarcane

	Treatments	Germination (%)			No. of shoots (000/ha)
		20 DAP	30 DAP	40 DAP	120 DAP
T_1	Un-primed cane node	16.8	27.6	36.1	73.2
T_2	Treating cane node in hot water at 50°C for 2 hours.	20.2	31.0	42.3	78.8
T_3	Treating cane node in hot water (50° C) +urea solution (3%) for 2 hours	29.6	40.9	48.5	85.1
T_4	Priming cane node with cattle dung, cattle urine and water in1:2:5 ratio.	20.3	34.3	45.1	79.4
T_5	Conventional 3-bud sett planting.	42.7	46.3	53.9	159.3
T_6	Primed and sprouted cane node (Incubated for four days after priming)	39.2	44.8	53.0	91.2
CD at 5%		3.1	3.8	4.1	8.6

Table 7: Effect of different treatments on growth and cane yield of sugarcane

Treatments		NMC (000/ha)	Cane height (cm)	Cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
T_1	Un-primed cane node	72.3	118	675	48.2	11.86	5.72
T_2	Treating cane node in hot water at 50°C for 2 hours.	76.2	137	682	51.4	11.89	6.12
T_3	Treating cane node in hot water (50° C) + urea solution (3%) for 2 hours	82.6	180	710	57.9	11.83	6.85
T_4	Priming cane node with cattle dung, cattle urine and water in1:2:5 ratio.	78.1	186	681	52.6	11.85	6.23
T_5	Conventional 3-bud sett planting.	115.3	220	816	92.9	12.15	11.29
T_6	Primed and sprouted node (Incubated for four days after priming)	89.6	180	719	63.6	12.02	7.65
CD at 5%		6.7	16	28	3.8	0.11	0.48

4. LUCKNOW

Experimental results indicated that the priming of cane nodes with hot water (50^{o}C)+ 3% urea solution for 2 hrs or in a mixture of cattle dung, cattle urine and water in 1:2:5 ratio and planted directly in the field or after incubation (4 days) gave significantly higher germination of cane buds (70.47%) as recorded 45 days after planting as compared to un-primed cane nodes (55.81%) or treating them with hot water at 50^{o}C for 2 hrs only (51.47%). Conventionally planted crop with 3-bud setts produced the lowest germination (44.1%). Number of tillers and millable canes and yield of cane also exhibited the same trend as the germination of cane buds obtained in different treatments. Accordingly, cane yield obtained under priming followed by incubation was found significantly higher by 13.4 and 11.8 % over that with planting of unprimed cane nodes and treated with hot water only, respectively. Conventional planting with 3-bud setts although produced cane yield (75.83 t/ha) at par with primed cane node treatments (76.43 t/ha) but with the use of huge seed cane (72 q/ha) whereas only 17.52 q/ha seed cane was used in cane node planting method.

5. PANTNAGAR

Three budded setts of variety Co pant 99214 were sown in furrows at 75 cm distance on 27 March, 2014. Experiment was conducted in Randomized block design with four replications. Before sowing setts were treated with carbendazim solution (0.2 %) to avoid fungal infection if any. Setts were treated as per technical programme and sown. Other cultural practices were adopted as per need of the crop. Sugarcane crop was harvested on 30.3.2015

To see the effect of different treatments on germination observation were recorded from 20 DAP onward (30 and 40 DAP). Germination % however was found non-significant at 20 DAP but there was variation in different treatments and was recorded highest in conventional (3 bud setts planting) followed by seed treatment of cane node in hot water 50 ^{0}C + urea @ 3% for 2 hours and in T_4- (Priming cane node with cattle dung, cattle urine and water (1: 2: 5) ratio. Lowest germination % was recorded in un-primed cane node at 20 DAP (Table - 10).

At 40 DAP stage the germination % was highest in T_5- (conventional 3 bud setts) which was significantly higher over un-primed cane node (T_1) and T_6- (Primed and sprouted cane node (incubated for 4 days after priming). Highest shoot population at 150 DAP was recorded in T_2. Cane node treated in hot water at (50 ^{0}C) for 2 hours which produced significantly higher shoot population over T_1- (unprimed), T_3- (cane node treated in hot water (50 ^{0}C) + urea (3 % for 2 hours) and T_6 - (Primed and sprouted cane node (incubated foe 4 days after priming). Cane yield was recorded highest in T_5 - (conventional 3 budded setts) which was significantly higher over rest of the treatments except T_2- (cane node treated in hot water (50 ^{0}C). NMC, cane weight, cane length and cane girth were also higher in T_5- (conventional 3 bud setts) as compare to rest of the treatments. CCS yield was also higher in T_5- (conventional 3 bud setts) which was found significantly higher over rest of the treatments.

Summary: Germination %, shoot population, NMC, cane yield, CCS yield, cane length, cane girth were highest in T_5 – (conventional 3 bud setts). Cane yield was also higher in T_2 - (cane node treated in hot water at 50 ^{0}C for 2 hours). CCS yield, Sucrose % was higher in conventional 3 bud setts (T_5).

Table AS 66.5.1: Priming of cane node for accelerating germination

Treatments	Germination %			NMC (000/ha)	Average cane weight (g)	Plant height (cm)	Cane girth (cm)	Cane yield (t/ha)	Sucrose % at Nov.	Sucrose % at harvest	CCS (t/ha)
	20 DAP	30 DAP	40 DAP								
T_1-Un-primed cane node	4.3	18.3	24.9	68.3	1012.5	375.8	8.0	65.5	15.5	17.3	7.6
T_2-Treating cane node in hot water at 50ºC for 2 hours	10.0	35.7	42.3	100.5	1250.0	380.8	10.1	98.5	14.9	17.4	11.4
T_3-Treating cane node in hot water at (50ºC) + urea solution (3 %) for 2 hours	14.0	37.4	44.0	71.8	1062.5	352.5	8.0	69.5	15.9	17.5	8.2
T_4-Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	13.6	37.4	44.7	74.7	1125.0	384.5	8.3	72.6	15.6	16.9	7.9
T_5-Conventional 3 bud setts planting	15.0	47.1	48.3	105.3	1300.0	400.5	10.1	90.1	15.4	17.3	11.8
*T_6-Primed and sprouted cane node (Incubated for 4 days after priming)	3.3	17.6	23.3	82.5	1200.0	389.5	9.0	81.2	14.9	16.5	8.7
SEm±	3.6	5.1	5.1	0.6	18.8	9.9	0.09	0.3	0.3	0.03	0.07
CD at 5 %	NS	15.2	15.5	1.7	57.7	29.8	0.27	0.9	0.8	0.08	0.22

Table AS 66.5.2: Effect of priming treatments on sugarcane growth and yield (pooled)

Treatments	Germination % at 40 DAP				Cane yield (t/ha)				CCS (t/ha)			
	2012 - 13	2013 - 14	2014 - 15	Pooled	2012 -13	2013 -14	2014 -15	Pooled	2012 -13	2013 -14	2014 -15	Pooled
T_1-Un-primed cane node	45.0	44.7	24.9	38.1	64.8	69.1	65.3	66.4	7.0	9.0	7.6	7.8
T_2-Treating cane node in hot water at 50ºC for 2 hours.	69.3	60.3	42.4	57.3	96.6	86.1	98.5	93.7	11.4	10.0	11.4	10.9
T_3-Treating cane node in hot water at (50ºC) + urea solution (3 %) for 2 hours	73.6	65.6	44.0	61.0	67.4	72.6	69.4	69.8	7.5	9.4	8.2	8.4
T_4-Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	52.5	57.8	44.8	51.7	70.4	73.7	72.7	72.3	8.0	9.7	7.9	8.5
T_5-Conventional 3 bud setts planting	56.0	59.0	48.4	54.3	101.3	101.7	90.1	97.7	11.6	12.9	11.7	12.1
*T_6-Primed and sprouted cane node (Incubated for 4 days after priming)	50.5	55.7	23.4	43.1	78.4	79.3	81.2	79.6	8.9	10.0	8.6	9.2
SEm±	1.5	1.4	1.5	1.0	3.4	2.7	0.4	2.1	0.2	0.6	0.06	0.3
CD at 5 %	4.4	4.3	4.5	3.0	10.3	8.3	1.3	6.3	0.6	1.7	0.18	0.9

Pooled analysis: The pooled analysis of 3 years experiments revealed that germination of sugarcane at 40 days stage was recorded highest in T_3 - (Cane node treated in hot water (50^oC) + urea solution (3 %) for 2 hours which was significantly higher over rest of the treatments. Germination % was recorded lowest in un-primed cane node which was significantly lower than rest of the treatments. Significantly higher NMC were recorded in T_5 - (Conventional bud setts) over rest of the treatments. However, NMC were improved in all the priming treatments except in un-primed cane node. Cane yield was recorded highest in conventional 3 bud setts planting which produced significantly higher cane yield over rest of the treatments except cane node treated in hot water ($50\ ^0C$) for 2 hours. CCS yield was also recorded highest in both the treatments.

Summary: On the basis of three years pooled analysis of data it may be concluded that to enhance the germination in sugarcane cane node should be treated with hot water ($50\ ^oC$) + urea solution 3 % for 2 hours. However, the cane yield was recorded highest in conventional 3 bud setts planting followed by cane node treated in hot water ($50\ ^OC$) for 2 hours. CCS yield was also higher in both the treatments. However, highest CCS yield was recorded in conventional 3 bud setts planted sugarcane.

6. SHAHJAHANPUR

The soil of experimental field was low in organic carbon (0.31), phosphorus (15.60 kg/ha) and medium in potash (129.5 kg/ha) with pH 7.37. Experimental crop was planted on 26.02.2014 and harvested on 28.03.2015.

Experimental results indicated that significantly higher germination (44.0 %), NMC (1, 37,731) and cane yield (99.03 t/ha) were obtained in priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T_4). CCS % in cane was not significantly affected with different treatments.

Summary:

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio resulted significantly higher germination and cane yield than that of other treatments. CCS % in cane was not affected with different treatments.

Table AS 66.6.1: Effect of treatments on germination, shoots, millable canes, cane yield and CCS %

Treatments		Germ. %	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS %
T^1-	Unprimed cane node	30.40	159.25	111.11	80.90	10.67
T^2-	Treating cane node in hot water at 50^0C for 2 hours	35.20	187.26	117.59	78.59	10.50
T^3-	Treating cane node in hot water at 50^0C and urea solution (3%)	36.70	210.76	130.78	92.82	10.10
T^4-	Priming cane node with cattle dung, cattle urine and water in 1:2:3 ratio	44.00	227.66	137.73	99.03	10.38
T^5-	Conventional 3 bud sett planting	39.90	150.92	107.52	76.73	10.65
T^6-	Primed and sprouted cane node incubated for four days after priming	30.60	143.05	105.09	89.58	10.50
SE±		2.40	4.75	5.12	2.72	0.28
CD 5%		5.11	10.12	10.09	5.79	NS

7. KOTA

The experiment with CoPK 05191 was planted on 23.2.2014 keeping three budded four setts per meter row length at 75 cm row to row distance with the objective of assessing suitable cane node priming technique for accelerating germination and to cut down the seed cost. Recommended dose of fertilizer to each treatment was applied.

Data revealed that different priming techniques significantly influence the germination at 20, 30 and 40DAP over unprimed and at par with each other except 10 DAP crop growth stage. The germination % and tillers count was receded significantly higher in T_4 (52.68 %) over rest of the treatment except conventional three bud sett andT_6 treatment at 40 DAP. Conventional 3 bud sett (T_5), primed cane node in hot water at (50^0C) urea solution (3%) for 2 hours (T_3), priming cane node with cattle dung, cattle urine and water in 1:2:5 ratios (T_4) or T_6 germinated cane eyes significantly better when compared with unprimed cane node. Cane yield (92.35 t/ha) and CCS (11.85 t/ha) were recorded significantly better under priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T_4) as compared to T_1,T_2,T_3 and T_5 and at par with T_6 (90.28 t/ ha). Crop planted by 3-bud sett, use of huge seed cane (70.0q/ha) whereas only 23 q/ha seed cane as used in cane node planting method. Highest brix % 21.10) was also recorded in T_4 whereas sucrose % (18.59) and CCS % (12.84) were also recorded in 3-bud sett treatment which was significantly higher unprimed (T1) and at par with rest of the treatments.

Summary: Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio was suitable for increasing millable cane (97,450 /ha), cane yield (93t/ha) which was significantly superior over un-primed cane node, conventional 3- bud sett planting treatment, T_2 and T_3 except T_6.

Table AS 66.7.1: Effect of Priming of cane node for accelerating the sugarcane production during 2014-15 at Kota

Treat-ment	Germination (%)				Cane length (cm)	Cane girth (cm)	NMC (000/ ha)	Yield (t/ha)	Brix (%)	Sucrose (%)	CCS (%)	CCS (t/ha)
	10 DAP	20 DAP	30 DAP	40 DAP								
T1 :	6.34	17.73	33.00	38.15	250.50	7.64	75.20	70.75	19.15	16.58	11.35	8.04
T2 :	6.83	19.97	33.50	42.21	270.83	7.85	85.58	76.80	19.35	16.78	11.50	8.84
T3 :	6.96	20.10	34.41	46.80	271.50	8.29	86.40	77.00	20.30	17.76	12.23	9.41
T4 :	7.15	22.71	39.90	50.40	281.25	8.80	97.45	93.00	20.48	17.94	12.36	11.49
T5 :	7.21	22.00	39.70	48.75	278.08	8.75	90.00	80.30	20.26	17.72	12.20	9.77
*T6 :	7.10	20.50	39.40	48.40	278.80	8.70	95.85	90.35	20.38	17.84	12.28	11.09
SEm ±	0.30	0.96	1.37	2.28	7.40	0.30	5.10	3.70	0.40	0.40	0.30	0.50
CD(P=0.05)	0.90	2.93	4.16	6.90	22.50	1.00	15.60	11.30	1.22	1.20	0.92	1.40
CV	7.60	8.15	6.48	8.61	4.70	6.80	10.10	7.90	3.40	4.00	5.00	8.10

PENINSULAR ZONE

8. NAVSARI

The data related to growth, yield and quality parameters are presented in table AS 66. 8.1. Significantly highest germination % was recorded with treatment T6 (Primed and sprouted cane node (incubated for four days after priming)) at 10, 20, 30 and 40 DAP over un-primed cane node. At 60 DAP, significantly highest shoot was noticed with T6 and remained at par with all the treatments except T1 at 60 DAP while at 90 DAP it was at par with T4 and T3. Different cane node priming techniques failed to reach the level of significance on no. of

shoots at 120 and 150 DAP. Significantly higher per clump shoots were found with T6 at 60 & 120 DAP while at 90 & 150 DAP it found highest with T4 over un-primed cane node and remained at par with T6.

The highest and lowest NMC (115.28 & 94.10 thousand ha^{-1}) was noticed with T_6 (Primed and sprouted can node (incubated for four days after priming)) over un-primed cane node and at par with T_4 (Priming cane node with cattle dung, cattle urine and water in 1:2.5 ratio). Cane length was significantly highest with T_6 over un-primed cane node and at par with T_4 and T_5. There was no significant difference was observed due to various priming techniques on girth and single cane weight. Significantly highest and lowest cane yield was recorded with T4 (115.92 t ha^{-1}) and T_1 (95.06 t ha^{-1}) respectively while CCS yield was recorded significantly highest with T4 over un-primed cane node and at par with T_6. Almost all the quality parameters were not influenced due to priming treatment except purity % which recorded highest with T_1 and remained at par with T_3, T_4 and T_6.

Table No. AS 66. 8.1: Growth parameters as influenced by cane node priming technique

Treatment	NMC 000/ha at harvest	Cane length (cm) at harvest	Cane girth (cm) at harvest	Single cane weight (kg) at harvest	Cane yield (t/ha)	CCS yield (t/ha)
T_1	94.10	217.49	2.11	1.06	95.06	12.00
T_2	96.35	227.74	2.15	1.11	97.57	12.54
T_3	99.31	238.59	2.32	1.08	101.51	12.98
T_4	111.46	247.82	2.26	1.10	115.92	14.81
T_5	91.49	227.81	2.31	1.09	95.60	12.03
T_6	115.28	248.71	2.33	1.13	107.96	14.14
S.Em ±	5.29	7.29	0.09	0.04	4.72	0.74
C.D.at 5%	15.94	21.96	NS	NS	14.23	2.23
C.V.%	10.43	6.21	7.75	7.89	9.23	11.33

9. POWARKHEDA

The germination percentage was influenced significantly due to various treatments during experimentation. However, germination per cent was recorded significantly higher (67.34) in priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio treatment as compared to Un-primed cane node (54.22), but increase in germination per cent did not differ significantly.The number of shoots increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (110.34) as compared to Un-primed cane node (97.15). Except Un-primed cane node, other treatments showed beneficial effect on tillers.

The plant height increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (265 cm) as compared to Un-primed cane node (247 cm). The NMC influenced significantly due to treatment. Significantly higher NMC values recorded of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (107.25) as compared to Un-primed cane node (93.90). The NMC recorded of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (107.25) and Conventional 3 bud sett planting (103.24) was at par.

The value of brix per cent did not differ significantly due to various treatments during experimentation. The brix percentage ranged between 21.25 to 21.34 per cent.

The cane yield increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (107.33 t/ha) as compared to Un-primed cane node (91.74 t/ha). However, increase in cane yield did not differ significantly.

Summary: The germination percentage, cane yield and yield attributes increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (67.34 %) than other treatments.

Table AS 66.9.1: Effect of different treatments on germination growth, yield and quality of sugarcane

S.No.	Treatments	Germination (%)	Tillers (000'/ha)	Height (cm)	NMC (000'/ha)	Brix (%)	Yield (t/ha)
1	Un-primed cane node	54.22	97.15	247	93.90	21.27	91.74
2	Treating cane node in hot water at 50 C for 2 hr.	56.33	103.09	250	100.00	21.27	99.38
3	Treat. cane node in hot water (50 C) urea solution (3%) for 2 hr.	58.75	103.47	258	100.39	21.25	100.54
4	priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio	67.34	110.34	265	107.25	21.26	107.33
5	Conventional 3 bud sett planting	57.34	107.87	251	103.24	21.34	100.23
6	primed & sprouted cane node (Incubated for 4 days after priming	55.31	101.16	249	98.07	21.34	97.53
	S Em ±	1.74	2.06	1.69	2.16	0.03	1.81
	CD at 5%	5.23	6.21	5.09	6.51	NS	5.45

10. PADEGAON

The data on cane and CCS yields revealed that priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) recorded significantly the highest cane and CCS yield (135.43 and 17.82 t ha^{-1}). However, cane yield was found at par withtreating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours (T_3) (131.63 t ha^{-1}) and CCS yield was found at par with treating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours (T_3) (17.28 t ha^{-1}), treating cane node in hot water in 50^{o}C for 2 hours (T_2) (16.46 t ha^{-1}) and

conventional 3 bud setts planting (T_5) (16.33 t ha^{-1}). The lowest cane and CCS yield was observed in unprimed cane node.

The perusal of data revealed that the conventional 3 bud setts planting (T_5) recorded significantly higher germination (73.17%) However, it was at par the priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) (72.67), treating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours (T_3) (69.96).

The priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) recorded significantly higher tillering ratio (1.74), It was found at par with the treatment treating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours (T_3). The number millable canes(109000/ha) are recorded significantly higher in the priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) and found at par with the rest of the treatments except un-primed cane node (T_1) and Primed and sprouted cane node (Incubated for four days after priming) (T_6). The milliable height (306 cm), cane girth (11.2 cm) and the weight per cane (1.24 kg) recorded numerically highest in the priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4).

Quality parameters:

The data regarding juice quality parameters revealed that priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T_4) recorded significantly the highest brix (22.44), sucrose (20.54 %) and CCS (14.38 %). than the rest of the treatment. While CCS per cent was found at par with treatment T_3

Summary:

The priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) recorded significantly the highest cane and CCS yield (135.43 and 17.82 t ha^{-1}) and the cane yield was at par with treating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours (T_3) (131.63 t ha^{-1}), CCS yield was found at par with treatment T_3, T_2 and T_5. The lowest cane and CCS yield was observed in unprimed cane node.

