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 sugarcan 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 Methodolo :

Recommended variety of sugarcane will be planted in paired rows at recommended spacing for the region. Drip treatments will be placed between sugarcane rows at a depth of 20-25cm. Entire dose of P and K fertilizers as per recommendation of the region will be applied. Entire dose of nitrogen after deducting the amount of N supplied through DAP will be applied through urea in different 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 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 (2015-16)

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.

1. FARIDKOT

Surface drip was laid in paired row trench plots planted at 30: 120 cm spacing. Drip irrigation at 100% IW/CPE ratio was significantly better than surface flood irrigation in cane yield. When drip irrigation was applied at 80% IW/CPE the cane yield was at par with surface irrigation. Irrigation water applied was about 48% 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 60% and 80% RDN in drip irrigated crop.

2. LUCKNOW

Highest sugarcane yield of 111.42 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 2265.5 kg/ha-cm when fertigation with recommended dose of nitrogen was done and the amount of irrigation water was kept at 75 per cent of pan evaporation. The sugarcane yield and IWUE were influenced by doses of nitrogen in fertigation treatments but the influence of nitrogen on sugarcane yield and irrigation water use efficiency was more distinctive in surface irrigation treatment. With surface irrigation, the mean sugarcane yield and IWUE were 74.21 t/ha and 773.1 kg/ha-cm respectively.

3. CUDDALORE

Highest sugarcane yield of 139.4 t/ha was recorded with 125% PE for irrigation. However, irrigation water use efficiency (IWUE) was highest at 1477 kg/ha-cm when fertigation was done and the amount of irrigation water was kept as 75 per cent of pan evaporation. Among the nitrogen levels 100 per cent application of nitrogen through sub surface drip fertigation recorded the maximum cane yield (139.8 t/ha).

Current year report (2016-17)

North West Zone

1. FARIDKOT

In ratoon crop initiated on 15.01.2016 drip irrigation at 100% IW/CPE ratio was significantly better than surface flood irrigation for cane yield. When drip irrigation was applied at 80% IW/CPE the cane yield was at par with surface irrigation. 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 60% and 80% RDN in drip irrigated crop. Apparent water productivity and total water productivity with drip was higher than surface irrigation (**Table AS 67.1.1**).

Table AS 67.1.1: Yield and water productivity of sugarcane under different surface drip irrigation methods at Faridkot during 2016-17 (ratoon)

Irrigation treatment	Cane yield (t/ha)	Irrigation water input(cm)	Total water input[#] (cm)	Apparent water productivity (Kg/m^3)	Total water productivity (Kg/m^3)
Surface drip irrigation at 60% CPE	77.0	30	78.4	25.7	9.8
Surface drip irrigation at 80% CPE	83.5	40	88.4	20.9	9.4
Surface drip irrigation at 100% PE	88.7	50	98.4	17.8	9.0
LSD (p=0.05)	7.3	-	-	1.7	NS
60% RDN	74.9	40	88.4	19.2	8.5
80% RDN	84.6	40	88.4	21.8	9.6
100% RDN	91.2	40	88.4	23.7	10.4
LSD (p=0.05)	5.3	-	-	1.4	0.6
Absolute control	80.3	82.5	130.9	9.7	6.1
LSD (p=0.05) Drip vs Flood	6.6	-	-	1.7	0.8