Table AS 66.10.1: Pooled mean cane and CCS yields as affected by various treatments

Treatment	Cane yield (t/ha)				CCS yield (t/ha))			
	2012-13	**2013-14**	**2014-15**	**Pooled mean**	**2012-13**	**2013-14**	**2014-15**	**Pooled mean**
T_1 : Un-primed cane node.	115.2	116.9	117.7	**116.66**	15.71	13.6	16.84	**15.4**
T_2 :Treating cane node in hot water in 50°c for 2 hours.	127.3	128.8	129.2	**128.49**	17.26	13.6	18.51	**16.4**
T_3 : Treating cane node in hot water in 50°c urea solution (3%) for 2 hours	129.9	131.7	133.1	**131.63**	18.44	14.2	19.15	**17.2**
T_4 : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	132.7	134.6	138.8	**135.43**	18.94	14.3	20.18	**17.8**
T_5: Conventional 3 bud setts planting.	122.7	124.4	126.0	**124.45**	17.35	14.1	17.45	**16.3**
T_6 Primed and sprouted cane node (Incubated for four days after priming)	118.0	119.8	121.1	**119.66**	16.28	13.8	16.62	**15.5**
SE+	**4.06**	**3.88**	**3.03**	**2.05**	**0.58**	**0.10**	**0.44**	**0.72**
C.D at 5%	**12.23**	**10.86**	**9.14**	**6.15**	**1.73**	**0.28**	**1.32**	**2.13**

11. SANKESHWAR

Germination differed significantly for priming the cane nodes with different treatments. Significantly highest germination percent was recorded in T_4 (91.15), treated with cattle dung, cattle urine and water followed by T_6 (81.27), primed and sprouted cane node planting. The lowest germination was recorded in T_2 (39.43) by treating the cane node with hot water (50 ^{0}C) for two hours. The other growth parameters recorded similarly except for cane height.

Significantly higher cane girth was recorded in T_4 (3.16) and lowest cane girth was recorded in T_6 (2.86). However, the other treatments were on par with T4.Significantly higher number of millable canes per hectare were recorded in T_7 (157786) followed T6 (152443) and the lower number was recorded in T_2 (91864).

Significantly the highest cane yield was recorded in T_7 (273.15) followed by T_4 (266.09). The lowest cane yield was recorded in T_2 (152.58).Juice weight (kg): Significantly higher juice weight was recorded in T_7 (1.18) followed by T_4 (1.16) and the lowest juice weight was recorded in T_2 (0.91).The brix values also differed significantly for priming treatments. The highest brix value (26.450) was recorded in T_5 and T_6 and lowest was recorded in T_1 (25.703). There was non-significant difference in Pol percentage among the treatments.Significantly higher juice purity was recorded in T_1 (93.27) followed by T_2 (92.67). The lowest juice purity was in T_6 (89.75).Significantly the higher CCS yield was recorded in T_7 (45.29) followed by T_4 (44.61). The lowest was recorded in T_2 (25.86).

As the germination was affected with hot water treatment in treatment no. T_2 and T_3 and poor germination in T_4 so the trial was vitiated.

Table AS 66.11.1: Yield and Yield attributes influenced by Priming of cane node for accelerating germinations

Sl NO	Cane Girth (Cm)	NMC/ha	Single Cane weight (Kg)	Cane yield (t/ha)	Number of internodes
	2.950	98939	2.22	222.95	25.967
2	2.963	91864	1.68	152.58	26.433
3	2.977	105271	1.71	179.72	25.067
4	3.160	126823	2.10	266.09	28.933
5	3.040	125756	1.89	238.57	27.300
6	2.860	152443	1.66	251.43	25.433
7	3.027	157786	2.11	273.15	25.200
CV	4.84	9.51	15.26	17.03	6.56
S.EM+	0.08	6733.50	0.17	22.25	1.00
CD (5%)	0.26	20747.98	0.52	68.56	3.07

12. THIRUVALLA

The experiment was conducted to find out suitable cane node priming technique and to assess the effect of cane node on acceleration of germination. The crop was planted on 25.1.12014 and harvested on 16.1.2015.

The results revealed that the different priming techniques have significantly influenced the germination percentage and tiller count. The highest germination percentage and tiller population were recorded in 3 bud sett planting (T_5) and the lowest value for the above parameters were obtained for the primed and sprouted cane node (T_6).

Maximum cane length (248.10 cm), MCC (78660 / ha), cane yield (85.80 t/ha) were recorded for the 3 bud sett planting (T_5). Brix and sugar yield also showed same trend and recorded significantly higher value (10.47 t/ha) for the very same treatment (T_5). This was followed closely by treating cane node in cattle dung, cow urine and water in the ratio 1:2:5 (T_4).

There was no significant variation in the soil fertility parameters prior to and after the conduct of the trial .The highest BC ratio of 1.38 was recorded by T_5 (three bud sett planting).

Table AS 66.12.1: Germination, cane yield and juice quality as influenced by cane node priming techniques

Treatments		Germination (%)		Cane length(cm)	Cane girth (cm)	Single cane weight (kg)	MCC (‘000/ ha)	Cane yield (t/ha)	Sugar yield (t/ha)	BC ratio
		30 DAP	45 DAP							
T_1	Un primed cane node	25.84	45.76	217.11	9.51	1.32	62.05	66.60	7.86	1.01
T_2	Cane node in hot water at 50^o c for 2 hours	25.21	45.94	234.89	9.30	1.40	67.48	71.10	8.11	1.25
T_3	Cane node in hot water (50^o c) Urea solution (3%))for 2 hours	30.58	48.90	225.56	9.59	1.35	71.64	75.26	9.04	1.32
T_4	Cane node in cattle dung, cows urine and water (1:2:5)	31.50	58.25	225.90	10.05	1.30	75.50	76.33	8.86	1.35
T_5	3 bud sett	35.70	60.47	248.10	10.25	1.48	78.66	85.80	10.47	1.38
T_6	Primed and sprouted cane node	22.41	37.36	226.43	9.42	1.20	66.71	69.00.	8.15	1.05
CD (0.05)		**2.90***	**3.22***	**9.25***	**0.25***	**NS**	**3.25***	**9.60***	**0.52***	**NS**

13. MANDYA

Planting of conventional three eye budded setts recorded significantly higher germination (64.0 %), number of millable cane (96,100 ha^{-1}), and cane yield (118.5 MT ha^{-1}) compared to all other treatments. The cane length, girth, weight, number of internodes and internodal length were statistically at par among the treatments. The next best treatment was primed and sprouted cane node (Incubated for four days after priming). Un-primed cane node recorded significantly lower germination (33.5%), NMC (55,300 ha^{-1}) and cane yield (76.1 MT ha^{-1}). Two years average data also followed similar trend.

Table AS 66.13.1: Influence of cane node priming on yield & quality of sugarcane

Treatment	Germination (%)	Cane weight (kg)	Cane length (m)	Cane girth (cm)	NMC ('1000 ha^{-1})	Cane yield (t/ha)	Purity (%)
T_1: Un-primed cane node	33.5	1.2	1.8	2.3	55.3	76.1	77.0
T_2: Treating cane node in hot water at 50°C for 2 hours	35.6	1.1	1.9	2.4	70.4	87.3	79.0
T_3: Treating cane node in hot water (50° C) urea solution (3%) for 2 hours	-	-	-	-	-	-	-
T_4: Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	38.0	1.1	2.1	2.1	82.1	90.6	75.8
T_5: Conventional 3-bud sett planting.	64.0	1.2	2.2	2.5	96.1	118.5	79.0
T_6: Primed and sprouted cane node (Incubated for four days after priming)	39.7	1.1	2.0	2.3	80.3	94.1	76.5
S.Em+	**-**	**0.07**	**0.15**	**0.08**	**3.02**	**7.25**	**1.35**
CD @ 5%	**-**	**NS**	**NS**	**NS**	**9.30**	**22.34**	**NS**
CV (%)	**-**	**11.71**	**14.74**	**6.87**	**7.86**	**15.54**	**3.49**

EAST COAST ZONE

14. ANAKAPALLE

Germination was recorded at 30 and 40 days after planting expressed in %. At 40 DAP, conventional 3 bud sett planting recorded significantly higher per cent germination (89.8). Among different priming cane node treatments, priming cane node with cattle dung, urine and water in 1:2:5 ratio recorded highest germination percent (81.9). Significantly lowest per cent germination was registered in un-primed cane node plot (67.2).

Significant differences were observed in number of millable canes due to different priming cane node treatments. Conventional 3 bud sett planting recorded significantly higher number of millable canes (72,587/ha). Among different priming treatments, priming cane node with cattle dung, urine and water in 1:2:5 ratio registered significantly higher number of millable canes of 70,214/ha but found on par with planting of cane nodes treated with hot water at 50OC+ 3 % urea solution(69,620/ha).

Cane juices were analysed for sucrose content at harvest. Per cent juice sucrose values did not vary significantly due to different priming cane node treatments. However, the per cent juice sucrose values in different treatments varied from 16.0 to 17.4.

Commercial cane sugar was calculated treatment wise and presented in table-6. CCS% did not vary significantly due to different treatments. However slightly higher CCS% was recorded in conventional 3 bud sett planting. Conventional 3 bud sett planting recorded significantly higher cane yield (80.1 t/ha) than with primed cane nodes planting. Cane yields recorded in all priming cane node treatments along with control i.e un-primed cane node treatment plots were on par with each other and no significant variations were observed unlike other two years experimental results which might be due to crop lodging during the month of October due to *Hud hud* cyclone. However, highest cane yield among different cane node treatments was recorded in priming cane node with cattle dung, urine and water in 1:2:5 ratio (77.6 t/ha) and the lowest cane yield of 75.0 t/ha was registered in un-primed cane node treatment . Sugar yield was computed treatment wise. Sugar yield ranged from 8.8 to 10.0 t/ha.

Summary:

Studies conducted on priming of cane nodes in different methods for accelerating the germination in sugarcane was studied at Regional Agricultural Research Station, Anakapalle during 2013-14 season. The results indicated that conventional 3 bud sett planting recorded significantly higher number of millable canes (72,587 /ha) and cane yield (80.1 t/ha). Among different priming cane node treatments priming cane node with cattle dung, urine and water in 1:2:5 ratio performed better and registered higher cane yield of 77.6 t/ha and found on par with conventional 3 bud sett planting and also it was on par with the other priming cane node treatments.

Pooled data:

Pooled data mean (Three plant crops) of number of miilable canes (NMC), juice sucrose %, cane yield and sugar yield was calculated and presented in table-7. Three years studies on priming of cane nodes in different methods for accelerating the germination in sugarcane at RARS, Anakapalle indicated that different priming treatments could not increase either germination per cent or cane yield as compared to conventional three bud sett planting(Table- 7) except priming cane node with cattle dung, urine and water in 1:2:5 ratio which performed better and registered higher mean germination per cent (78.5), number of millable canes (71,800/ha), cane yield (76.9 t/ha) than other priming cane node treatments. Conventional three bud sett planting was found superior over all other treatments in germination per cent(83.3), number of millable canes (74,600/ha), cane yield (80.0 t/ha). Quality parameters did not vary due to different priming cane node treatments.

Table AS 66.14.1: Yield attributes, yield and quality of sugarcane as influenced by priming of cane node during 2014-15

Treatment	Germination % at 30DAS	Germination % at 40DAS	LMC (cm)	NMC /ha	Cane yield (t/ha)	Juice sucrose (%)	CCS (%)	Sugar yield (t/ha)
T1:Un-primed cane node	64.1	67.2	268.5	68,433	75.0	16.7	12.1	9.0
T2: Treating cane node in hot water in 50^0C for 2 hours.	68.4	76.8	270.5	69,225	76.0	16.8	12.2	9.2
T3: Treating cane node in hot water (50^0 C) + urea solution (3%) for 2 hours.	59.0	78.8	268.0	69,620	76.5	16.0	11.6	8.8
T4: Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio.	66.0	81.9	288.5	70,214	77.6	16.9	12.2	9.5
T5: Conventional 3 bud settplanting.	78.5	89.8	266.0	72,587	80.1	17.4	12.6	10.0
T6: Primed and sprouted cane node (incubated for four days after priming)	51.2	75.8	247.5	68,235	75.9	16.5	12.0	9.1
SEm+	2.7	1.5	5.0	603.0	1.2		-	-
C.D (0.05)	8.2	4.5	15.0	1817.0	3.5	NS	NS	NS
C.V%	8.5	3.8	3.9	2.0	5.5			

Table AS 66.14.2: Yield attributes, yield and quality of sugarcane as influenced by priming of cane node treatments (pooled over 3 years from 2012-13 to 2014-15)

Treatments	Germination % at 40 DAP				Cane yield(t/ha)				Sugar yield (t/ha)			
	2012-13	2013-14	2014-15	Mean	2012-13	2013-14	2014-15	Mean	2012-13	2013-14	2014-15	Mean
T1:Un-primed cane node	55.4	58.8	67.2	60.5	63.3	73.4	75.0	70.6	8.2	10.7	9.0	9.3
T2: Treating cane node in hot water in 50^0C for 2 hours.	62.7	75.8	76.8	71.8	66.0	75.3	76.0	72.4	7.9	10.6	9.2	9.23
T3: Treating cane node in hot water (50^0 C) + urea solution (3%) for 2 hours	67.8	80.9	78.8	75.8	69.1	78.7	76.5	74.8	8.4	11.5	8.8	9.6
T4: Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	71.7	82.0	81.9	78.5	73.5	79.5	77.6	76.9	9.6	11.2	9.5	10.1
T5: Conventional 3 bud settplanting.	74.2	85.9	89.8	83.3	75.3	84.6	80.1	80.0	10.5	11.4	10.0	10.6
T6: Primed and sprouted cane node (incubated for four days after priming)	56.4	60.3	75.8	64.2	64.4	74.6	75.9	71.6	7.7	10.3	9.1	9.0
SEm±	2.17	1.09	1.5		0.78	1.8	1.2		-	-	-	
C.D (0.05)	6.56	3.3	4.5		2.35	5.3	3.5		-	NS	NS	
C.V(%)		2.9	3.8			4.8	5.5			6.3		

15. NAYAGARH

Out of the six treatments, conventional method of planting three budded sugarcane setts proved to be the best with highest number of net millable canes (82.75 th/ha), cane (86.23t/ha) and CCS yield (9.45t/ha). The treatment next in order was T6 where primed and sprouted cane nodes were planted which could produce NMC of 79.25 (’000 /ha) with cane and CCS yield of 83.85 and 8.64 t/ha, respectively. Planting of primed cane nodes in cattle dung (1): cattle urine (2): water (5) ratio could produce NMC of 75.75 (’000 /ha) cane and CCS yield of 82.16 and 8.83 t/ha, respectively. These three treatments were at par and significantly superior to other treatment combinations. The higher yield parameters i.e. number of shoots/ha, number of shoots per clump, length and girth of cane in the above mentioned treatments were the factors of higher cane and CCS yield. However, the juice quality was not affected by various priming effects. Planting of un-primed cane nodes (T1) was the lowest yielder (cane and CCS yield of 60.56 and 6.38 t/ha, respectively).

Table AS 66.15.1: Effect of priming of cane nodes on juice quality and yield of cane

Treatments		Brix %	Pol %	Purity %	NMC (000/ha)	Cane yield (t/ha)	CCS (t/ha)
T_1	Unprimed cane node	18.42	15.58	86.83	50.75	60.56	6.38
T_2	Treating cane nodes in 50^0C hot water for 2 hrs	17.35	15.38	90.83	62.06	79.18	8.42
T_3	Treating cane nodes in (50^0C) hot water urea solution(3%) for 2 hrs	18.79	15.61	85.28	65.25	81.90	8.54
T_4	Priming of nodes in cattle dung (1): cattle urine (2) : water(5) ratio	18.80	15.91	87.24	75.75	82.16	8.83
T_5	Conventional 3 bud sett planting	18.40	16.28	90.66	82.75	86.23	9.45
T_6	Primed and sprouted cane nodes	18.94	15.20	82.77	79.25	83.85	8.64
SEm ±		0.392	0.429	3.558	2.279	4.002	0.567
CD at 5 %		NS	NS	NS	6.866	12.058	1.709
CV%		4.25	5.48	8.15	7.17	12.31	13.54

16. CUDDALORE

Among the six treatments, sugarcane planting with three budded setts (T_5) recorded significantly the maximum germination of 69.82, 73.56 and 86.89 per cent at 20, 30 and 40 days after planting. There was no germination up to 10 DAP. Planting of three budded setts (T_5) significantly recorded the higher shoot count of 99,250 ha^{-1} and 2,02,350 ha^{-1} on 60 and 90 days after planting and maximum of 1,70,250 ha^{-1} at 150 DAP.

Planting of three budded setts (T_5) significantly recorded the higher millable cane population of 1,28,240 ha^{-1}. The same treatment has also recorded the maximum cane length, cane diameter and individual cane weight of 284.06 cm, 2.89 cm and 1.63 kg and it was on par with the primed and sprouted cane node (incubated for four days after priming) which recorded 277.13 cm, 2.78 cm and 1.59 kg respectively. Numerically higher CCS(%) was recorded with the treatment T_5 (12.52 %).

The sugarcane planting with three budded sett (T_5) significantly recorded the higher cane yield and sugar yield of 148.4 t ha^{-1} and 18.58 t ha^{-1} respectively.

Summary: Planting of sugarcane with three budded setts (T_5) significantly recorded all the growth, quality and yield parameters of sugarcane.

Table AS 66.16.1: Effect of priming cane node for accelerating germination on growth and yield characteristics of sugarcane (2014-15)

Treatments	Germination (%)			Shoot counting ('000/ha)			
	20 DAP	30 DAP	40 DAP	60 DAP	90 DAP	120 DAP	150 DAP
T_1	42.50	57.23	68.45	53.22	105.30	98.25	91.25
T_2	46.85	58.98	72.63	64.58	159.85	151.25	143.26
T_3	54.20	63.56	76.24	69.25	165.23	152.00	147.82
T_4	59.50	67.70	78.52	78.56	173.56	163.51	151.23
T_5	69.82	73.56	86.89	99.25	202.35	182.35	170.25
T_6	57.95	63.25	77.25	78.51	180.23	175.25	168.25
CD (P=0.05)	3.01	3.24	3.60	2.85	7.50	6.11	6.55

Table AS 66.16.2: Effect of priming cane node for accelerating germination on yield parameters and yield of sugarcane (2014-15)

Treatments	Millable cane ('000/ha)	Cane length (cm)	Cane diameter (cm)	Individual cane weight (kg)	CCS (%)	Cane Yield (t ha^{-1})	Sugar Yield (t ha^{-1})
T_1	78.20	234.53	2.11	1.12	11.28	89.7	10.12
T_2	84.28	248.40	2.45	1.31	12.18	97.85	11.92
T_3	89.51	251.10	2.60	1.43	12.02	111.3	13.38
T_4	94.40	276.25	2.70	1.50	12.32	132.5	16.32
T_5	128.24	284.06	2.89	1.63	12.52	148.4	18.58
T_6	101.51	277.13	2.78	1.59	12.43	141.2	17.55
CD (P=0.05)	8.72	12.15	0.11	0.05	NS	6.11	0.62

NORTH CENTRAL ZONE

17. SEORAHI

The soil of experimental field was medium in organic carbon (0.41), low in available phosphorus (15.0 kg/ha) and potash (70.19 kg/ha) with pH 8.44. Experimental crop was planted on March, 15, 2014 and harvested on March, 28, 2015.

Experimental data indicated that significantly higher germination (55.49 %) was recorded with primed (cattle urine, dung and water solution) cane nodes which was numerically higher than that of un-primed cane node (T_1) and conventional 3 buds sett planting (T_5). Maximum cane yield (83.5 t/ha) was also obtained in priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T4).

Summary:

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio resulted significantly higher germination (55.49 %) than that of other treatments. Maximum cane yield (83.5 t/ha) was also obtained in priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T_4).

Table AS 66.17.1: Effect of treatments on germination, shoots, millable canes, cane yield and sucrose %

Treatments		Germ. (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Sucrose (%)
T^1-	Unprimed cane node	45.20	146	123	80.26	15.99
T^2-	Treating cane node in hot water at 50^0C for 2 hours	50.83	150	125	81.49	16.39
T^3-	Treating cane node in hot water at 50^0C and urea solution (3%)	52.70	155	127	52.65	16.16
T^4-	Priming cane node with cattle dung, cattle urine and water in 1:2:3 ratio	55.49	151	128	83.50	16.24
T^5-	Conventional 3 bud sett planting	46.32	149	125	81.03	16.94
T^6-	Primed and sprouted cane node incubated for four days after priming	53.54	143	119	77.32	17.08
	SE±	3.06	4.52	5.17	3.37	.47
	CD 5%	6.52	NS	NS	NS	NS

NORTH EASTERN ZONE

18. BURALIKSON

The experimental crop var. Kolong (CoBln9102) was planted on 26th March, 2014 and was harvested on 28th of March, 2015. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93.

The data on germination percentage recorded at 10 days interval up to 40 days after planting showed that no germination percentage was recorded up to 20 days after planting among all the treatments as moisture stress condition prevails at the time of planting. However significant differences in germination percentage were recorded at 30DAP and 40 DAP. Out of different treatments, conventional 3-buded sett planting (T_5) showed significantly higher germination percentage at 30 and 40 days after planting 26.9, 42.8, respectively which were statistically significant in comparison to other cane node treatments. The same treatment also recorded the significantly higher no of shoots 63.4, 70.7, 73.1 thousand/ha at 90, 120, 150 DAP, respectively.

Likewise the germination percentage the conventional 3 budded sett planting recorded significantly higher NMC (79.7 thousand/ha), cane diameter (2.8cm) than all other treatments. The same treatment also recorded the higher cane yield (69.0 tonnes/ha), which is statistically at par with the yield recorded by priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (61.3 t/ha).However, no significant differences on juice quality parameters were recorded due to different priming technique.

Table AS 66.18.1: Effect of primed cane node on germination

Treatments	Germination (%)			
	10 DAP	20 DAP	30DAP	40 DAP
T_1	0.0	0.0	13.9	27.8
T_2	0.0	0.0	12.7	25.7
T_3	0.0	0.0	15.1	28.9
T_4	0.0	0.0	20.2	30.2
T_5	0.0	0.0	26.9	42.8
T_6	0.0	0.0	15.3	27.7
SEm ((±))	0.0	0.0	2.16	2.28
CD 5%	0.0	0.0	6.51	6.85

Table AS66.18.2: Effect of primed cane node on numbers of shoots and shoots per Clump

Treatments	No. of shoots('000/ha)			No. of shoots per clump		
	90 DAP	120 DAP	150 DAP	90 DAP	120 DAP	150 DAP
T_1	41.2	49.0	53.6	1.5	2.1	2.5
T_2	48.1	59.5	61.0	1.4	2.0	2.6
T_3	40.4	48.7	53.2	1.4	2.0	2.6
T_4	50.5	53.0	56.6	1.5	2.2	2.6
T_5	63.4	70.7	73.1	1.8	2.4	3.0
T_6	33.0	38.5	43.1	1.4	2.0	2.4
SEm ((±))	2.49	3.39	3.47	0.08	0.07	0.09
CD5%	7.49	10.23	10.46	NS	NS	NS

Table AS66.18.3: Effect of primed cane node on yield and quality parameters

Treatments	NMC('000/ha)	Cane length(m)	Cane Diameter (cm)	Yield (t/ha)	Sucrose (%)	CCS (%)	Purity (%)
T_1	48.9	2.3	2.7	43.9	18.9	12.4	79.7
T_2	60.1	2.5	2.6	46.1	18.8	12.6	82.1
T_3	64.7	2.5	2.5	54.1	19.0	12.8	81.1
T_4	53.1	2.5	2.7	61.3	18.9	12.5	79.6
T_5	79.7	2.8	2.8	69.0	19.0	12.7	83.5
T_6	56.9	2.7	2.7	48.3	18.9	12.6	81.1
SEM ((±)	2.8	0.07	0.09	2.75	0.20	0.15	1.34
CD 5 %	8.4	0.22	NS	8.29	NS	NS	NS

PROJECT NO. : AS 67

Title : **Optimization of fertigation schedule for sugarcane through micro-irrigation technique under different agro- climatic conditions.**

Objective : To economize water use in cultivation and improve sugarcane productivity.

Centres : Cuddalore, Mandya, Lucknow and Coimbatore (2013-14)

Year of start : 2012-13

Year of completion : 2014-15

Treatments :

A. Irrigation water/ method applied:

- I_1 - Sub-surface drip irrigation at 75% Pan Evaporation (PE)-irrigation once in two days.
- I_2 - Sub-surface drip irrigation at 100% PE-irrigation once in two days.
- I_3 - Sub-surface drip irrigation at 125% PE-irrigation once in two days.
- I_4 - Farmer's practice-surface irrigation.

B. Nitrogen levels:

- N_1 - 100% recommended dose of nitrogen (RDN).
- N_2 - 75% (RDN).
- N_3 - 50% (RDN).

Details of Methodology :

Recommended variety of sugarcane will be planted in paired rows at recommended spacing for t region. Drip treatments will be placed between sugarcane rows at a depth of 20-25cm. Entire dose P and K fertilizers as per recommendation of the region will be applied. Entire dose of nitrogen af deducting the amount of N supplied through DAP will be applied through urea in differe installments at 10-12 days interval before onset of monsoon as per the recommendation.

Treatments : 12

Design : Strip plot.

Replication : Three

Plot size : 10 rows of 10m length.

Observations to be recorded :

1. Soil parameter:

i) Physical parameters (bulk density and infiltration rate).
ii) Quantity of water applied.
iii) Water use efficiency.

2. Sugarcane:

i) Germination
ii) Periodic tiller population and millable cane count.
iii) Growth parameters *i.e.*, cane length, diameter and weight.
iv) Juice quality (brix, pol and purity).
v) Cane and sugar yields.

SUMMARY REPORT FOR THE LAST YEAR (2013-14)
NORTH WEST ZONE

This experiment was originally allotted (2011-12) to the four centres namely Faridkot, Mandya, Lucknow and Cuddalore. In the workshop (2012-13) Coimbatore was added to take up the experiment from 2013-14. This year only Lucknow and Faridkot conducted the trial whereas Mandya and Cuddalore could not conduct it as supply of drip materials was delayed. Cuddalore has informed to initiate it from spring 2014.

NORTH WEST ZONE

1. FARIDKOT

Drip irrigation at 100% and 125% IW/ CPE ratio was at par with surface irrigation in millable canes and cane yield. When drip irrigation was applied at 75% IW/ CPE the cane yield was significantly lower than surface irrigation. Cane yield with 100% recommended dose of nitrogen (RDN) was significantly better than 50% RDN and was at par with 75% RDN. Same was the trend for millable canes.

2. LUCKNOW

Highest sugarcane yield of 94.10 t/ha was observed when sugarcane was drip fertigated with recommended dose of nitrogen and water equivalent to 125 % pan evaporation. However, irrigation water use efficiency (IWUE) was the highest at 2946.88 kg/ha-cm when fertigation was done and the amount of irrigation water was kept as 75 per cent of pan evaporation.

CURRENT YEAR'S REPORT (2014-15)

ZONE WISE AND CENTRE WISE REPORT

NORTH WESTERN ZONE

1. FARIDKOT

The centre carried out the trial with a modified set of treatments as mentioned below:

A. Irrigation water/method applied:

I_1: Surface drip irrigation in paired row trench at 60% CPE

I_2: Surface drip irrigation in paired row trench at 80% CPE

I_3: Surface drip irrigation in paired row trench at 100% CPE

I4: Recommended Flood irrigation with RDN in flat planted sugarcane

B. Nitrogen Levels (Fertigation):

N1: 60% RDN

N2: 80% RDN

N3: 100% RDN (150 kg N/ha)

Replications: 3

Date of planting: 22.02.2014

Results: Surface drip was laid in paired row trench plots panted at 30: 120 cm spacing. Drip irrigation at 100% CPE/IW ratio was significantly better than surface flood irrigation in cane yield (Table 7a). When drip irrigation was applied at 80% CPE/IW the cane yield was at par with surface irrigation. Cane yield was significantly lower than surface flood irrigation when drip irrigation was applied at 60% CPE/IW. Irrigation water applied was about 40% less with drip irrigation (100% CPE) than flood irrigated plots. Cane yield with 100% recommended dose of nitrogen (RDN) applied to flood irrigated crop was at par with Fertigation 100% and 80% RDN in drip irrigated crop (Table 7b)

Table AS 67.1.1: Yield and water productivity of sugarcane under different irrigation methods at Faridkot during 2014-15

Irrigation treatments	Cane yield (t/ha)	Irrigation Water applied (cm)	Water expenses (cm)	Cane produced (kg) per l000 litres of water applied	Cane produced (kg) per l000 litres of water expense
Surface drip irrigation at 60% CPE	54.5	32.2	91.4	16.93	5.97
Surface drip irrigation at 80% CPE	71.3	45.4	104.6	15.70	6.81
Surface drip irrigation at 100% PE	80.6	53.8	113.0	14.98	7.13
CD (5%)	5.0		-	1.16	0.48
Flood Irrigation	73.6	90.0	149.2	8.17	4.93
CD (5%) Drip vs Flood	6.6	-	-	1.44	0.61

Table AS 67.1.2: Yield and water productivity of sugarcane under different Fertigation levels at Faridkot during 2014-15

Fertigation (RDN)*	Cane yield (t/ha)	Irrigation Water applied (cm)	Water expenses (cm)	Cane produced (kg) per l000 litres of water applied	Cane produced (kg) per l000 litres of water expense
60% RDN	60.3	43.0	102.2	13.82	7.69
80% RDN	70.4	43.0	102.2	16.24	6.79
100% RDN	75.7	43.0	102.2	17.55	7.32
CD (5%)	5.0			1.16	0.48
Flood Irrigation with RDN	73.5	90.0	149.2	8.17	4.93
CD (5%) Fertigation vs control	6.6			1.44	0.61

*RDN: Recommended dose of nitrogen i.e. 150 kg N/ha

2.LUCKNOW

Sugarcane ratoon crop was initiated during second week of March, 2014 and the crop was harvested in the first week of Feb, 2015. It was observed that irrigation treatments significantly influenced shoot count at 60 and 120 days of ratooning. However, nitrogen doses did not influence the shoot count. Irrigation X nitrogen interaction was also non-significant. Length of sugarcane plant leaf, number of leaves per plant and the area of individual leaf were also significantly influenced by irrigation treatments but leaf width remained un-affected with irrigation and nitrogen treatments both. However, total leaf area per hectare before on-set of monsoon was significantly influenced by irrigation and nitrogen treatments. The Irrigation treatments significantly affected number of millable canes. However, the effect of nitrogen and interaction of Nitrogen X Irrigation was non-significant on number of millable canes. Cane stalk length was significantly influenced by irrigation and nitrogen treatments but cane stalk diameter was significantly influenced by irrigation treatments only. Highest sugarcane yield of 102.97 t/ha was observed when sugarcane was drip fertigated with recommended dose of nitrogen and water equivalent to 125 % pan evaporation. However, irrigation water use efficiency (IWUE) was the highest at 2554.7 kg/ha-cm when fertigation was done and the amount of irrigation water was kept as 75 per cent of pan evaporation. The sugarcane yield and IWUE were not influenced significantly by doses of nitrogen in fertigation treatments but influenced significantly in surface irrigation treatment. With surface irrigation, the mean sugarcane yield and IWUE were 69.96 t/ha and 874.49kg/ha-cm respectively.

Table AS 66.2.1: Shoot count after 120 days of ratooning

Nitrogen / Irrigation	Nitrogen application rate			
	N_1 = 100% recommended dose of N	N_2 = 75% recommended dose of N	N_3 = 50% recommended dose of N	Average
I_1= Sub surface drip at 75% PE	365833	364167	338056	356019
I_2 = Sub surface drip at 100% PE	353333	352500	350278	352037
I_3 = Sub surface drip at 125% PE	365278	365000	361389	363889
I_4=Farmers practice surface irrigation	353611	312222	280000	315278
Average	359514	348472	332431	
SE (Irrigation)				12388
CD (Irrigation)				39406
SE (Nitrogen)				10728
CD (Nitrogen)				NS
SE (IxN)				12388
CD(IxN)				NS

Table AS 66.2.2: Number of millable canes ('000/ha)

Nitrogen / Irrigation	Nitrogen application rate			
	N_1 = 100% recommended dose of N	N_2 = 75% recommended dose of N	N_3 = 50% recommended dose of N	Average
I_1= Sub Surface Drip at 75% PE	101.40	101.97	100.23	101.20
I_2 = Sub Surface Drip at 100% PE	104.20	103.33	104.20	103.91
I_3 = Sub Surface Drip at 125% PE	111.97	108.53	113.90	111.47
I_4=Farmers practice surface irrigation	98.30	97.40	97.47	97.72
Average	103.97	102.81	103.95	
SE (Irrigation)				2.06
CD (Irrigation)				6.54
SE (Nitrogen)				1.78
CD (Nitrogen)				NS
SE (IxN)				2.06
CD(IxN)				NS

Table AS 66.2.3: Cane stalk length at harvest (cm)

Nitrogen / Irrigation	Nitrogen application rate			
	N_1 = 100% recommended dose of N	N_2 = 75% recommended dose of N	N_3 = 50% recommended dose of N	Average
I_1= Sub Surface Drip at 75% PE	246.3	242.5	236.7	241.9
I_2 = Sub Surface Drip at 100% PE	248.5	250.0	245.4	248.0
I_3 = Sub Surface Drip at 125% PE	262.6	255.8	253.4	257.3
I_4=Farmers practice surface irrigation	221.8	220.3	214.2	218.8
Average	244.8	242.2	237.4	
SE (Irrigation)				2.4
CD (Irrigation)				7.5
SE (Nitrogen)				2.1
CD (Nitrogen)				8.8
SE (IxN)				2.4
CD(IxN)				NS

Table AS 66.2.4: Sugarcane yield (t/ha)

Nitrogen / Irrigation	Nitrogen application rate			
	N_1 = 100% recommended dose of N	N_2 = 75% recommended dose of N	N_3 = 50% recommended dose of N	Average
I_1= Sub Surface Drip at 75% PE	89.20	90.95	88.11	89.42
I_2 = Sub Surface Drip at 100% PE	93.44	92.44	94.97	93.62
I_3 = Sub Surface Drip at 125% PE	102.97	99.72	99.78	100.82
I_4=Farmers practice surface irrigation	75.96	70.75	63.17	69.96
Average	90.39	88.47	86.51	
SE (Irrigation)				1.18
CD (Irrigation)				3.75
SE (Nitrogen)				1.02
CD (Nitrogen)				4.40
SE (IxN)				1.18
CD(IxN)				2.89

Table AS 66.2.5: Irrigation water use efficiency (kg/ha-cm)

Nitrogen / Irrigation	Irrigation water applied (ha-cm)	Nitrogen application rate			
		N_1 = 100% recommended dose of N	N_2 = 75% recommended dose of N	N_3 = 50% recommended dose of N	Average
I_1= Sub Surface Drip at 75% PE	35.6	2505.5	2554.7	2475.0	2511.74
I_2 = Sub Surface Drip at 100% PE	47.5	1967.2	1946.2	1999.4	1970.95
I_3 = Sub Surface Drip at 125% PE	59.4	1733.6	1678.8	1679.8	1697.38
I_4=Farmers practice surface irrigation	80	949.5	884.4	789.6	874.49
Average		1789.0	1766.0	1736.0	
SE (Irrigation)					21.1
CD (Irrigation)					67.1
SE (Nitrogen)					18.3
CD (Nitrogen)					78.6
SE (IxN)					21.1
CD(IxN)					51.6

3. CUDDALORE

The drip materials for laying out of sub-surface drip irrigation been purchased. The experiment was taken up in during the year 2014. Now the plant crop is at harvest stage.

PROJECT No.: AS-68

Title: Impact of integrated application of organics and inorganics in improving soil health and sugarcane productivity

Objective : To develop nutrient management strategy for sustaining soil health and sugarcane production.

Year of start : 2014 - 2015

Locations : All the participating centres

Cropping system : Sugarcane – Ratoon-I – Ratoon-II

Treatment & Methodology:

Treatments	**Sugarcane (plant crop)**	**Ratoon-I**	**Ratoon- II**
T1	No organic + 50% RDF	Application of trash at 10 tonnes/ ha + 50% RDF	Application of trash at 10 tonnes/ ha + 50% RDF
T2	No organic + 100% RDF	Application of trash at 10 tonnes/ ha + 100% RDF	Application of trash at 10 tonnes/ ha + 100% RDF
T3	No organic + soil test based recommendation	Application of trash at 10 tonnes/ ha + soil test basis (NPK application)	Application of trash at 10 tonnes/ ha + soil test basis (NPK application)
T4	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)
T5	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)
T6	Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (rating chart)	Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (NPK application)	Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (NPK application)
T7	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF
T8	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF
T9	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis (NPK application)	Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis (NPK application)

Note:

1. The application rate of biofertilizer (*Azotobacter/ Acetobacter* + PSB) will be 5 kg/acre (solid based fertilizer 10^{7-8}cfu).
2. $ZnSO_4$ @ 25 kg/ha will be applied at the start of the cycle.
3. Trash will be inoculated with cellulolytic organism such as *Trichoderma viride* @ 500 g/tonne.
4. The experiment will be conducted in permanent field lay out.

Design : RBD

Replications : Three

Plot size : 6 rows of 6 m length

Planting season: February – March / Main season

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP / DAR
2. Tiller population at 120 and 150 DAP/DAR
3. Millable canes, length, girth and cane weight at harvest
4. Cane and sugar yield
5. Juice quality parameters (Brix, pol, purity) at 10 and 12 months age
6. Soil analysis initial and after harvest of each crop (bulk density, infiltration rate, organic carbon,
   soil pH, EC, available N, P_2O_5, K_2O in kg/ha)
7. Economics
8. Nutrient uptake (N, P, K)) at harvest (optional)
9. Soil microbial parameters (optional)

CURRENT YEAR'S REPORT (2014-15)

ZONE WISE AND CENTRE WISE REPORT

NORTH WESTERN ZONE

1. FARIDKOT

Cane yield (94.8 t/ha) was the highest withapplication of FYM/Compost @ 20 tonnes / ha + inorganic nutrient based on soil test (T_6) which was significantly higher than only 50% RDF without organic sources **(**T_1**),** 100% RDF without organic sources **(**T_2**)** and application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/Acetobacter* + *PSB*) + 50% RDF. All other treatments were at par with T_6. There was no effect of treatments on sucrose %.

Table AS 68.1.1: Growth, yield and quality of sugarcane during 2014-15 under various treatments

Treatments	Germination (%)	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)
T_1	32.0	163.2	72.8	200	2.58	899	67.1	18.67
T_2	30.7	174.3	79.7	208	2.60	956	73.1	18.10
T_3	31.7	181.5	90.1	214	2.64	967	83.9	18.48
T_4	33.2	171.6	99.0	207	2.61	999	83.4	18.35
T_5	35.8	194.1	104.2	212	2.66	1083	90.8	18.14
T_6	34.0	203.2	106.4	216	2.70	1071	94.8	18.40
T_7	32.8	166.4	75.1	203	2.58	973	79.5	18.40
T_8	31.5	182.7	83.2	209	2.55	1003	88.9	18.92
T_9	33.8	192.1	90.4	211	2.59	1015	91.9	18.40
CD (5%)	NS	NS	12.2	NS	NS	NS	11.9	NS

2. KAPURTHALA

The experiment was conducted on loamy sand soil, tested low in organic carbon (0.30 %), medium in available P (30.8 kg/ha) and low in available K (125 kg/ha).The data presented in table reveals that the highest cane yield (84.0 t/ha) was obtained in treatment T_6 when FYM 20t/ ha was applied along with 100% of recommended RDF, which was significantly higher than the treatments (T_1,T_4& T_7) where 50% RDF was applied alone and also with combination of FYM & biofertilizer. Similar trend was observed in case of millable canes where these were

significantly high in T6 than T_1,T_4&T_7 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: AS 68.2.1: Effect of various treatments on sugarcane growth and yield

Treatments	Germination %	Tiller Count (000/ha)	Cane length (cm)	Cane girth (cm)	Single Cane wt. (g)	Millable canes (000/ha)	Cane yield (t/ha)	Pol % juice
T_1	36.0	113.0	148	2.23	673	72.0	53.9	19.89
T_2	35.2	128.6	154	2.20	760	81.6	65.2	20.09
T_3	37.8	135.6	168	2.22	773	98.9	74.6	19.84
T_4	37.2	133.5	156	2.13	777	79.8	67.0	19.86
T_5	38.2	155.3	161	2.18	853	88.0	79.0	20.11
T_6	38.8	157.3	168	2.29	833	103.8	84.0	20.24
T_7	35.4	115.1	152	2.14	740	75.4	64.3	19.94
T_8	37.0	130.1	160	2.24	791	85.1	71.4	20.76
T_9	35.8	139.6	165	2.22	815	101.9	79.2	20.48
CD(5%)	NS	NS	NS	NS	NS	20.1	13.8	NS

Summary: Soil test based nutrients application along with organic source in an integrated way helps to attain the optimum sugarcane crop yield

3. KOTA:

A field experiment was planted during 2014-15 at ARS, Kota to develop nutrient management strategy for sustaining soil health and sugarcane production. Sugarcane variety CoPK-05191 was planted at 75 cm row distance, keeping 3 budded 4 setts per meter row length. Fertilizer, FYM and biofertilizer were applied as per treatment. Cultural operations were followed as per recommendation as and when desired. Data revealed that significantly higher germination (45.53 and 50.97 %) at 30 and 45 DAP, Tillers at 120 DAP(1,75,400/ha) and NMC(1,32,100/ha) was obtained with the application of 100%RDF through inorganic source enriched with 10 t FYM /ha +12.5 + 12.5 kg/ ha (*Azotobacter* + PSB) over T_1,T_4 and T_7 treatments. However, other treatments were at par with each other. Whereas tillers population at 150 DAP (1, 86,670/ha) and cane girth (9.70 cm) was recorded maximum in T9 treatment which was significantly higher over T_1, T_4 and T_7 and at par with rest of treatments. Taller (255.03 cm) canes and higher single cane weight (856 g) were also harvested with application of 20 t FYM / ha along with inorganic nutrient application based on soil test, significantly

higher over T_1,T_4 and T_7 in cane length and single cane weight only T1 and at par with rest of treatments. Application of 100%RDF/ STBR with organic manure or biofertilizer increased millable cane, cane length and individual cane weight and was observed superior as compared to control.

Data revealed that significantly higher cane yield (98.20 t/ha) and CCS (12.10 t/ha) were recorded by application of inorganic nutrients based on soil test enriched with 10 t FYM /ha +12.5 + 12.5kg/ha (Azotobactor + PSB) over T1, T4 and T7 treatments and at par with rest of treatments. The higher cane yield was the cumulative effect of higher cane length, girth and NMC. However, quality parameter i.e. brix (20.40%),sucrose (17.87%),CCS(12.30% and purity(87.56%) were recorded maximum under application of inorganic nutrient based on soil testing along with 20 t FYM/ha which was significantly superior over T1,T4 and T7 treatments except rest of treatments. Significant increase in soil organic carbon (0.54%) and infiltration rate (4.70 mm/hr) was also obtained by application of inorganic nutrient based on soil testing along with 20 t FYM/ha over T1, T2 and T3 treatments and at par with rest. FYM application in combination of either 100 %RDF or STBR increased SOC and infiltration rate over without added FYM and biofertilizer treated plots. Increase in infiltration rate can be attributed to increase SOM. Water stable aggregates increased with application of FYM (Table AS68.4).Soil pH (8.14) and bulk density (1.35 mg/m2) of soil reduced with application of T6 treatment over T1, T2 and T3 treatments and at par with rest. Application of inorganic nutrients enriched biofertilizer with FYM also loosened soil and showed lowest values of bulk density. Lower bulk density and soil pH determinate in manure treated plots was because of higher OM content of soil increased root growth, better aggregation and increased volume of micro pores. Application of inorganic nutrients enriched biofertilizer with FYM could not influence EC significantly over application of inorganic nutrient treatments. These results suggested that added organic substances either through plant residues or manure/ biofertilizer conserved soil organic carbon to a greater extent. Significantly higher available N (340 kg/ha) in soil was obtained with T5 treatment over T1, T2 and T3 treatments and at par with rest. Whereas higher available P (25.65 kg/ha) was noted with T9 which was significantly superior over T1, T2 and T3 treatments except rest of treatments.Available K (325 kg/ha) in soil also increased significantly with T6 over T1, T2 and T3 treatments. Application of inorganic nutrient either 100% RDF or STBR along with 20/10tFYM/ha enriched with biofertilizer ensured C addition and increase in microbial activity. Manure application significantly increased SOC and NPK availability as compared to no use of organic. It indicated that application of biofertilizer enriched with FYM improving soil structure, SOC and available nutrients status in soil during plant crop growth.

There were differences in cost of cultivation, GR, NR owing to different treatment cost. The higher GR, NR and BCR recorded with application of T9 treatment which was significantly higher over T1, T4 and T7 and at par with rest of treatments. However, maximum cane production cost(Rs1,17,804/ha) recorded in T5 treatment owing to higher cost of FYM and lower added of nutrients, whereas. Lowest production cost, GR and NR recorded in T1.

Summary: Among the treatment combination of nutrient management strategy, application of based on soil test (150:50:30 kg N P2 O 5 K2 O / ha) through inorganic source enriched with 10 t FYM /ha +12.5 + 12.5kg/ha (Azotobacter + PSB) was found excellent for increasing cane yield (98.20 t/ha), CCS yield (12.10 t/ha) and returns which was significantly superior over T1, T4 and T7 treatments except rest treatments. Whereas, application of 150:50:30 kg N, P_2O_5, K_2O/ha (STB)

through inorganic source enriched with 20 t FYM /ha (T6) found significantly superior and nest best treatment in respect of growth, quality and improving status of soil.

Table AS 68.3.1: Effect of integrated application of organics and inorganics on cane yield, quality and soil health during 2014-15 at Kota

Treatment	Cane yield (t/ha)	Brix (%)	Sucrose (%)	CCS (%)	CCS (t/ha)	Purity (%)
T_1 - No organic + 50% RDF	75.40	17.83	15.22	10.35	7.83	85.33
T_2 - No organic + 100% RDF	92.00	18.07	15.46	10.53	9.70	85.53
T_3 -No organic + soil test based recommendation	90.33	19.00	16.42	11.24	10.15	86.42
T_4 – Application of FYM/Compost @ 20tonnes/ha +50%RDF(inorganic source)	80.87	19.53	16.97	11.64	9.41	86.88
T_5 -Application of FYM/Compost @ 20 tonnes / ha +100%RDF(inorganic source)	95.00	20.30	17.76	12.23	11.63	87.49
T_6 -Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (rating chart)	97.40	20.40	17.87	12.30	12.01	87.56
T_7 -Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	81.00	20.00	17.45	12.00	9.73	87.27
T_8 Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	97.67	20.33	17.80	12.25	11.96	87.52
T_9 -Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis	98.20	20.35	17.81	12.26	12.10	87.48
SEm ±	4.85	0.49	0.51	0.38	0.74	0.41
CD (P=0.05)	14.70	1.49	1.54	1.14	2.24	1.25
CV	9.35	4.37	5.18	5.58	12.18	0.82

4. LUCKNOW

Field experiment was conducted to develop nutrient management strategy for sustaining soil health and sugarcane production. The experiment consisted of 10 treatments *viz*. T_1-No organic + 50% RDF (recommended dose of fertilizer), T_2-No organic + 100% RDF, T_3-No organic + soil test based recommendation (STBR), T_4-Application of FYM @ 20 tonnes/ ha + 50% RDF (inorganic source) : 20 t + 50% RDF, T_5-Application of FYM @ 20 tonnes / ha + 100% RDF (inorganic source) : 20 t + 100 % RDF,T_6-Application of FYM @ 20 tonnes / ha +

in organic nutrient application based on soil test (rating chart) : 20 t + STRC, T_7-Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Acetobacter* + *PSB*) + 50% RDF : 10 t + B + 50 % RDF, T_8-Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Acetobacter* + *PSB*) + 50% RDF : 10 t + B + 100 % RDF, T_9-Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Acetobacter* + *PSB*) + 50% RDF : 10 t + B + STBR, T10-Only organic: Organic. The experiment was laid out in Randomised Block Design with three replications. The cane setts were soaked with bioferilizer cultures by dipping in the containers. FYM was applied in the furrows at the time of planting

The data on sugarcane growth, yield and quality indicate significant variations among the treatments. Significantly the highest rate of germination (39.6%) was observed under the treatment of biofertilizer application along with FYM. Highest number of tillers (132.7 thousand /ha at 120 days after planting), shoot count (178.6 thousand/ha at 180 DAP), number of millable canes (123.2 thousand/ha), cane yield (98.0 t/ha) and sugar yield (12.27 t/ha) were recorded under the treatment where application of FYM @ 20t/ha was done along with soil test (rating chart) based inorganic fertilizer recommendations. However it was found comparable to the treatment of FYM @ 10 t/ha along with biofertilizer and soil test basis inorganic fertilizers application. The yield attributing characters vis. cane length (238.4 cm), cane girth (2.25 cm) and weight of individual cane (1.18 kg) was recorded significantly highest with the application of FYM @ 20 t/ha along with inorganic fertilizers applied on the basis of soil test rating chart. The quality parameters viz. brix value and pol % were significantly improved with application of FYM and bio-fertilizers.

Table AS 68.4.1: Germination, shoot population and yield of sugarcane as affected by different nutrient management treatments

Treatment	Germination (%)	Shoot population ('000/ha)			NMC ('000/ha)	Yield
	45 DAP	May	July	Sep		(t/ha)
50 %RDF	35.2	90.2	130.9	139.6	87.26	60.47
100 % RDF	35.4	99.1	164.5	162.9	98.36	78.97
STBR	34.4	98.6	169.9	161.2	97.54	82.00
20 t FYM + 50 % RDF	38.2	98.5	166.3	159.7	93.56	73.13
20 + 100	38.4	107.3	175.4	169.0	106.85	90.13
20 + STRC	38.4	119.5	183.7	178.6	123.21	98.03
10+ B +50	39.6	99.3	176.5	169.1	101.69	78.83
10+B+100	39.6	114.6	173.6	168.0	115.49	93.40
10+ B STB	39.6	117.7	175.1	172.2	118.76	96.33
Organic	36.1	99.1	173.2	163.0	100.65	80.93
SEm ±	0.61	3.20	4.69	4.55	2.84	2.29
CD (P= 0.05)	1.80	9.52	13.93	13.51	8.45	6.80

RDF: Recommended dose of fertilizers; B: Bio-fertilizers; STCR: Soil test rating chart

Table 2: Effect of different treatments on juice quality, yield attributes and sugar yield

Treatment	Brix	Pol %	Purity	Length	Girth	Cane Wt.	CCS	CCS
	%	%	%	cm	cm	kg	%	t/ha
50 %RDF	18.55	15.69	84.40	207.67	2.10	0.90	10.61	6.42
100 % RDF	19.35	16.46	85.62	228.67	2.11	0.94	11.17	8.82
STBR	19.34	16.66	85.76	233.33	2.16	1.05	11.38	9.33
20 t 50 %	19.16	16.34	84.89	221.00	2.16	1.09	11.11	8.12
20 + 100	19.56	16.90	86.06	233.67	2.24	1.15	11.56	10.42
20 + STRC	19.87	17.93	86.24	238.40	2.25	1.18	12.52	12.27
10+ B +50	19.26	16.41	85.46	222.00	2.17	1.12	11.14	8.78
10+B+100	19.71	17.07	86.10	235.00	2.15	1.13	11.69	10.92
10+ B STB	19.77	17.77	86.11	234.00	2.17	1.15	12.39	11.93
Organic	19.12	16.56	85.67	232.00	2.34	1.10	11.34	9.18
S E m ±	0.40	0.46	1.07	6.21	0.06	0.03	0.29	058
C D (P= 0.05)	1.17	1.35	NS	18.44	0.18	0.09	0.87	1.73

5. UCHANI

The experiment was conducted on clay loam in texture having pH 8.0, EC 0.44 dsm^{-1}, organic carbon 0.38%, available P 12.2 kg/ha and available K 159.2 kg/ha, available S (12.8 kg/ha), available Zn (0.9 ppm) and available Fe (4.1 ppm) and available Mn (7.8 ppm). Sugarcane variety CoH 160 (Early maturing and good ratooner was planted on March 28, 2014 at 75 cm spacing in randomized block design with three replications. Doses of phosphorus, potash as per treatments were applied at the time of planting whereas dose of nitrogen was applied in three equal splits as top dressing (April, May & June). Recommended dose of Nitrogen, phosphorus and potash were 150, 50 and 50 kg/ha, respectively. The values for Nitrogen, phosphorus and potash on soil test basis were 172, 56 and 60 kg/ha, respectively. The crop was irrigated at 8-10 days intervals during pre-monsoon period and 20 days interval during post monsoon period. The plant crop was harvested on February 24, 2015.

No significant differences were observed in germination percent among different treatments. The treatments with 100 % RDF and soil test based fertilizer with and without FYM application being at par produced significantly higher number of tillers, millable canes and cane yield as compared to the treatments of 50 % RDF with and without FYM (Table 8). Application of 20 t/ha FYM with 50 % RDF or 100% RDF or Soil test based fertilizers application produced similar number of tillers, mlillable canes, cane yield in comparison to the treatments of 10 t/ha FYM + Biofertilizers application with 50 % RDF or 100% RDF or Soil test based fertilizers application. FYM/Compost 20 t/ ha + 100% RDF through inorganic source (T6) and FYM/Compost @ 10 t/ ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + soil test basis (T9) were found best and at par treatments in terms of number of tillers, millable canes and cane and sugar yield as compared to rest of the treatments. So FYM 10t /ha can be saved with application of biofertilizer in sugarcane crop in addition in increasing the population of soil microorganism. There was a yield reduction of 55.1, 52.1 and 52.0 % in yield of

sugarcane with 50 % RDF alone over soil test basis alone, 50 % RDF+ FYM 20 t/ha over soil test basis + FYM 20 t/ha and 50 % RDF + FYM 10 t/ha+ biofertilzers over soil test basis fertilizer application + FYM 10 t/ha+ biofertilizers, respectively.

Summary: FYM/Compost 20 t/ ha + 100% RDF through inorganic source (T6) and FYM/Compost @ 10 t/ ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + soil test basis (T9) were found best and at par treatments in terms of number of tillers (43.6, 152.6 thousands/ha) , millable canes (122.8, 121.9 thousands/ha) and cane yield (107.8, 106.8 t/ha) and sugar yield (13.26, 13.13 t/ha) as compared to rest of the treatments.

Table AS 68.5.1: Effect of different treatments on sugarcane plant crop

Tr.	Sugarcane (plant crop)	Germination (%)	No. of tillers (000/ha)	No. of millable canes (000/ha)	Single cane weight (g)	Cane yield (t/ha)	Sugar yield (t/ha)
T1	No organic + 50% RDF	43.1	90.5	64.9	660	42.3	5.12
T2	No organic + 100% RDF	44.6	138.1	109.0	850	91.6	11.26
T3	No organic + soil test based recommendation	44.0	143.2	113.0	853	95.3	11.73
T4	Application of FYM @ 20 t/ ha + 50% RDF	45.8	112.2	76.1	709	53.4	6.50
T5	Application of FYM @ 20 t/ ha + 100% RDF	46.1	148.4	118.6	883	103.8	12.74
T6	Application of FYM @ 20 t / ha + in organic nutrient application based on soil test (rating chart)	46.5	153.6	122.8	888	107.8	13.26
T7	Application of FYM @ 10 t/ ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 50% RDF	44.5	101.4	75.7	707	52.8	6.43
T8	Application of FYM @ 10 t/ ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 100% RDF	44.8	147.1	117.7	884	102.9	12.63
T9	Application of FYM @ 10 t/ ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + soil test basis	45.0	152.6	121.9	887	106.8	13.13
	CD at 5%	NS	5.6	3.8	15	3.2	0.36

6. PANTNAGAR

Setts of sugarcane variety Co Pant 5224 were planted at 75 cm apart row to row by flat method planting on March 25, 2014. Sugarcane setts were treated with carbendazim (0.2 % for 10 minutes to prevent the setts from fungal infection if any). Treatments were given as per technical programme. Crop was raised with recommended package and practices and as per need of the crop. Soil of the experiment was silty loam in texture, rich in organic matter (1.05 %) and medium in available P_2O_5 (79.0 kg/ha) and K_2O (240.7 kg/ha). Soil was neutral pH (7.5) crop was harvested on 30.3.2015.

Highest germination at 45 DAP recorded in the treatment T_5 - (FYM/compost @ 20 tonnes/ha + 100 % RDF, inorganic source (120: 60: 40 NPK/ha) and T_6 - (FYM/compost @ 20 tonnes/ha + in organic nutrient based on soil test) which were significantly higher over rest of the treatments. Higher cane yield was also recorded from the treatment T_5 and T_6 which were significantly higher over rest of the treatments. Higher cane yield in these treatments was due to higher shoot population, NMC, cane girth and heavier cane recorded in these treatments. Sucrose % was also significantly higher in these treatments over T_1, T_2 and T_3. Thus CCS yield was recorded highest in T_6 which was found significantly higher over T_1, T_2, T_3 and T_9.

Summary: Highest cane yield was recorded from T_5 - (FYM @ 20 ton/ha + 100 % RDF (120: 60: 40) followed by T6 - (FYM 20 ton/ha + inorganic nutrients based on soil test). The higher cane yield in these treatments was due to higher NMC, cane girth, cane length and weight of individual cane. Sucrose % and CCS yield were also higher in these treatments.

Table AS 68.6.1: Effect of various treatments on sugarcane growth and yield

Treatments	Germination (%)		Cane yield (t/ha)	Millable cane (000/ha)	Cane girth at harvest (cm)	Cane length (cm)	Per cane weight (g)	CCS (t/ha)
	35 DAP	45 DAP						
T_1-No organic + 50% RDF	27.2	31.2	65.9	73.2	8.0	348.3	800.0	7.0
T_2- No organic + 100% RDF	29.4	31.7	66.8	73.2	8.7	358.7	833.3	7.2
T_3- No organic + Soil test ba recommendation (150:60:60)	29.4	31.7	68.8	75.7	8.7	358.3	833.3	7.3
T4- Appication of FYM/compost @ 20 t/h 50 % RDF (inorganic source)	33.0	34.4	70.6	78.6	9.0	418.3	916.7	7.9
T5-Application of FYM/compost @ 20 t/ha +100 % RDF (inorganic source) (120 : 60: 40)	33.2	36.0	77.9	83.0	9.3	429.0	1216.7	7.9
T6- Application of FYM/compost @ 20 t/h in organic nutrient application based soil test (rating chart)	33.5	35.8	77.9	82.9	9.2	440.0	1250.0	8.3
T7- Application of FYM/compost @ 10 t/h bio fertilizer (*Azotobacter /Acetobacter* PSB) + 50 % RDF	31.4	32.1	69.3	75.7	8.5	366.7	1066.7	7.4
T8- Application of FYM/compost @ 10 t +bio fertilizer (*Azotobacter /Acetobacte* PSB) + 100 % RDF	31.7	33.7	71.7	79.1	9.0	372.0	1033.3	7.8
T9- Application of FYM/compost @ 10 t +bio fertilizer (*Azotobacter /Acetobacte* PSB) + soil test basis	31.5	32.3	69.8	76.1	9.0	382.0	1083.3	7.5
SEm±	0.3	0.3	0.5	1.0	0.2	2.2	19.7	0.2
CD at 5 %	1.1	0.9	1.5	3.1	0.6	6.5	59.2	0.7

7. SHAHJAHANPUR

The soil of experimental field was low in organic carbon (0.36), medium in phosphorus (20.40 kg/ha) and potash (162 kg/ha) with pH 6.54. Experimental plant crop was planted on 12.02.2014 and harvested on 05.03.2015. Ratoon experiment is in progress.

Experimental data given showed that application of FYM @ 10 tonnes/ha + bio-fertilizers (*Azotobacter* + PSB) @ 10 kg/ha each + soil test basis (NPK) produced significantly higher cane yield (113.10 t/ha) than that of other treatments in plant cane. CCS % in cane was significantly not affected with different treatment.

Summary: Application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobacter + PSB) + soil test basis (NPK) produced significantly higher cane yield (113.10 t/ha) than that of other treatments.CCS % in cane was found to be more or less similar.

Table AS 68.7.1: Effect of treatments on germination, shoots, millable canes, cane yield and CCS % (Plant cane)

Treatmemts		Germ. %	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS %
T_1	No organic + 50% RDF	42.65	137.73	97.22	79.74	10.41
T_2	No organic + 100% RDF	41.17	148.95	105.09	82.64	10.40
T_3	No organic + soil test based recommendation	41.47	145.36	102.08	84.03	10.78
T_4	Application FYM @ 20 tonnes/ha +50% RDF(inorganic source)	42.86	140.50	98.61	79.86	10.36
T_5	Application FYM @ 20 tonnes/ha +100% RDF(inorganic source)	42.16	151.85	106.94	95.95	10.83
T_6	Application FYM @ 20 tonnes/ha + inorganic nutrient application based on soil test	41.26	162.49	114.23	96.30	10.87
T_7	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ 50% RDF	45.23	151.50	106.49	87.27	10.49
T_8	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ 100% RDF	46.23	167.27	117.12	104.28	10.47
T_9	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ soil test basis (NPK application)	43.35	174.99	123.26	113.10	10.90
	SE±	1.85	5.17	2.95	2.26	0.13
	CD 5%	NS	10.96	6.25	4.80	0.27

8. SRIGANGANAGAR

The field experiment was conducted to study the response of sugarcane crop to different plant nutrients with respect to yield and quality of sugarcane. The soil of the experimental field being sandy loam in texture, alkaline in reaction (8.3), tested low in organic carbon (0.33%), medium in available P_2O_5 (24 kg/ha) and high in available K_2O (362 kg/ha). Early maturing variety Co6617 was planted on 11.02.2014 at 75 cm spacing in randomized block design with three replications and harvested on 18.12.2014.

The local sugarcane variety Co 6617 was planted on 11.02.2014 and harvested on 30.12.2014. The field experiment was conducted to study the response of sugarcane crop to different plant nutrients with respect to yield and quality of sugarcane. The soil of the experimental field being sandy loam in texture, alkaline in reaction (8.3), tested low in organic carbon (0.33%), medium in available P_2O_5 (24 kg/ha) and high in available K_2O (362 kg/ha). The results of experiment indicated that germination percent remained uninfluenced. However, nutrient management treatments significantly influenced cane yield and its attributes. Application FYM @ 10 tonnes/ha along with bio fertilizers and soil test based inorganic fertilizers gave highest cane yield (94.62 t/ha) but it was at par with T6- FYM@20 tonnes/ha + 50% RDF Soil test (93.84 t/ha), T8-FYM@10 tonnes/ha + Bio fertilizer + 100% RDF (92.39 t/ha) and T5- FYM@20 tonnes/ha + 100% RDF (91.92 t/ha). It indicate that application of bio fertilizers saved FYM @ 10 t/ha and application of FYM @ 20 t/ha gave significantly higher yield over alone application of inorganic fertilizers.

Table AS 68.8.1: **Effect of treatments on yield and quality of sugarcane crop at Sriganganagar during 2014-15**

Treatments	**Germination (%)**	**Cane yield (t/ha)**	**Sucrose (%) at harvest**
T1-No organic + 50% RDF	40.29	72.29	17.24
T2-No organic + 100% RDF	40.81	84.36	17.57
T3-No organic + 100% RDF Soil test	40.86	86.41	17.58
T4-FYM@20 tonnes/ha + 50% RDF	41.21	83.72	17.41
T5-FYM@20 tonnes/ha + 100% RDF	41.26	91.92	17.59
T6-FYM@20 tonnes/ha + 50% RDF Soil test	41.34	93.84	17.61
T7-FYM@10 tonnes/ha + Bio fertilizer + 50% RDF	41.41	80.48	17.39
T8-FYM@10 tonnes/ha + Bio fertilizer + 100% RDF	41.48	92.39	17.57
T9-FYM@10 tonnes/ha + Bio fertilizer + 50% RDF Soil test	41.51	94.62	17.69
CD at 5 %	NS	7.41	0.26

PENINSULAR ZONE

9. THIRUVALLA

The experiment to study the impact of integrated application of organics and inorganics in improving soil health and sugar cane productivity was planted on 21.1.2014 and harvested on 10.1.2015. The germination percentage and tiller count remained unaffected due to the various treatments tried.

The variations due to different treatments were significant for growth and yield parameters. Among the various treatments imposed T_8 (FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter*/ *Acetobacter* + PSB) + 100% RDF) recorded significantly higher value for cane length (232.90 cm), MCC (81550 /ha) and resulted in maximum yield (89.09 t/ha). Brix and sugar yield also followed same trend with significantly higher value with for sugar yield (10.87 t/ha) for the same treatment. It was followed by T6 (FYM/Compost @ 20 tonnes / ha + inorganic nutrient application based on soil test (rating chart)). Growth and yield parameters recorded by all other treatments except T_1, were on par.

Slight variation in the soil fertility parameters were noticed before and after the conduct of the trial especially regarding the status of major nutrients where higher values were recorded in the soil after completion of the experiment.The treatment T_8 recorded the highest BC ratio (1.40).

Table AS 68.9.1: Growth, cane yield and juice quality as influenced by different treatments

Treatments		Cane length (cm)	Cane girth (cm)	Single cane weight (kg)	MCC ('000/ ha)	Cane yield (t/ha)	Sugar yield (t/ha)	BC ratio
T_1	No organic + 50% RDF	195.00	8.91	1.18	52.27	56.04	6.28	0.75
T_2	No organic + 100% RDF	201.32	8.99	1.20	71.46	74.79	9.28	1.28
T_3	No organic + soil test based recommendation	210.10	9.27	1.23	73.08	75.31	8.89	1.30
T_4	FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	207.45	9.30	1.20	69.71	72.02	8.65	1.25
T_5	FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	215.56	9.47	1.27	70.94	74.38	8.63	1.28
T_6	FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (rating chart)	223.67	9.60	1.40	75.26	76.33	8.78	1.29
T_7	FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 50% RDF	212.89	9.24	1.37	66.33	68.82	8.26	1.20
T_8	FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 100% RDF	232.90	10.05	1.52	81.55	89.09	10.87	1.40
T_9	FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + soil test basis	228.22	9.40	1.28	70.40	72.74	8.59	1.25
CD (0.05)		**9.48***	**0.52***	**0.18***	**2.25***	**8.83***	**NS**	**NS**

10. MANDYA

Application of FYM @ 20 t / ha + in organic nutrient application based on soil test results recorded significantly higher cane yield (96.58 MT ha^{-1}) compared to all other treatments. However, it was on par with application of FYM @ 20 t / ha + 100% RDF (93.12 MT ha^{-1}), application of FYM @ 10 t / ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF (90.63 MT ha^{-1}) and application of FYM @ 10 t / ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test basis fertilizer application (88.73 MT ha^{-1}).

Table AS 68.10.1: Growth and yield of sugarcane as influenced by integrated application of organics and inorganics

Treatment	Cane girth (cm)	Cane length (m)	Single cane weight (kg)	NMC (1000 ha^{-1})	Cane yield (kg/ha)	Purity %
T_1: No organic + 50% RDF	1.98	1.41	0.82	44.21	62.33	77.67
T_2: No organic + 100% RDF	2.63	1.69	0.88	52.15	75.33	78.00
T_3: No organic + soil test based recommendation	2.80	1.78	1.16	57.29	88.94	81.00
T_4: Application of FYM/Compost @ 20 tonnes / ha + 50% RDF (Inorganic source)	2.67	1.86	1.17	53.63	76.33	83.00
T_5: Application of FYM/Compost @ 20 tonnes / ha + 100% RDF (Inorganic source)	2.90	2.10	1.21	59.82	93.12	80.33
T_6: Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (Rating chart)	2.97	2.21	1.44	61.30	96.58	81.67
T_7: Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 50% RDF	2.79	1.61	0.92	52.93	78.31	80.00
T_8: Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + 100% RDF	2.89	1.91	1.20	57.93	90.63	79.00
T_9: Application of FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter + PSB*) + soil test basis	2.80	1.85	1.21	57.95	88.73	79.00
S.Em. ±	**0.15**	**0.14**	**0.09**	**4.50**	**4.87**	**1.35**
CD @ 5 %	**0.44**	**0.42**	**0.26**	**13.49**	**14.59**	**NS**
CV (%)	**9.29**	**13.42**	**13.69**	**14.10**	**10.11**	**2.92**

11. SANKESHWAR

Cane girth differed significantly due to the treatments. The highest cane girth was recorded in T_8 (2.803) followed by T_6 (2.777). The lowest cane girth was recorded in T_9 (2.570).

Significantly higher number of millable canes were recorded in T_9 (153395) followed by T_8 (94342). The lower number of millable cane were recorded in T3 (76029).Yield of Sugarcane differed significantly due to treatments, significantly higher cane yield was recorded in T_9 (168.57) followed by T_7 (122.49). The lowest yield was recorded in T_3 (92.88)

Brix percent, Pol percent and purity percent differed significantly with treatments.Significantly higher brix values were recorded in T5 (23.70) followed by T4 (23.67). The lower brix values were recorded in T2 (23.23). Higher pol percent was recorded in T5 (22.23) followed by T6 (22.16) and the lower pol percent was recorded in T3 (20.34).Juice purity variation was significant with treatment effect the highest purity was recorded in T5 (93.77) and the lowest purity values were recorded in T3 (86.97).

Highest CCS percent was recorded in T5 (15.80) and the lowest was recorded in T3 (13.96).The CCS yield differed significantly with treatments although CCS percent variation was significant but cane yield variation has masked the effect of CCS percent in CCS yield. Significantly the higher CCS yield was recorded in T_9 (26.11) followed by T_7 (18.14). The lowest CCS yield was recorded in T3 (12.95).

Table AS 68.11.1: Growth parameters influenced by Integrated Nutrient Management

Treatment No	Number of internodes	Cane height (m)	Number of Tillers /ha	Number of Clumps/ha
	23.97	2.343	95590	13043
T2	24.63	2.477	101770	13892
T3	27.00	2.565	93896	12799
T4	24.93	2.437	111715	15249
T5	24.10	2.457	107394	14698
T6	23.73	2.453	104643	14307
T7	22.83	2.413	112826	15400
T8	25.30	2.450	117215	16022
T9	24.40	2.460	195940	15902
CV	7.06	5.83	37.66	34.47
S.EM+	1.00	0.08	25152.27	3124.55
CD (5%)	3.00	0.25	75406.48	NS

Table AS 68.11.2: Yield and yield attributes influenced by Integrated Nutrient Management

Treatment No	Single Cane weight (Kg)	Cane Girth (Cm)	Yield t/ha	NMC/ha
	1.250	2.750	96.96	77675
T2	1.180	2.705	96.53	82305
T3	1.228	2.697	92.88	76029
T4	1.066	2.720	95.82	89918
T5	1.231	2.623	108.52	87346
T6	1.148	2.777	99.87	85494
T7	1.351	2.657	122.49	90844
T8	1.178	2.803	111.26	94342
T9	1.158	2.570	168.57	153395
CV	12.26	5.93	30.94	35.04
S.EM+	0.08	0.09	19.71	18819.59
CD (5%)	0.25	0.28	59.08	56421.12

Table AS 68.11.3: Yield And Quality Parameters Influenced By Integrated Nutrient Management

Treatment No	Juice Weight (Kg)	Corrected Brix (%)	Corrected pol (%)	PURITY %	CCS %	Yield t/ha	CCS Yield t/ha
	0.723	23.39	20.58	87.99	14.20	96.96	13.78
T2	0.645	23.23	21.93	94.34	15.63	96.53	15.17
T3	0.731	23.37	20.34	86.97	13.96	92.88	12.95
T4	0.590	23.67	20.79	87.83	14.33	95.82	13.71
T5	0.739	23.70	22.23	93.77	15.80	108.52	17.09
T6	0.652	23.66	22.16	93.67	15.74	99.87	15.82
T7	0.862	23.48	21.29	90.70	14.91	122.49	18.14
T8	0.683	23.45	21.13	90.14	14.75	111.26	16.39
T9	0.798	23.51	22.00	93.59	15.62	168.57	26.11
CV	15.07	0.90	5.41	5.07	7.70	30.94	30.91
S.EM+	0.06	0.12	0.67	2.66	0.67	19.71	2.96
CD (5%)	0.19	0.36	2.00	7.98	2.00	59.08	8.87

12. PADEGAON

The data in respect of yield and yield contributing parameters revealed that the treatment T_6 receiving 100 % RDF along with 20 t ha^{-1} FYM recorded significantly the higher average cane weight, number of millable canes and cane yield (2.05 kg, 91.12 '000 ha^{-1} and 186.09 t ha^{-1}, respectively) and it was at par with T_9, T_5, T_8 and T_4 for average cane weight and cane yield and it was at par with T_5, T_9, T_8, T_4 and T_3. The treatment T_1 receiving 50 % RDF only recorded the lowest average cane weight, number of millable canes and cane yield (1.74 kg, 74.88 '000 ha^{-1} and 129.76 t ha^{-1}, respectively).

The CCS per cent and CCS yield were significantly affected by the different organic and inorganic treatments. The treatment T_6 receiving 100 % RDF along with 20 t ha^{-1} FYM only recorded significantly the highest CCS percent and CCS yield (13.88 % and 25.82 t ha^{-1} , respectively) and it was at par with rest of the treatments except T_1 receiving 50 % RDF only, T_2 receiving 100 % RDF only and T_3 receiving RDF as per soil test.

Soil chemical properties:

The soil chemical properties have been analyzed from pre and post-harvest soils of sugarcane. The soil pH was slightly reduced in all the integrated nutrient management treatments. The lowest soil pH (7.53) was recorded in treatment of T_4 receiving 50 % RDF along with 20 t ha^{-1} FYM and found highest in the treatment T_3 receiving RDF as per soil test (7.81). The soil EC was increased in all the treatments over the initials. The significantly lowest EC was noted in the treatment T_1 receiving 50 % RDF and T_2 receiving 100 % RDF only (0.49 dSm^{-1}) and it was at par with T_3 receiving RDF as per soil test (0.52 dSm^{-1}). The highest soil EC was recorded in treatment T_6 receiving RDF as per soil test along with 20 t ha^{-1} FYM (0.65 dSm^{-1}) and it was at par with all the integrated nutrient management treatments.

Soil organic carbon content was reduced in the inorganic treatments T_1, T_2 and T_3 and it was increased in all other all the integrated nutrient management treatments over the

initial values. The treatments T_4 receiving 50 % RDF along with 20 t ha^{-1} FYM and T_6 receiving RDF as per soil test along with 20 t ha^{-1} FYM were recorded significantly the higher organic carbon (0.74 %) and it was at par with T_5, T_8, T_9 and T_7. The lowest organic carbon was recorded in the treatments T_1 receiving 50 % RDF only and T_3 receiving RDF as per soil test (0.66 %).

Economics: The data pertaining to gross returns, net returns and benefit-cost ratio as affected by different treatments revealed that, the application of RDF as per soil test along with 20 t ha^{-1} FYM (T_6) recorded significantly the higher per hectare gross return (Rs.4,18,710 ha^{-1}), and followed by T_9 receiving RDF as per soil test along with 10 t ha^{-1} FYM + biofertilizers and T_5 receiving 100 % RDF along with 20 t ha^{-1} FYM (Rs.4,10,400 and 4,05,383 ha^{-1}, respectively) and lowest in the treatment T_1 (Rs.2,91,968 ha^{-1}). The treatments T_9 reported significantly the higher per hectare net return (Rs.2, 69,901 ha^{-1}), and lowest in the treatment T_1 (Rs.1, 99,380 ha^{-1}). The highest benefit-cost ratio was reported in the treatments T_3 receiving only RDF as per soil test (2.43) and it was found lowest in the treatment T_4 (1.22).

SUMMARY: The application of recommended dose fertilizers as per soil test along with 20 t ha^{-1} FYM for pre-seasonal sugarcane was found beneficial in terms of yield, quality and soil health.

Table AS 68.12.1: Effect of different treatments on growth, yield and yield parameters of sugarcane

Treat.	Germi-nation (%)	TR (120 days)	Girth (cm)	Milleable height (cm)	ACW (Kg)	NMC (000 ha^{-1})	Cane yield (tha^{-1})	CCS %	CCS yield (t ha^{-1})
T_1	54.93	1.99	8.94	229	1.74	74.88	129.76	13.60	17.66
T_2	59.21	2.05	9.21	239	1.79	78.50	140.14	13.63	19.11
T_3	60.24	2.07	9.33	253	1.82	83.06	149.91	13.73	20.58
T_4	55.70	2.07	9.53	268	1.95	87.33	171.24	13.86	23.72
T_5	59.42	2.18	9.80	276	2.01	89.58	180.17	13.86	24.98
T_6	62.88	2.22	9.98	282	2.05	91.12	186.09	13.88	25.82
T_7	63.24	2.03	9.30	254	1.92	84.03	161.68	13.84	22.38
T_8	65.20	2.08	9.51	269	1.98	88.66	175.22	13.86	24.28
T_9	64.58	2.09	9.81	280	2.02	89.08	182.40	13.87	25.31
SE±	2.32	0.07	0.26	6.48	0.04	2.90	5.95	0.04	0.84
CD at 5%	NS	0.20	0.78	19.41	0.12	8.69	17.84	0.13	2.52

Table AS 68.12.2: Economics of different treatments

Treat.	Gross returns (Rs. ha^{-1})	Prod. cost (A) (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B : C Ratio
T_1	291968	92588	199380	2.15
T_2	315323	98517	216805	2.20
T_3	337305	98479	238826	2.43
T_4	385298	173804	211494	1.22
T_5	405383	179733	225649	1.26
T_6	418710	179695	239015	1.33
T_7	363780	134608	229172	1.70
T_8	394253	140537	253715	1.81
T_9	410400	140499	269901	1.92
SE ±	13393	--	13393	--
CD at 5 %	40151	--	40151	--

13. POWARKHEDA

The number of millable canes increased significantly due to application of FYM/Compost @ 20 t/ha +inorganic nutrient based on Soil test (116.26) as compared to no organic + 50% RDF (78.40), FYM/Compost @ 20 t/ha + 50% RDF (97.43), no organic +100% RDF (105.97) and no organic +Soil test base (107.00). The NMC obtained at par in between T_6, T_5, T_8, T_9 and T_7.The value of brix per cent did not differ significantly due to various treatments during experimentation. The brix percentage ranged between 20.94 to 21.25 per cent.

The cane yield increased significantly due to application of FYM/Compost @ 20 t/ha +inorganic nutrient based on Soil test (116.87 t/ha) as compared to no organic + 50% RDF (79.01 t/ha), FYM/Compost @ 20 t/ha + 50% RDF (98.25 t/ha), no organic +100% RDF (106.69 t/ha) and no organic +Soil test base (107.72 t/ha). The NMC obtained at par in between T_6, T_5, T_8, T_9 and T_7.

Summary: The cane yield increased significantly due to application of FYM/Compost @ 20 t/ha +inorganic nutrient based on Soil test (116.87 t/ha) as compared to no organic + 50% RDF (79.01 t/ha), FYM/Compost @ 20 t/ha + 50% RDF (98.25 t/ha), no organic +100% RDF (106.69 t/ha) and no organic +Soil test base (107.72 t/ha). The NMC obtained at par in between T6, T5, T8, T9 and T7.

Table AS68.13.1: Effect of different treatments on growth, yield and quality of sugarcane

S.No.	Treatments	Germination (%)	Tillers (000'/ha)	Height (cm)	NMC (000'/ha)	Brix (%)	Yield (t/ha)
1	No organic + 50% RDF	67.98	81.48	225	78.40	21.13	79.01
2	No organic +100% RDF	67.52	109.05	264	105.97	21.24	106.69
3	No organic+Soil test base	68.60	109.57	267	107	21.24	107.72
4	Application of FYM/Compost @ 20 t/ha + 50% RDF (inorganic s.)	68.52	100.51	268	97.43	21.24	98.25
5	Application of FYM/Compost @ 20 t/ha +100% RDF (inorganic s.)	67.67	118.83	297	115.74	21.25	116.36
6	Appli.of FYM/Compost @ 20 t/ha +inorganic nutrient appli. based on Soil test	68.29	119.34	297	116.26	21.24	116.87
7	Application of FYM/Compost @ 10 t/ha + biofertilizer (Azoto./Aceto.+PSB) + 50% RDF	68.36	115.43	297	112.35	20.94	113.07
8	Application of FYM/Compost @ 10 t/ha + biofertilizer (Azoto./Aceto.+PSB) + 100% RDF	67.82	116.46	296	113.37	21.23	114.09
9	Application of FYM/Compost @ 10 t/ha + biofertilizer (Azoto./Aceto.+PSB) + Soil test based	67.59	115.74	297	113.17	21.23	113.48
	S Em ±	0.32	1.85	3.18	2.02	0.08	1.98
	CD at 5%	NS	5.54	9.26	6.05	NS	5.94

14. NAVSARI

The data pertaining to initial soil fertility status, growth, yield parameters and after harvest soil status showed that significantly higher germination (%) was recorded with application of FYM/Compost@10 tonnes /ha +biofertilizer (Azotobacter / Acetobacter + PSB) + soil test basis (NPK application) (T_9) over 50 % RDF (T_1) at 30 and 45 DAP. Significantly higher tiller count at 120 and 150 DAP was recorded with treatment T_9 over T_1. However, it remained at par with T_3, T_4, T_6 and T_7 at 120 DAP.

Cane yield (134.01 t ha^{-1}) was recorded significantly highest with T_9 over T_1 and was at par with T_6. CCS yield (16.16 t ha^{-1}) was also counted highest with T_9 over T_1 and remained at par with all the treatments except T_3. Various quality parameters were not influenced significantly due to different nutrient management treatments at 10 and 12 month.

There was no significant difference due to various inorganic and organic treatments on soil pH, OC %, available nitrogen and phosphorus. Available K_2O was observed significantly higher in T_1 over T_6, T_7, T_8 and T_9. Significantly highest and lowest BD was recorded with T_1 and T_9 respectively however it remained at par with T_2.

Table AS 68.14.1: **Growth and yield parameters of sugarcane as influenced by different organic and inorganic treatments**

Treatment	Germination at 45 DAP	No. of tillers at 120 DAP (000/ha)	Number of Millable cane at harvest (000/ha)	Millable cane length (cm) at harvest	Single cane weight (kg)	Cane yield (t/ha)	CCS yield (t/ha) at harvest
T_1	47.92	138.89	97.83	190.51	1.12	107.21	14.66
T_2	51.48	141.20	100.63	234.16	1.40	113.46	15.74
T_3	50.90	164.58	99.13	230.05	1.45	104.60	14.82
T_4	55.30	150.93	104.76	235.67	1.41	117.77	15.78
T_5	52.28	142.36	98.90	224.51	1.51	116.92	16.44
T_6	60.15	171.99	104.10	242.98	1.55	122.69	17.79
T_7	49.68	151.62	99.85	238.38	1.54	118.79	16.59
T_8	53.58	143.52	103.31	233.25	1.46	117.88	15.44
T_9	63.99	180.32	110.81	259.28	1.76	134.01	18.39
S.Em ±	3.09	11.42	4.79	11.43	0.08	4.94	0.83
C.D.at 5%	9.27	34.25	14.36	34.25	0.24	14.81	2.49
C.V.%	9.93	12.85	8.12	8.53	9.56	7.31	9.93

EAST COAST ZONE

15. CUDDALORE

This experiment was laid out in Randomized Block Design during the second week of March 2014 with four replications. The objective of the experiment was to develop nutrient management strategy for sustaining soil health and sugarcane production. The soil of the experimental site is sandy loam with pH 7.4, organic carbon (0.42 %), bulk density (1.41 g cc^{-1}) and infiltration rate (1.37 cm hr^{-1}). The initial nutrient status of the soil is 181.0: 23.4: 232.5 NPK kg ha^{-1}. The recommended dose of fertilizer is 300:100:200 NPK kg ha^{-1}. Among the nine treatments application of treatment(T_8) FYM @ 10 tonnes ha^{-1} + biofertilizer (Azotobacter + PSB) + 100 % RDF found to record maximum germination percentage (92.00), tiller population (1,86,140 ha^{-1}), millable canes (1,26,870 ha^{-1}), CCS (12.86 %), cane yield (142.42 t ha^{-1}) and sugar yield (18.32 t ha^{-1}). The B:C ratio was found to be numerically high with the treatment T_8 (3.73) which was closely followed by the treatment T_9 (3.59).

Apart from the nutrient availability status the soil physical (bulk density and infiltration rate) and chemical (organic carbon, EC and pH) factors were not influenced by the treatments in the post-harvest soil sample. The highest soil nutrient availability of 171.26: 22.17: 278.33 $N:P_2O_5:K_2O$ kg $ha^{-1}$was reported in the treatment T_9 which is at par with the treatment T_8.

Table AS 68.15.1 : Effect of treatments on germination, growth, quality and yield of sugarcane (2014-15)

Treatments	Germination (%)	Tillers ('000 ha^{-1})	Millable canes ('000 ha^{-1})	CCS (%)	Cane yield (t ha^{-1})	Sugar yield (t ha^{-1})	B:C ratio
T_1	80.24	128.35	104.01	11.23	83.63	9.39	2.61
T_2	86.52	141.25	108.23	11.75	113.85	13.38	3.27
T_3	88.99	145.68	113.81	11.60	125.43	14.55	3.52
T_4	87.24	156.80	117.82	11.36	98.44	11.18	2.53
T_5	89.08	173.69	121.82	11.71	137.44	16.09	3.31
T_6	91.45	178.50	122.46	12.05	140.08	16.88	3.30
T_7	89.23	168.89	111.23	11.34	106.8	12.11	3.01
T_8	92.00	186.14	126.87	12.86	142.42	18.32	3.73
T_9	90.58	183.23	124.25	12.60	139.87	17.62	3.59
CD (p=0.05)	NS	7.12	6.12	NS	7.60	0.74	

SUMMARY: The treatment (T_8) application of FYM/Compost @ 10 tonnes ha^{-1} + biofertilizer (*Azotobacter* + PSB) + 100 % RDF registered significantly higher growth and yield parameters and it was comparable with soil test crop response including treatment T_9.

16. ANAKAPALLE

Initial soil analysis was done. Soil was neutral in pH (7.57), normal in E.C (0.35 dSm^{-1}), low in organic carbon (0.50%), low in available nitrogen (201 kg N /ha) and high in available potassium (360 kg K_2O /ha). At 45 DAP, Application of FYM @ 10 tonnes/ha + Biofertilizer (Azotobacter + PSB) + inorganic nutrient application based on Soil test basis recorded significantly higher germination per cent as compared to no organic treatment plots (T1,T2 and T3) but found on par with other treatments (T5,T6,T8 and T7) Significantly lowest per cent germination was registered in No organic + 100% RDF treat ment.

Significant differences were not observed in number of millable canes due to different organic and inorganic treatments. However, application of FYM @ 10 tonnes/ha + biofertilizer (Azotobacter + PSB) + inorganic nutrient application based on Soil test basis recorded higher number of millable canes (67,285/ha) at harvest.Length of the millable cane was measured at harvest in cm.Significantly longest canes were registered in application of FYM @ 10 tonnes/ha + Biofertilizer (Azotobacter + PSB) + inorganic nutrient application based on Soil test basis treatment (266.2 cm) but found on par with all other treatments except application of no organics + 50% RDF(240.7 cm).

Per cent juice sucrose values did not vary significantly due to different organic and inorganic treatments. However, the per cent juice sucrose values in different treatments varied from 16.6 to 17.7. Commercial cane sugar did not vary significantly due to different treatments.

Cane yield responded to application of FYM @ 10 tonnes/ha + biofertilizer+inorganic nutrient application based on soil test basis and registered significantly higher cane yield of 67.4 t/ha as compared to application of 50 % RDF+FYM@20 t/ha(60.0 t/ha) or 50%RDF+FYM@20t/ha+Biofertilizer (61.7 t/ha) or 100% RDF or application of fertilizers based on soil test (62.8 t/ha). Application of FYM @ 10 tonnes/ha+ biofertilizer+ 100%RDF

(66.7 t/ha) or FYM@20 tonnes/ha + inorganic nutrient application based on soil test (64.0 t/ha) or FYM @ 20 tonnes/ha + 100% RDF (63.5 t/ha) recorded more or less similar cane yields.s Application of only 50% RDF registered lowest cane yield of 58.2 t/ha. Sugar yield was computed treatment wise. Sugar yield ranged from 6.8 to 8.1 t/ha.

SUMMARY:

Studies on impact of integrated application of organics and in-organics in improving soil health and sugarcane productivity was studied at Regional Agricultural Research Station, Anakapalle during 2014-15 season. The results indicated that application of FYM @ 10 tonnes/ha + biofertilizer+inorganic nutrient application based on soil test basis registered significantly higher cane yield of 67.4 t/ha as compared to application of 50 % RDF+FYM@20 t/ha(60.0 t/ha) or 50%RDF+FYM@20t/ha+ biofertilizer (61.7 t/ha) or 100% RDF or application of fertilizers based on soil test (62.8 t/ha) or application of inorganic nutrient based on soil test but found on par with the application of FYM @ 10 tonnes/ha+ biofertilizer+ 100%RDF (66.7 t/ha) or FYM@20 tonnes/ha + inorganic nutrient application based on soil test (64.0 t/ha) or FYM @ 20 tonnes/ha + 100% RDF (63.5 t/ha). Application of only 50% RDF registered lowest cane yield of 58.2 t/ha. Cane yields recorded were low during 2014-15 season due to lodging and water logging on account of heavy rain fall and high speed gales during *hudhud* cyclone.

Table AS 68.16.1: Yield attributes, yield and quality of sugarcane as influenced by application of organic and inorganic plant nutrients during 2014-15

Treatment	Germination % at 45 DAS	Tiller population at 150 DAP	NMC/ha	LMC (cm)	Cane yield (t/ha)
T1-No organic + 50% RDF	66.3	88,542	60,775	240.7	58.2
T2-No organic + 100% RDF	61.0	90,169	61,300	249.9	62.8
T3-No organic + Soil test based recommendation.	64.1	89,518	59,382	251.2	63.0
T4-Application of FYM/Compost @ 20 tonnes/ha + 50% RDF (inorganic source).	71.8	1,06,120	63,477	254.7	60.0
T5-Application of FYM / Compost @ 20 tonnes/ha + 100% RDF (inorganic source).	76.6	1,21,093	64,453	256.7	63.5
T6-Application of FYM/Compost @ 20 tonnes/ha + inorganic nutrient application based on soil test(rating chart)	76.6	1,18,489	64,778	257.8	64.0
T7-Application of FYM/Compost @ 10 tonnes/ha + Biofertilizer (Azotobactor / Acetobactor + PSB) + 50% RDF	75.9	1,13,281	63,477	257.3	61.7
T8-Application of FYM/Compost @ 10 tonnes/ha + Biofertilizer (Azotobactor / Acetobactor + PSB) + 100%RDF	74.7	1,12,955	66,732	261.3	66.7
T9-Application of FYM/Compost @ 10 tonnes/ha + Biofertilizer (Azotobactor /Acetobactor + PSB) + inorganic nutrient application based on Soil test basis	77.4	1,26,628	67,285	266.2	67.4
SEm+	3.13	5912	4512	8.0	1.4
C.D (0.05)	9.4	17,722	NS	24.0	4.1
C.V(%)	7.6	9.6	5.4	12.3	3.4

17. NAYAGARH

Application of FYM/Compost @ 10t/ha+(Azotobactor+PSB)+50% RDF (T7), Application of FYM/Compost @ 10t/ha+(Azotobactor+PSB)+100% RDF (T8) and Application of FYM/Compost @ 10t/ha + Azotobactor + PSB + Soil test based(NPK) fertilizer application (T9) recorded higher percentage of germination at 45 DAP i.e. 58.43, 57.91 and 56.78%, respectively. These treatments subsequently performed better than other treatment combinations leading to higher yield parameters and cane yield. The length and girth of the cane were also higher 3.3 & 2.33 cm in T7, 3.3 & 2.53 cm in T8 and 3.2 & 2.67 cm in T9, respectively. The NMC and Cane yield were 84.67'000 & 95.91 t/ha in T7, 87.19'000 & 96.33 t/ha in T8 and 88.80'000 &96.98 t/ha in T9, respectively. This exhibits the positive effect of organic manures and bio fertilizers on cane yield.

AS 68.17.1: Impact of integrated application of organics and in-organics on germination and shoot count at various stages of cane growth

Treatments		Germination %		Length of cane (cm)	Girth of cane (cm)	Weight of cane (kg)	NMC (000/ha)	Cane yield (t/ha)
		30 DAP	45 DAP					
T_1	50% RDF	33.00	45.23	2.7	1.70	1.29	66.79	69.67
T_2	100% RDF	41.30	46.97	2.9	2.20	1.33	71.46	83.50
T_3	Soil test based fert. application (NPK)	42.76	51.76	3.1	2.33	1.55	75.33	87.67
T_4	Application of FYM/Compost @ 20t/ha+ 50% RDF	44.30	53.30	2.4	2.43	1.30	76.67	79.77
T_5	Application of FYM/Compost @ 20t/ha+ 100% RDF	43.82	52.82	2.7	2.20	1.29	78.67	81.66
T_6	Application of FYM/Compost @ 20t/ha+ Soil test based fert. application (NPK)	46.04	56.90	2.9	2.30	1.31	78.63	83.17
T_7	Application of FYM/Compost @ 10t/ha+(Azotobactor+PSB)+50% RDF	47.39	58.43	3.3	2.33	1.58	84.67	95.91
T_8	Application of FYM/Compost @ 10t/ha+(Azotobactor+PSB)+100 % RDF	45.85	57.91	3.3	2.53	1.50	87.19	96.33
T_9	Application of FYM/Compost @ 10t/ha + Azotobactor + PSB + Soil test based fert application (NPK)	47.95	56.78	3.2	2.67	1.59	88.80	96.98
SEm $\pm$		1.858	2.577	0.174	0.164	0.062	2.455	5.606
CD at 5 %		5.571	7.724	0.520	0.492	0.186	7.359	16.804
CV%		7.38	8.37	10.20	12.35	9.55	5.40	11.27

AS 68.17.2: Impact of integrated application of organics and in-organics on soil fertility status

Treatments		BD (g cm^{-3})	pH	EC (dsm^{-1})	OC%	Available Nutrient (kg/ha)		
						N	P	K
T_1	50% RDF	1.36	5.6	0.201	0.452	227	15.5	125.8
T_2	100% RDF	1.34	5.5	0.233	0.446	230	21.3	136.3
T_3	Soil test based fert. application (NPK)	1.35	5.6	0.301	0.468	246	20.4	138.4
T_4	Application of FYM/Compost @ 20t/ha+ 50% RDF	1.39	5.8	0.323	0.491	251	22.3	127.8
T_5	Application of FYM/Compost @ 20t/ha+ 100% RDF	1.40	5.9	0.331	0.501	249	23.8	129.6
T_6	Application of FYM/Compost @ 20t/ha+ Soil test based fert. application (NPK)	1.41	6.2	0.336	0.511	248	22.6	135.2
T_7	Application of FYM/Compost@ 10t/ha +(Azotobactor+PSB) + 50% RDF	1.42	5.9	0.333	0.523	255	24.3	132.6
T_8	Application of FYM/Compost@ 10t/ha +(Azotobactor+PSB)+100% RDF	1.44	6.3	0.311	0.521	253	25.6	133.5
T_9	Application of FYM / Compost @ 10t/ha + Azotobactor + PSB + Soil test based fert application (NPK)	1.43	6.2	0.321	0.513	252	24.8	135.6

NORTH CENTRAL ZONE

18. SEORAHI

The soil of experimental field was medium in organic carbon (0.56), low in available phosphorus (18.30 kg/ha) and medium in available potash (102.9 kg/ha) with pH 8.34. Experimental plant crop was planted on March, 19, 2014 and harvested on March, 10, 2015.

Experimental data revealed that application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobactor + PSB) @ 10 kg/ha each + soil test basis (NPK) produced significantly higher cane yield (110.29 t/ha) than that of other treatments in plant cane. Sucrose % in cane was significantly not affected with different treatments.

SUMMARY:

Application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobactor + PSB) + soil test basis (NPK) produced significantly higher cane yield (110.29 t/ha) than that of other treatments. Sucrose % in cane was found to be more or less similar.

Table AS 68.18.1: Effect of treatments on germination, shoots, millable canes, cane yield and Sucrose % (Plant cane)

Treatments		Germ. (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Sucrose (%)
T_1	No organic + 50% RDF	42.90	160	135	87.14	13.49
T_2	No organic + 100% RDF	42.82	167	138	88.89	14.02
T_3	No organic + soil test based recommendation	41.28	170	140	90.02	14.49
T_4	Application FYM @ 20 tonnes/ha +50% RDF(inorganic source)	43.28	161	133	87.14	14.24
T_5	Application FYM @ 20 tonnes/ha +100% RDF(inorganic source)	45.52	164	137	89.40	13.68
T_6	Application FYM @ 20 tonnes/ha + inorganic nutrient application based on soil test	43.67	181	142	93.21	14.29
T_7	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ 50% RDF	49.69	193	154	102.16	14.22
T_8	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ 100% RDF	50.46	202	160	106.17	14.72
T_9	Application FYM @ 10 tonnes/ha+ bio-fertilizers (Azotobactor+PSB)+ soil test basis (NPK application)	51.38	205	166	110.29	14.62
SE±		0.72	4.72	3.45	2.26	0.22
CD 5%		1.52	10.01	7.31	4.79	NS

NORTH EASTERN ZONE

19. BURALIKSON

The experimental crop (CoBln 9103) was planted on 10th April, 2014 and was harvested on 12th April, 2015. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93.

Application of 10 tonnes FYM /ha along with biofertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield **(**82.0 t/ha) followed by application of FYM @20 tonnes/ha along with inorganic fertilizer based on soil test (74.1 t/ha) which is statistically at par with yield recorded by application of FYM @10 tonnes/ha + biofertilizer +

100% RDF (72.3 t/ha). In terms of economics application of 10 tonnes FYM /ha along with biofertilizer and inorganic fertilizer based on soil test also recorded the highest gross return(Rs 2, 53,050.00) and B: C (2.29). Moreover, application of organic fertilizers along with inorganic fertilizers enhances the juice quality than the sole application of inorganic fertilizers.

Table AS68.19.1: Effect of integrated application of organic and inorganic nutrients on yield and quality of sugarcane

Treatments	**Germ. (%)**	**No.of shoots (000/ha)**	**NMC (000/ha)**	**Cane length (mm)**	**Cane diameter (cm)**	**Cane yield (t/ha)**	**Sucrose (%)**	**CCS (%)**	**Purity %**
T_1	24.7	47.8	43.6	2.2	2.6	48.3	18.8	12.5	80.0
T_2	25.8	66.3	62.8	2.5	2.6	63.6	19.2	12.5	82.0
T_3	28.1	56.8	52.6	2.4	2.6	64.5	19.2	12.8	80.7
T_4	29.6	58.9	54.3	2.5	2.6	59.5	19.6	12.9	84.0
T_5	30.5	59.6	54.0	2.6	2.7	62.3	19.9	13.2	86.7
T_6	28.9	61.4	57.7	2.7	2.7	74.1	20.0	12.9	87.3
T_7	28.0	64.3	59.0	2.2	2.8	53.2	19.6	12.5	85.7
T_8	30.0	61.1	57.7	2.4	2.6	72.3	19.8	13.0	83.0
T_9	27.9	68.2	63.7	2.6	2.8	82.0	19.9	13.2	87.3
SEM (±)	2.33	3.98	4.63	0.09	0.11	4.54	0.14	0.13	1.57
CD 5 %	NS	NS	NS	0.27	NS	13.62	0.43	0.39	4.10

SUMMARY OF THE ACHIEVEMENTS FOR THE YEAR 2014-15

Sugar sector in the country is facing challenges like escalating cost of sugarcane cultivation, plateaued productivity of the crop, scarcity of labour, depleting soil fertility and productivity in major sugarcane producing regions, climate change induced weather aberrations besides the slide in sugar prices in domestic and international markets. Such a scenario has severely dented the profitability of sugar mills which in turn has resulted in their tapered interest for sugarcane development work in their factory command areas. Farmers on the other hand are not getting timely remuneration for the crop and hence often are not in a position to arrange inputs in time. The situation therefore warrants for development of technologies to effectively address the issues mentioned above. In order to provide user-friendly technology to the growers the Crop Production discipline encompassing Agronomy and Soil Science continues to play important role in devising and testing of such technologies for sugarcane cultivation. During the crop season 2014-15 six trials (experiments) were conducted through length and breadth of the country. These were concentrated on aspects such as agronomic evaluation of promising genotypes for their performance potential under varying fertility levels, response of sugarcane crop to secondary and micro-nutrient inclusion in fertilizer application schedule, suitability of cane node technology for sugarcane planting to save on seed cost and its effect on crop productivity, finding suitable sowing/ planting schedule for wheat and sugarcane in FIRB (furrow irrigated raised beds) method of planting, efficacy of sub-surface drip method of irrigation in saving of water and raising of crop yield and also to develop integrated nutrient management schedule for sugarcane production system to ensure soil health and crop productivity. Most of the centres carried out these trials in the true research spirit and reported the results as per the prescribed format. However, Akola faced the constraints like scarcity of irrigation water and could not conduct the trials. A summary table showing no. of centres allotted, conducted and not conducted the stipulated experiments during 2014-15 is given in Appendix I.

The experiment wise summary of the results are presented below:

AS 42: Agronomic Evaluation of Promising Sugarcane Genotypes

This is a continuing trial which was initiated during 2007-08. It is conducted for three years with one set of genotypes, thereafter genotypes are changed and continue further. From the cropping season2012-13, the trial is being conducted only in one season and will be concluded after taking two plant crops and one ratoon. This trial was allotted to all 25 centres. Out of that, 20 centres conducted it and only five centres namely Kolhapur, Akola, Sriganganagar, Mandya and Bethuadhari failed to conduct it.

NORTH WEST ZONE

1. FARIDKOT

Among genotypes CoH 10261 was promising in cane yield and Co 10035 in sucrose%. In midlate group CoPb 10181 and CoPb 10182 were better in cane yield. Genotype, CoPb 10181 was better in sucrose%. The response to N fertilizer was up to 100% recommended dose.

2. KOTA

Among genotypes CoS-06247 produced significantly higher millable cane and cane yield over CoLK-07201 and at par with CoPK-05191 and Co-06033. However, CoPK-05191

also maintained its superiority over other genotypes in terms of cane quality. Cane yield increased significantly up to 100% of the recommended dose of NPK fertilizer in different genotypes during the three years.

3. KAPURTHALA

For early group, genotype Co 0118 recorded the highest cane yield. Whereas CoJ 64 showed highest POL% but similar to Co 0118. The nitrogen application upto 100% of recommended increased cane yield significantly over 75% of recommended nitrogen.

The genotype Co 08217 recorded the highest cane yield among mid-late genotypes, being significantly better than the check CoJ88 and comparable to Co 0238 and CoPb 91. The POL% of CoJ 88 was significantly higher than Co 0238 and was at par with Co 08217 and CoPb 91. 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.

4. LUCKNOW

For early group of genotypes CoLk 09204 recorded higher shoot count and NMC over CoPb 08217 and CoS 08235. However, significantly higher cane yield (70.9 t/ha) was recorded with CoPb 08217. Levels of nutrient application showed significant effect only on NMC, cane length and cane yield. Addition of 125% RDF recorded the highest cane yield (68.5 t/ha) however, similar cane yield (65.7 t/ha) was observed with the application of 100% RDF. Juice quality parameters were not affected by fertilizer doses.

5. PANTNAGAR

Among all the sugarcane varieties Co Pant 5224 performed better for higher NMC, cane yield, cane girth and cane length over rest of the varieties. However, cane yield was at par with variety Co Pant 99214. Cane yield, NMC, cane girth, CCS yield (t/ha) were higher in 125 % of the recommended dose of NPK over 75 or 100 % of the recommended dose.

Ratoon of sugarcane variety Co Pant 5224 performed better over rest of the genotypes i.e. Co Pant 6224, Co Pant 4222 and Co Pant 2218 as the ratoon cane yield was significantly higher in Co Pant 5224. Sucrose % was also recorded higher in the variety Co Pant 5224. 125 % of the recommended N (150 kg N/ha) was found good over 75 or 100 % of the recommended N. Cane length, cane weight, millable cane, CCS yield were also significantly higher in 125 % of the recommended N/ha over recommended or sub optimal dose (75 % of the recommended).

6. SHAHJAHANPUR

Genotype CoS 07240 gave significantly higher cane yield (85.34 t/ha) followed by genotype CoS 03261 (81.67 t/ha) and CoS 03251 (78.82). Regarding different nitrogen levels, significantly higher cane yield (86.34 t/ha) was obtained with 125 % of recommended N than that of 75 % of recommended N.

7. UCHANI

In early group, variety CoLk 09202 produced significantly highest cane (75.5 t/ha) and sugar yield (8.69 t/ha). CoH 9262 produced significantly higher CCS % and sugar yield as compared rest of the varieties. In mid late group, varieties CoP10231 and Co 10036 being at par produced significantly higher cane yield and sugar yield as compared to variety Co 10031. All the varieties responded upto 25 % higher than recommended dose of nitrogen (187 kg/ha) irrespective of maturity group.

PENINSULAR ZONE

8. PADEGAON

The genotype Co 06002 was found significantly superior in early group for cane and CCS yields than the other genotypes followed by PI 06032. The application of 125 % recommended dose of nitrogen produced significantly higher CCS yields which was found at par with 100% recommended dose of nitrogen. While cane yield was not affected by different nitrogen levels.The sugarcane variety Co 86032, among mid-late genotypes, recorded significantly higher cane and CCS yields than the other genotypes and it was followed by Co-06015. The application of 125 percent recommended dose of nitrogen produced significantly higher cane yield and found at par with 100 % recommended dose of nitrogen.

9. PUNE

The genotype PI07131 recorded significantly higher cane yield (100.22t/ha) & B:C ratio (1: 1.90) than the other genotypes under study. However it was on par with the check variety Co 86032. Application 125% of recommended fertilizer dose of NPK to suru season sugarcane produced significantly higher cane yield (92.66 t/ha), CCS yield (13.31 t/ha) & B:C ratio (1: 1.75) than the other doses of NPK fertilizer applications.

10. POWARKHEDA

Results revealed that among the early genotypes Co 06022 gave significantly higher cane yield of (98.87 t/ha) than Co C 671 (93.20 t/ha) and Co 06002 (88.61 t/ha). Application of 125 % RDF NPK gave significantly higher cane yield of (95.88 t/ha) than 75 % RDF NPK (89.74 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF NPK.

Among the mid late genotypes Co 06027 gave significantly higher cane yield of (115.22 t/ha) than Co 06015 (100.68 t/ha), and Co JN 86-600 (100.99 t/ha), but the cane yield obtained at par in between Co 06027 (115.22 t/ha) and Co 06010 (111.41 t/ha). Application of 125 % RDF NPK gave significantly higher cane yield (109.28 t/ha) than 75 % RDF NPK (103.21 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF NPK.

11. NAVSARI

Among early genotypes, significantly higher cane yield (133.26 t ha^{-1}) was recorded with variety CoN 10071at par with CoN 09071. CCS yield was not influenced significantly due to varieties. The fertilizer level 125 % of RDF recorded significantly higher cane and CCS (130.47 &16.96 t ha^{-1}) yields over that with 75 % of RDF but at par with 100 % of RDF regarding cane yield.

For mid-late genotypes significantly highest NMC (113.96 ha^{-1}) and cane (127.78 t ha^{-1}) and yield were recorded with V4 (CoN 13073) over V1 and V2 & remained at par with V3 (CoN 11073). CCS yield was not influenced significantly due to varieties. The fertilizer level F3 (125 % RDN) failed to reach the level of significance on NMC and CCS yield while cane (125.68 t ha^{-1}) yield recorded significantly highest with F2 over F1 and remained at par with F3.

12. THIRUVALLA

Genotype, CoSnk 08101 recorded maximum values for cane length, cane weight, millable cane count and resulted in reasonably good yield which was significantly superior to others (79.31 t/ha) followed by Co 07008 with an yield of 75.58 t/ha. Brix and sugar yield also followed same trend with significantly superior yield for CoSnk 08101 (10.40 t/ha). The growth and yield of the genotypes at 125% at the recommended dose of N was significantly superior to that at 100% (78.86 t/ha). Similarly sugar yield at 125% of recommended dose of N

was significantly superior to that at 100% (10.17 t/ha). Interaction effect of the genotypes with N nutrition was not significant for the parameters under study.

13. COIMBATORE

The variety Co 86032 recorded the highest mean cane yield of 133.34 t/ha and the new genotype Co 08009 with 75 % of Recommended Dose of Fertilizer (225 kg N + 60 kg P2o5+120 kg K2O) gave the on par yield of 113.00 t/ha with check variety Co 86032 The fertilizer levels did not significantly influence the cane yield .The CCS yield was significantly affected by the fertilizer levels. The effect of different treatments on CCS yield (t/ha) was similar to that on cane yield.

14. SANKESHWAR

Cane yield was not influenced by varieties at higher doses of fertilizer application (100% & 125%). However, there were significant differences in yield levels among the varieties at lower doses of fertilizer. Significantly the higher cane yield was recorded in Co 7015 (217.99) at 75% RDF application and the lowest yield was recorded in Co 94012 (168.17).

EAST COAST ZONE

15. ANAKAPALLE

The results showed that application of 'N' at 125% recommended dose registered significantly higher cane yield of 60.5 t/ha than lower levels of 75% (54.1 t/ha) and 100% (56.2 t/ha) recommended nitrogen. Among the three new mid late genotypes under test 2004A104 proved superior (59.9 t/ha) to 2007A126 (54.7 t/ha) and 2007A177 (53.3 t/ha) and on par with the check variety Co 7219(59.4 t/ha). Due to heavy rainfall (231.0 mm) received during the month of October due to *hud hud* cyclone, when crop was in grand growth phase the experimental field was lodged and hence the yields obtained were very low.

Performance of new promising early sugarcane genotypes viz., 2004A55 and 2001A63 along with check 93A145 was studied in ratoon under graded levels of Nitrogen under irrigated conditions at Regional Agricultural Research Station, Anakapalle during 2014-15 season. Significant variation in cane yield was not observed both, with genotypes and nitrogen doses as ratoon sugarcane crop was lodged and subjected to water logging for more than one month during *huhud* cyclone occurred on 12.10.2014. However application of 125 % RDN to new promising early sugarcane genotypes (2004A55 and 2001A63) registered higher cane yield of 51.5 t/ha. Both the new genotypes viz. 2004A55 (50.5 t/ha) and 2001A63 (49.3 t/ha) registered higher cane yield than the check variety 93A145 (48.6 t/ha).

16. CUDDALORE

The genotype CoC 11 336 significantly registered the maximum millable cane, individual cane weight, cane yield and sugar yield in both spring and autumn season. Also in the juice quality, the clone CoC 11 336 registered the highest commercial cane sugar (CCS) per cent and was on par with the entry CoC 24.

Prescription of 125 per cent of the recommended dose of nitrogen significantly registered higher values of yield components, cane and sugar yield compared to 75 and 100 per cent of recommended dose of nitrogen.

17. NAYAGARH

The genotype CoOr 8346 produced the highest average cane yield of 88.47 t/ha with application of 100 % RDN and was closely followed by Co A 08324 (86.50 t/ha) and Co 6907 (84.07 t/ha). All these genotypes were statistically superior to CoC 07336 (76.90 t/ha). Among

the four genotypes tried in the said experiment CoC 07336 produced the lowest average cane (76.90 t/ha) and CCS (7.99 t/ha) yield.

NORTH CENTRAL ZONE

18. PUSA

From the results it may be summarized that sugarcane early genotypes CoP 112 and CoP 081 should be fertilized with 125% recommended dose of nitrogen for getting higher yield of sugarcane.The investigations showed that sugarcane mid-late genotype CoP 092 can be grown with 100 % recommended dose of nitrogen to get higher productivity under north Bihar conditions.

19. SEORAHI

Genotype CoSe 011453 produced significantly higher cane yield (97.62 t/ha) followed by genotype CoSe 011451 (88.45 t/ha) and CoSe 011454 (84.17 t/ha). Cane yield increased significantly upto 100 % recommended dose of N.

20. BURALIKSON

Among early genotypes the check variety CoBln 9103 recorded the higher cane yield of 62.37 t/ha which is statistically at par with the yield recorded by the genotypes CoBln 14501(60.70 t/ha) and CoBln 14503 (59.27 t/ha), respectively but significantly superior than the yield recorded by CoBln 14502 (50.14 t/ha). However, all the genotypes were statistically at par in terms of juice quality parameters such as CCS% and sucrose.

For mid-late group genotype CoBln 14505 recorded the higher cane yield (64.21 t/ha) which is statistically at par with the yield recorded by CoBln 14504 (60.50 t/ha) but significantly superior than the yield recorded by CoBln 14506 (45.65t/ha). However no significant differences were observed in terms of juice quality parameters among the four genotypes.

Among the three fertilizer levels, application of 125% of the recommended dose of NPK recorded significantly the higher cane yield (63.54t/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (44.61t/ha) and 100% of the recommended dose of NPK (53.54 t/ha), respectively.

Important Observations

North West Zone: Depending on centres, Co 118, Co Lk 09202, CoLk 09204,CoH 10261, Co Pant 05224/ Co Pant 99214 were recognized as promising genotypes for the early maturity group, whereas Co H 09262, Co P 10231, Co 10036, CoS 07240, CoPb 08217 and CoPb 10181 seemed promising among mid-late genotypes. Significant response to N was observed from 100-125% of RDN.

Peninsular Zone: Depending on the trials conducted at different centres Co 07015, Co 08009, CoSnk 08101, CoN 10071/ CoN 09071 CoN 13073, Co 06002/06022 and PI 07131 proved to be superior genotypes. At most of the centres yield increased significantly up to 125% RDN.

East Coast Zone: 2004A55, 2001 A 63, CoOr 8346, Co A 08324, CoC 11336, 2004 A 104 were observed to be promising genotypes. Response to N up to 125% of RDN.

North Central Zone: CoSe 11451, CoP 112, CoP 081 and CoP 092 were promising materials responding up to 125% of RDN however at par with 100 % RDN.

North Eastern Zone: CoBln 09103, Co Bln 14501, CoBln 14505/ 14504 proved to be good genotypes responding up to 125% of RDN.

AS 64: Response of sugarcane crop to different plant nutrients in varied agro-ecological situations.

The trial was, though, initiated in 2011-12, some modifications were made in the treatments during 2012-13, and hence, starting year was considered as 2012-13. It was allotted to all participating 25 centres. Out of that 14 centres conducted it.

NORTH WEST ZONE

1. FARIDKOT

On the basis of three year data it can be concluded that cane yield with soil test based fertilizer application and with additional application of Zn, Fe, Mn and their combination to recommended NPK i.e. T_7 to T_{11} was better than control (T_1), application of FYM @20 t/ha (T_{13}), Application of N (T_2), NP (T_3), NPK (T_4) and NPK+S (T_5).

2. KOTA

Application of NPK+S+ Zn (200+60+40+40+5 kg/ha) was found suitable for increasing millable cane, cane yield and CCS which was significantly superior to control, N, NP, NPK,FYM treatments and NPK +Mn and at par with rest of the treatments.

3. KAPURTHALA

Soil test based fertilizer application should be followed to obtain an optimum cane yield. In the absence of soil test report, one should only apply the nitrogenous fertilizer at recommended dose of 150 kg ha-1 to get the optimum yield.

4. LUCKNOW

Application of NPK + S + Zn+ Fe produced significantly highest NMC (110476/ha) and cane yield (89.21 t/ha) over the control (72169 NMC and 63.07 t/ha, respectively), which was 34.6 % and 29.3 % higher and was closely followed by NMC (106561) and cane yield (83.81 t/ha) recorded with NPK + S + Zn with.

5. PANTNAGAR

Germination % at 45 DAP recorded highest in T_9 (NPK+Zn+S) which was significantly higher over T1, T2, T3, T8, T12 and T13. Cane yield was also recorded highest in T9 which was significantly higher over rest of the treatments except T10 and T11. Sucrose % and CCS yield were also higher in T9, T10 and T11. However sucrose % and CCS yield NMC and cane yield were improved in different treatments over control. FYM alone @ 20 ton/ha could not performed better. Higher cane yield in T9, T10 and T11 was the result of higher NMC, cane length and cane girth. Higher net returns were also calculated in T9 followed by T10 and T11.

6. UCHANI

The application of individual micronutrient (Fe, Mn and Zn) in combination NPK did not significantly increase cane yield over NPK. However, the combined application of these micro nutrients significantly increased cane yield over NPK alone. The application of N over control, NP over N alone, NPK over NP, and NPKS over NPK significantly increased cane yield.

7. SRIGANGANAGAR

The significant increase in mean yield and yield attributes was recorded due to application of NPK alone or along with secondary nutrient like sulphur and micronutrients (Zn, Fe & Mn) over control, alone application of nitrogen and FYM @ 20 t/ha.

PENINSULAR ZONE

8. PADEGAON

The application of recommended dose fertilizers as per soil test along with 20 t ha^{-1} FYM for pre-seasonal sugarcane was found beneficial in terms of yield, quality and soil health.

9. NAVSARI

Cane yield (127.04 t ha^{-1}) was recorded significantly highest with T_{12} (soil test based fertilizer application) and was at par with T_4, T_5 and T_6. CCS yield (17.50 t ha^{-1}) was also noticed significantly highest with T_{12} and remained at par with T_4, T_5, T_6, T_7, T_8, T_{10} and T_{11}. Different juice qualities parameters were not significantly influenced due to various nutrient management treatments.

10. THIRUVALLA

The maximum cane length (234.27 cm), cane girth (10.19 cm), cane weight (1.55 kg), MCC (94000 / ha) and ultimately cane yield (105.68 t/ha) were obtained when the crop was supplemented with nutrients based on soil test result (T12).

11. MANDYA

Higher cane yield was recorded with application of nutrients based on soil test (109.85 MT ha^{-1}) which was significantly superior over control (58.80 MT ha^{-1}), N alone (76.25 MT ha^{-1}), NP only (88.55 MT ha^{-1}) but was on par with application of all the three primary nutrients in combination with secondary and micro nutrients.

EAST COAST ZONE

12. ANAKAPALLE

Three years studies on effect of different macro and micro nutrients along with sulphur revealed that, application of different nutrients as per soil test basis and application of macro nutrients (N,P,K) along with Fe, Zn and also Mn and S registered higher number of millable canes, cane yield and sugar yield as compared to other nutrient treatments.

13. CUDDALORE

Application of NPK + S + Zn + Fe + Mn through inorganic fertilizers significantly recorded the maximum millable cane population of 1,29,350 ha^{-1} and was on par with the soil test based fertilizer application (T_{12}) and NPK + S + Zn + Fe (T_{10}) which registered the cane population of 1,28,560 ha-1 and 1,24,610 ha^{-1} respectively.

14. NAYAGARH

Soil test based fertilizer application (315:100:60 kg N: P2O5: K2O + 60 kg elemental S/ha) resulted in higher number of tillers at different growth stages of sugarcane genotype “Sabita” leading to highest cane (81.44 t/ha) and CCS yield (8.79 t/ha).

NORTH EASTERN ZONE

15. BURALIKSON

Application of Zn along with recommended dose of NPK recorded the highest cane yield (106.8 t/ha) which is statistically at par with the yield recorded by application of fertilizers based on soil test (103.70 t/ha) followed by application of S, Zn, Fe, Mn along with the recommended dose of fertilizer (95.80 t/ha).

Important Observations: At most of the centres located in north-western zone soil test based application of nutrients was found to be the most effective followed by NPKS Zn. Most of the centres of peninsular zone found application of nutrients as per soil test rating most remunerative however, fortification of recommended dose of NPK with sulfur and Zn or FYM 20 t/ha was found equally effective. Centres of east-coast zone obtained yield enhancement with addition of all themicro-nutrients, except Nayagarh where NPK + S gave the best results. Buraliksan noted positive influence of Zn along with NPK application at recommended rates.

AS 65: Enhancing sugarcane productivity and profitability under wheat-sugarcane cropping system

The project was initiated during 2012-13 for its completion by 2014-15 and was allotted to seven centres under the subtropical zone. Five centres conducted it. At Lucknow the trial was initiated from 2013-14. For the year 2014-15 the trial was allotted to 09 centres, however Padegaon and Powarkheda voluntarily carried out the trial. Among allotted centres Sriganganagar, Modipuram and Bethuadahari failed to conduct the trial and report the progress. In all 08 centres carried out the trial during the year.

NORTH WEST ZONE

1. FARIDKOT

Wheat sown in November is significantly better than December sowing. The sugarcane sown in furrows of FIRB sown wheat in the February and March was significantly better than sugarcane planted after wheat harvest and was at par with autumn sole sugarcane. Same was case for germination, number of shoots, number of millable canes and cane weight.On the basis of three years data, it can be concluded that sugarcane sown in furrows of FIRB sown wheat in the February and March was better than sugarcane planted after wheat harvest.

2. KAPURTHALA

The highest cane equivalent yield of 90.7 t/ha was obtained under autumn sugarcane + wheat (1:2) system and was at par with that of the system where sugarcane was planted in 3rd week of March in FIRB sowing of wheat in November and significantly better than sole sugarcane crop and where crop was planted after wheat harvest.

3. LUCKNOW

Cane equivalent yield (96.5 t/ha) and B: C ratio were the highest in sugarcane planted in 3rd week of February in wheat under FIRB method. Sucrose content in cane juice was significantly higher in autumn, February and/or March planted cane over cane planted after wheat harvest.

4. PANTNAGAR

Cane yield can be increased if wheat planted on FIRB (timely sown or late sown) and sugarcane planted in blank furrows either in the month of February or March in standing crop

of wheat.Sugarcane planting after wheat harvesting should be restricted as the yield reduction was reduced upto 26 % in sugarcane-wheat cropping system.

5. UCHANI

There was a yield reduction of about 40% with late planting of sugarcane after wheat harvesting as compared to planting of sugarcane in February or March in standing crop of wheat. Maximum cane equivalent yield was recorded in autumn sugarcane + wheat intercropping system of 1:2 (127.0 t/ha) and 1:3 ratio (126.0 t/ha) and closely followed by FIRB sowing of wheat on 15th November or 15th December + sugarcane in furrows in 3rd week of February or March (104.2-109.2 t/ha) and lowest in T4 (75.0 t/ha) and T5 (70.3 t/ha) treatments.

PENINSULAR ZONE

6. POWARKHEDA

The results showed that the significantly highest Sugarcane equivalent yield (103.87 t/ha) obtained with autumn planted Sugarcane + Wheat (1:2) followed by autumn planted Sugarcane + wheat (1:3) (101.68 t/ha) intercropping systems. Among these treatment the equivalent yield recorded at par. The highest net return (Rs.59618/ha) and B:C ratio(1.35) was recorded under autumn planted Sugarcane + Wheat (1:2) intercropping systems.

7. PADEGAON

The autumn planted sugarcane produced significantly higher cane yield and CCS yield (145.21 t ha-1 and 20.61 t ha-1, respectively). Under intercropping system, autumn planted sugarcane + wheat (1:2) produced significantly higher cane yield and CCS yield (135.62 t ha-1 and 18.54 t ha-1, respectively). The intercropping of autumn planted sugarcane + wheat (1:2) was found to be more remunerative.

NORTH CENTRAL ZONE

8. PUSA

Accommodation of three rows of wheat between two rows of sugarcane (T3) recorded higher sugarcane equivalent yield (117.8 t/ha) followed in order by wheat sown on 15th Nov. - late sugarcane (T4) and FIRB sowing of wheat on 15th Nov. + sugarcane planted in furrow during 3rd week of February.

Important Observations: Intercropping of wheat either with 1:2 or 1:3 row ratio in autumn planted sugarcane (November sowing) was found to be more suitable followed by relay cropping of sugarcane either in February or March with 15th November FIRB sown wheat.

AS 66: Priming of cane node for accelerating germination

The project was started during 2012-13 and continued up to 2014-15 with allotment to all the participating centres. Out of that 18 centres conducted this trial.

1. FARIDKOT

On the basis of three years data, it can be concluded that among single cane node treatments priming treatments were better than control i.e. unprimed cane node. Three budded setts planting were better than all single cane node treatments.

2. KOTA

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio was found suitable for increasing cane yield which was significantly superior over un-primed cane node, conventional 3- bud sett planting treatment, T2 and T3 except T6. The highest GR (Rs1, 80,700/ha) and BCR (1.97) were also noted under the same treatment on mean of three years.

3. KAPURTHALA

In this experiment the optimum germination was achieved only T_5 where conventional three budded sets were planted whereas all other treatments did not germinate properly. Hence the data was not recorded.

4. LUCKNOW

Sugarcane yield obtained under priming followed by incubation was found significantly higher by 13.4 and 11.8 % over that with planting of unprimed cane nodes and treated with hot water only, respectively. Conventional planting with 3-bud setts although produced cane yield (75.83 t/ha) at par with primed cane node treatments (76.43 t/ha).

5. PANTNAGAR

On the basis of three years pooled analysis of data it may be concluded that to enhance the germination in sugarcane cane node should be treated with hot water (50 ^oC) + urea solution 3 % for 2 hours. However, the cane yield was recorded highest in conventional 3 bud setts planting followed by cane node treated in hot water (50 OC) for 2 hours. CCS yield was also higher in both the treatments. However, highest CCS yield was recorded in conventional 3 bud setts planted sugarcane.

6. SHAHJAHANPUR

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio resulted significantly higher germination and cane yield than that of other treatments. CCS % in cane was not affected with different treatments.

7. UCHANI

Three-bud sett planting recorded highest number of shoots (159.3 thousands/ha), millable canes (115.3 thousands/ha), cane weight (816 g), cane yield (92.9 t/ha), CCS (12.15 %) and sugar yield (11.29 t/ha) among all the treatments. Among priming treatments, planting of primed and sprouted cane node (T6) recorded highest germination at 40 DAS (53.0%), number of shoots (91.2 thousands/ha), millable canes (89.6 thousands/ha), cane weight (719 g), cane yield (63.6 t/ha) and sugar yield (7.65 t/ha).

PENINSULAR ZONE

8. PADEGAON

The priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio (T_4) recorded significantly the highest cane and CCS yield (135.43 and 17.82 t ha^{-1}) and the cane yield was at par with treating cane node in hot water in 50oc and urea solution (3%) for 2 hours (131.63 t ha^{-1}), CCS yield was found at par with treatment T_3, T_2 and T_5. The lowest cane and CCS yield was observed in unprimed cane node.

9. POWARKHEDA

The germination percentage, cane yield and yield attributes increased significantly due to treatment of priming cane node with cattle dung, cattle urine & water in 1:2:5 ratio (67.34 %) than other treatments.

10. SANKESHWAR

Significantly highest germination percent was recorded in T_4 (91.15), treated with cattle dung, cattle urine and water followed by T_6 (81.27), primed and sprouted cane node planting. The lowest germination was recorded in T_2 (39.43) by treating the cane node with hot water (50 0C) for two hours.Significantly the highest cane yield was recorded in T_7 (273.15) followed by T_4 (266.09).

11. NAVSARI

Significantly highest and lowest cane yield was recorded with T_4 (115.92 t ha^{-1}) and T_1 (95.06 t ha^{-1}) respectively while CCS yield was recorded significantly highest with T_4 over unprimed cane node and at par with T_6. Almost all the quality parameters were not influenced due to priming treatment except purity % which recorded highest with T_1 and remained at par with T_3, T_4 and T_6.

12. THIRUVALLA

Maximum cane length (248.10 cm), MCC (78660 / ha), cane yield (85.80 t/ha) were recorded for the 3 bud sett planting (T_5). Brix and sugar yield also showed same trend and recorded significantly higher value (10.47 t/ha) for the very same treatment (T_5). This was followed closely by treating cane node in cattle dung, cow urine and water in the ratio 1:2:5 (T_4).

13. MANDYA

Planting of conventional three eye bud-setts recorded significantly higher germination (64.0 %), number of millable cane (96,100 ha^{-1}), and cane yield (118.5 MT ha^{-1}) compared to all other treatments. The cane length, girth, weight, number of internodes and inter-nodal length were statistically at par among the treatments. The next best treatment was primed and sprouted cane node (Incubated for four days after priming).

EAST COAST ZONE

14. ANAKAPALLE

Three years studies on priming of cane nodes in different methods for accelerating the germination in sugarcane indicated that different priming treatments could not increase either germination per cent or cane yield as compared to conventional three bud sett planting, except priming cane node with cattle dung, urine and water in 1:2:5 ratio which performed better and registered higher mean germination per cent (78.5), number of millable canes (71,800/ha), cane yield (76.9 t/ha) than other priming cane node treatments. Conventional three bud sett planting was found superior over all other treatments in germination per cent(83.3), number of millable canes (74,600/ha), cane yield (80.0 t/ha). Quality parameters did not vary due to different priming cane node treatments.

15. CUDDALORE

The sugarcane planting with three budded sett (T5) significantly recorded the higher cane yield and sugar yield of 148.4 t ha-1 and 18.58 t ha-1 respectively.

16. NAYAGARH

Conventional method of planting three budded sugarcane setts proved to be the best with highest number of net millable canes (82.75 thousand/ha), cane (86.23t/ha) and CCS yield (9.45t/ha). The treatment next in order was T6 where primed and sprouted cane nodes were planted which could produce NMC of 79.25 (’000 /ha) with cane and CCS yield of 83.85 and 8.64 t/ha, respectively.

NORTH CENTRAL ZONE

17. SEORAHI

Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio resulted significantly higher germination (55.49 %) than that of other treatments. Maximum cane yield (83.5 t/ha) was also obtained in priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (T_4).

NORTH EASTERN ZONE

18. BURALIKSON

Conventional 3 budded sett planting recorded significantly higher NMC (79.7 thousand/ha), cane diameter (2.8cm) than all other treatments. The same treatment also recorded the higher cane yield (69.0 tonnes/ha), which is statistically at par with the yield recorded by priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio (61.3 t/ha).

Important Observations: Significant improvement in germination and yield of sugarcane due to planting of primed and pre-sprouted cane nodes over that of conventional 3-bud setts has been reported from 8 of the 18 centres where the trial was conducted. Of these 4 are from peninsular zone, 3 are from north-western zone and 01 is from north central zone. Majority of the 6 centres where conventional three bud planting performed better fall in north western zone. At 4 centers both these treatments were found to perform at par.

AS 67: Optimization of fertigation schedule for sugarcane through micro-irrigation technique under different agro-climatic conditions

This experiment was originally allotted (2011-12) to the four centres namely Faridkot, Mandya, Lucknow and Cuddalore. This year only Lucknow, Cuddalore and Faridkot conducted the trial whereas Mandya could not conduct it.

NORTH WEST ZONE

1. FARIDKOT

Surface drip was laid in paired row trench plots panted at 30: 120 cm spacing. Drip irrigation at 100% CPE/IW ratio was significantly better than surface flood irrigation in cane yield. When drip irrigation was applied at 80% CPE/IW the cane yield was at par with surface irrigation.Cane yield with 100% recommended dose of nitrogen (RDN) applied to flood irrigated crop was at par with Fertigation 100% and 80% RDN in drip irrigated crop.

2. LUCKNOW

Highest sugarcane yield of 102.97 t/ha was observed when sugarcane was drip fertigated with recommended dose of nitrogen and water equivalent to 125 % pan evaporation. However, irrigation water use efficiency (IWUE) was the highest at 2554.7 kg/ha-cm when fertigation was done and the amount of irrigation water was kept as 75 per cent of pan evaporation. The sugarcane yield and IWUE were not influenced significantly by doses of nitrogen in fertigation treatments but influenced significantly in surface irrigation treatment. With surface irrigation, the mean sugarcane yield and IWUE were 69.96 t/ha and 874.49kg/ha-cm respectively.

3. CUDDALORE

The drip materials for laying out of sub-surface drip irrigation been purchased. The experiment was taken up during the year 2014. Now the plant crop is at harvest stage.

Important observations: Sub-surface drip irrigation at Lucknow was found to yield 102.97 t/ha when sugarcane was drip fertigated with recommended dose of nitrogen and water equivalent to 125 % pan evaporation. Whereas, at Faridkot surface drip at 100% CPE/IW ratio was significantly better than surface flood irrigation in cane yield.

AS 68: Impact of integrated application of organics and inorganics in improving soil health and sugarcane productivity

The trial initiated during the year 20104-15 with allotment to all the centres. However, only 19 out of total 25 centres carried out the trial.

NORTH WEST ZONE

1. FARIDKOT

Cane yield (94.8 t/ha) was the highest with application of FYM/Compost @ 20 tonnes / ha + inorganic nutrient based on soil test.

2. LUCKNOW

Significantly the highest rate of germination (39.6%) was observed under the treatment of biofertilizer application along with FYM. Highest number of tillers (132.7 thousand /ha at 120 days after planting), shoot count (178.6 thousand/ha at 180 DAP), number of millable canes (123.2 thousand/ha), cane yield (98.0 t/ha) and sugar yield (12.27 t/ha) were recorded under the treatment where application of FYM @ 20t/ha was done along with soil test (rating chart) based inorganic fertilizer recommendations.

3. PANTNAGAR

Highest cane yield was recorded with the application of FYM 20 tonnes/ha + 100 % RDF (120: 60: 40) followed by that with FYM 20 tonnes/ha + inorganic nutrients based on soil test. The higher cane yield in these treatments was due to higher NMC, cane girth, cane length and weight of individual cane. Sucrose % and CCS yield were also higher in these treatments.

4. UCHANI

FYM/Compost 20 t/ ha + 100% RDF through inorganic source and FYM/Compost @ 10 t/ ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test basis (T9) were found best and at par treatments in terms of number of tillers (43.6, 152.6 thousands/ha) , millable canes (122.8, 121.9 thousands/ha) and cane yield (107.8, 106.8 t/ha) and sugar yield (13.26, 13.13 t/ha) as compared to rest of the treatments.

5. KAPURTHALA

Soil test based fertilizers nutrients application along with organic source in an integrated way helps to attain the optimum sugarcane crop yield.

6. SHAHJAHANPUR

Application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobacter + PSB) + soil test basis (NPK) produced significantly higher cane yield (113.10 t/ha) than that of other treatments.CCS % in cane was found to be more or less similar.

7. SRIGANGANAGAR

Application FYM @ 10 tonnes/ha along with bio fertilizers and soil test based inorganic fertilizers gave highest cane yield (94.62 t/ha) but it was at par with T6- FYM@20 tonnes/ha + 50% RDF Soil test (93.84 t/ha), T8-FYM@10 tonnes/ha + Bio fertilizer + 100% RDF (92.39 t/ha) and T5- FYM@20 tonnes/ha + 100% RDF (91.92 t/ha). It indicate that application of bio fertilizers saved FYM @ 10 t/ha and application of FYM @ 20 t/ha gave significantly higher yield over alone application of inorganic fertilizers.

8. KOTA

Among the treatment combination of nutrient management strategy, application of based on soil test (150:50:30 kg N P2 O 5 K2 O / ha) through inorganic source enriched with 10 t FYM /ha +12.5 + 12.5kg/ha (Azotobacter + PSB) was found excellent for increasing cane yield (98.20 t/ha), CCS yield (12.10 t/ha) and returns which was significantly superior over T1, T4 and T7 treatments except rest treatments. Whereas, application of 150:50:30 kg NP2O5K2O/ha (STB) through inorganic source enriched with 20 t FYM /ha (T6) found significantly superior and nest best treatment in respect of growth, quality and improving status of soil.

PENINSULAR ZONE

9. THIRUVALLA

Among the various treatments imposed T8 (FYM/Compost @ 10 tonnes / ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF) recorded significantly higher value for cane length (232.90 cm), MCC (81550 /ha) and resulted in maximum yield (89.09 t/ha).

10. MANDYA

Application of FYM @ 20 t / ha + in organic nutrient application based on soil test results recorded significantly higher cane yield (96.58 MT ha^{-1}) compared to all other treatments. However, it was on par with application of FYM @ 20 t / ha + 100% RDF (93.12 MT ha^{-1}), application of FYM @ 10 t / ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF (90.63 MT ha^{-1}) and application of FYM @ 10 t / ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test basis fertilizer application (88.73 MT ha^{-1}).

11. SANKESHWAR

Significantly the higher cane yield was recorded in plots receiving FYM/ compost 10 t/ha fortified with biofertilizers and nutrients on the basis of soil test rating (168.57) followed by that with application of 50% RDF along with organic manures and biofertilizers (122.49). The lowest yield was recorded where only recommended dose of nutrients were applied on soil teat basis without organic manures (92.88).

12. PADEGAON

The application of recommended dose fertilizers as per soil test along with 20 t ha-1 FYM for pre-seasonal sugarcane was found beneficial in terms of yield, quality and soil health.

13. POWARKHEDA

The cane yield increased significantly due to application of FYM/Compost @ 20 t/ha +inorganic nutrient based on Soil test (116.87 t/ha) as compared to no organic + 50% RDF (79.01 t/ha), FYM/Compost @ 20 t/ha + 50% RDF (98.25 t/ha), no organic +100% RDF (106.69 t/ha) and no organic +Soil test base (107.72 t/ha). The NMC obtained at par in between T6, T5, T8, T9 and T7.

14. NAVSARI

Cane yield (134.01 t ha-1) was recorded significantly highest with FYM/ compost 10 t/ha fortified with biofertilizers and nutrients on the basis of soil test rating (T_9)overthat with no organics + 100 % RDF (T_1). CCS yield (16.16 t ha^{-1}) was also counted highest with T9 over T1 and remained at par with all the treatments except T3. Various qualities parameters were not influenced significantly due to different nutrient management treatments at 10 and 12 month.

EAST COAST ZONE

15. CUDDALORE

The treatment (T8) application of FYM/Compost @ 10 tonnes ha-1 + biofertilizer (Azotobacter + PSB) + 100 % RDF registered significantly higher growth and yield parameters and it was comparable with soil test crop response including treatment T9.

16. ANAKAPALLE

Application of FYM @ 10 tonnes/ha + biofertilizer+inorganic nutrient application based on soil test basis registered significantly higher cane yield of 67.4 t/ha as compared to application of 50 % RDF+FYM@20 t/ha(60.0 t/ha) or 50%RDF+FYM@20t/ha+Biofertilizer (61.7 t/ha) or 100% RDF or application of fertilizers based on soil test (62.8 t/ha) or application of inorganic nutrient based on Soil test but found on par with the application of FYM @ 10 tonnes/ha+ Biofertilizer+ 100%RDF (66.7 t/ha) or FYM@20 tonnes/ha + inorganic nutrient application based on soil test (64.0 t/ha) or FYM @ 20 tonnes/ha + 100% RDF (63.5 t/ha).

17. NAYAGARH

Application of FYM/Compost @ 10t/ha+(Azotobacter+PSB) + 50% RDF (T7) or FYM/ compost @ 10t/ha+ (Azotobacter+PSB) +100% RDF (T8) and Application of FYM/Compost @ 10t/ha + Azotobacter + PSB + Soil test based (NPK) fertilizer application (T9) recorded higher percentage of germination at 45 DAP i.e. 58.43, 57.91 and 56.78%, respectively. These treatments subsequently performed better than other treatment combinations leading to higher yield parameters and cane yield. The length and girth of the cane were also higher 3.3 & 2.33 cm in T7, 3.3 & 2.53 cm in T8 and 3.2 & 2.67 cm in T9, respectively. The NMC and Cane yield were 84.67'000 & 95.91 t/ha in T7, 87.19'000 & 96.33 t/ha in T8 and 88.80'000 &96.98 t/ha in T9, respectively. This exhibits the positive effect of organic manures and bio fertilizers on cane yield.

NORTH CENTRAL ZONE

18. SEORAHI

Application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobacter + PSB) + soil test basis (NPK) produced significantly higher cane yield (110.29 t/ha) than that of other treatments. Sucrose % in cane was found to be similar.

NORTH EASTERN ZONE

19. BURALIKSON

Application of 10 tonnes FYM /ha along with biofertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield (82.0 t/ha) followed by application of FYM @20 tonnes/ha along with inorganic fertilizer based on soil test (74.1 t/ha).

Important Observations: Results obtained across the centres revealed that addition of organic manures (FYM or compost) along with bio-fertilizers and recommended nutrients brought about significant enhancement incane yield over that with application of inorganic fertilizers

alone. Better performance under nutrient application based on soil test over that with recommended dose of fertilizers is also evident from the results.

COMMENTS

- Most of the participating centres have reported the results and other required information like initial soil fertility level, date of planting and harvest and weather conditions as per the suggested format. This need to be regularly followed and may be made more systematic.
- Experiment AS 42 for evaluation of promising genotypes at different fertility levels still need a lot of attention particularly on aspects like selection of genotypes in a AICRP (S) zone, selection of group of genotyeps like early or mid-late, the growing season and naming of varieties as per the standard style followed for naming the entries in AVT trials. Care is required while reporting the results, it should clearly mention the early or mid-late, spring or autumn, plant or ratoon crop. Besides, the trial was conceptualized to provide agronomical data backup about the performance of genotypes in AVT to help identify the varieties for release. As this could not become a practice so far it is advisable that we can use resources for other important aspects instead of repeating this trial year after year.
- Though most of the centres have reported about initial soil fertility levels especially for the trial AS 64, critical limits for the sugarcane crop with respect to a particular micro-nutrient is generally lacking. This information can be obtained from SAUs located in respective state and based on that analysis and interpretation of data should be done.
- The trial on use of cane nodes and its priming techniques has run three years with mixed results. Majority of the centres in north west zone has found conventional 3-budded planting better over planting of cane nodes primed with cattle urine, dung and water (1:2:5). Whereas, peninsular zone has found planting of primed and sprouted cane nodes better over conventional set planting with respect to germination, growth and yield.
- Sub-surface drip irrigation for sugarcane has shown its potential in saving of irrigation water and raising the cane yield. However, observations on root growth pattern, soil wetting zone and root volume need to be included for establishing cause and effect relationship in a scientific manner.
- All the centres are requested to give meaningful summary of different trials by making it more informative and true representative of the findings.

SUGGESTIONS

- Continuation of trial AS 42 need to be reviewed.
- Trials AS 63, 64 and 65 have been completed. All the centres need to publish good research papers based on the data generated.
- The crop performance, in general, must be given in light of prevailing climatic condition particularly with reference to sucrose content & flowering behaviour.
- Critical limit of micronutrients in the soil must be given especially in AS 64.
- The treatments as decided should not be modified/ deleted.
- One or two pages of research highlights of all the experiments conducted at the centre must be enclosed with the annual report.
- Summary must be clear, to the point and self-explanatory.

ACKNOWLEDGEMENT

The hard work, sincerity and scientific rigour on the part of investigators at respective centres in implementation of different trials included in this report are acknowledged and put on record that without the same it was not possible to come out with the findings having country wide applicability. All round support and guidance received from Dr O. K. Sinha, Project Coordinator is duly acknowledged and we express our sincere thanks to him for his continuous support and guidance. Facilities and official provisions extended by Director, Indian Institute of Sugarcane Research, Lucknow for effective and timely implementation of various trials are sincerely recorded and acknowledged. The group humbly record its indebtedness to Indian Council of Agricultural Research, New Delhi for providing all required facilities, manpower and guidance in the course of implementation of the programme.

Annexure I

Details of Experiments allotted to and conducted by different Centres during 2014-15

Sl. No.	Centres	Experimental allotted						Experiments conducted						Experiments not conducted/reported					
1	Faridkot*	AS42	AS64	AS65	AS66	AS67	AS 68	AS42	AS64	AS65	AS66	AS67	AS68	-	-	-	-	-	-
2	Kota*	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
3	Lucknow	AS42	AS64	AS65	AS66	AS67	AS68	AS42	AS64	AS65	AS66	AS67	AS68	-	-	-	-	-	-
4	Kapurthala	AS42	AS64	AS65	AS66	-	AS68	AS42	AS64	AS65	AS66	-	AS68	-	-	-	-	-	-
5	Pantnagar	AS42	AS64	AS65	AS66	-	AS68	AS42	-	AS65	AS66	-	AS68	-	-	-	-	-	-
6	Shahjahanpur	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	AS64	-	-	-	-
7	Sriganganagar	AS42	AS64	AS65	-	-	AS68	-	AS64	-	-	-	AS68	AS42	-	AS65	AS66	-	-
8	Uchani	AS42	AS64	AS65	AS66	-	AS68	AS42	AS64	AS65	AS66	-	AS68	-	-	-	-	-	-
9	Akola	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-	AS42	AS64	-	AS66	-	AS68
10	Coimbatore	AS42	AS64	-	AS66	-	AS68	AS42	-	-	-	-	-	-	AS64	-	AS66	-	AS68
11	Kolhapur	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-	AS42	AS64	-	AS66	-	AS68
12	Mandya	AS42	AS64	-	AS66	AS67	AS68	-	AS64	-	AS66	-	AS68	AS42	-	-	-	AS67	-
13	Navsari	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
14	Padegaon	AS42	AS64	-	AS66	-	AS68	AS42	AS64	AS65	AS66	-	AS68	-	-	-	-	-	-
15	Powarkheda	AS42	AS64	-	AS66	-	AS68	AS42	-	AS65	AS66	-	AS68	-	AS64	-	-	-	-
16	Pune	AS42	AS64	-	AS66	-	AS68	AS42	-	-	-	-	-	-	AS64	-	AS66	-	AS68
17	Sankeshwar	AS42	AS64	-	AS66	-	AS68	AS42	-	-	AS66	-	AS68	-	AS64	-	-	-	-
18	Thiruvalla	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
19	Anakapalle	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
20	Cuddalore	AS42	AS64	-	AS66	AS67	AS68	AS42	AS64	-	AS66	AS67	AS68	-	-	-	-	-	-
21	Nayagarh	AS42	AS64	-	AS66		AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
22	Pusa	AS42	AS64	AS65	AS66	-	AS68	AS42	-	AS65	-	-	-	-	AS64	-	AS66	-	AS68
23	Seorahi	AS42	AS64	-	AS66	-	AS68	AS42	-	-	AS66	-	AS68	-	AS64	-	-	-	-
24	Bethuadhari*	AS42	AS64	AS65	AS66	-	AS68	-	-	-	-	-	-	AS42	AS64	AS65	AS66	-	AS68
25	Buralikson	AS42	AS64	-	AS66	-	AS68	AS42	AS64	-	AS66	-	AS68	-	-	-	-	-	-
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