[#]Total water input = IWI + Rainfall i.e. 48.4 cm

2. LUCKNOW

Fourth ratoon crop was initiated during last week of February, 2016 and the crop was harvested in the second week of Feb, 2017. It was observed that irrigation treatments significantly influenced shoot count. Length of sugarcane plant leaf at onset of monsoon was significantly influenced by irrigation and nitrogen treatments both. Numbers of leaves per plant were influenced significantly by nitrogen doses. Leaf area per plant was significantly influenced by irrigation and nitrogen treatments both. Highest LAI (11.7) was observed when the crop was drip fertigated with irrigation water equal to 1.25 times pan evaporation and nitrogen equal to 100 % of recommended dose. Sucrose content of juice was significantly influenced by irrigation treatments. Numbers of millable canes were significantly affected by irrigation as well as nitrogen treatments. Interaction effect of irrigation and nitrogen on number of millable canes. Cane diameter and length were significantly influenced by irrigation treatments. However, sugarcane stalk length was also significantly influenced by nitrogen treatments. Sugarcane yield was significantly influenced by irrigation and nitrogen treatments both. Highest ratoon yield of 94.43 t/ha was observed in drip fertigation treatment with irrigation water equal to 1.25 times pan evaporation and nitrogen equal to 100 % of recommended dose (**Table AS 67.2.1**). The lowest sugarcane yield (51.53 t/ha) was observed when the crop was irrigated with surface irrigation method and 50 % of recommended dose of nitrogen was applied. Drip fertigation influenced irrigation water use efficiency (IWUE) significantly. Highest IWUE of 2090.7 Kg/ha-cm was recorded when sugarcane was irrigated with irrigation

water equal to 0.75 times pan evaporation and nitrogen equal to 75 % of recommended dose. However, surface irrigation resulted in the lowest IWUE (585.5 Kg/ha-cm) when sugarcane was irrigated with surface irrigation method and nitrogen was equal to 50 % of recommended dose (**Table AS 67.2.2**).

Table AS 67.2.1. Influence of treatments on sugarcane ratoon yield (t/ha)

Nitrogen / Irrigation	Nitrogen application rate			
	N_1 (100% RDN)	**N_2 (75% RDN)**	**N_3 (50% RDN)**	**Average**
I_1= Sub Surface Drip at 75% PE	83.78	84.04	72.73	80.18
I_2 = Sub Surface Drip at 100% PE	85.91	93.11	74.35	84.46
I_3 = Sub Surface Drip at 125% PE	94.43	88.26	91.39	91.36
I_4=Farmers' practice (surface irrigation)	73.67	60.72	51.53	61.97
Average	84.45	81.53	72.50	
SE (Irrigation)	-	-	-	2.83
CD (Irrigation)	-	-	-	9.01
SE (Nitrogen)	-	-	-	2.45
CD (Nitrogen)	-	-	-	10.56
SE (IxN)	-	-	-	2.83
CD(IxN)	-	-	-	6.93

RDN: Recommended dose of nitrogen

Table AS 67.2.2: Effect of treatments on irrigation water use efficiency (Kg/ha-cm)

Nitrogen / Irrigation	Irrigation water applied (ha-cm)	Nitrogen application rate			
		N_1 (100% RDN)	**N_2 (75% RDN)**	**N_3 (50% RDN)**	**Average**
I_1= Sub Surface Drip at 75% PE	40.2	2084.02	2090.66	1809.15	1994.61
I_2 = Sub Surface Drip at 100% PE	53.6	1602.72	1737.15	1387.18	1575.68
I_3 = Sub Surface Drip at 125% PE	67.0	1409.41	1317.25	1363.97	1363.54
I_4=Farmers practice surface irrigation	88.0	837.12	690.03	585.54	704.23
Average		1483.32	1458.77	1286.46	
SE (Irrigation)					43.93
CD (Irrigation)					139.75
SE (Nitrogen)					38.05
CD (Nitrogen)					163.72
CD(IxN)					107.51

3. CUDDALORE

The second year ratooning was done on second week of July 2016 with the same objective and treatments as per the technical programme. The result indicated that, among the methods of irrigation applications, the sub surface drip irrigation at 125 per cent Pan Evaporation, irrigation once in two days recorded the maximum sprouting (1,38,200/ha), tiller population (176560/ha), Millable population (176560/ha), root dry weight at 120 (132.50 Kg/ha) and 150 (134.26 Kg/ha) DAP. Among the nitrogen levels, 100 per cent recommended dose of nitrogen recorded the maximum sprouting (133440/ha), tiller population (169460/ha), millable population (127800/ha), root dry weight at 120 DAP (132.01 Kg/ha), it was on par with 75 per cent recommended dose of nitrogen (**Table AS 67.3.1**).

Table AS 67.3.1: Performance of sugarcane under different irrigation methods and nitrogen levels

Treatment	Sprouting ('000/ha)	Tiller ('000/ha)	Millable cane ('000/ha)	Root dry weight (120 DAP)
Irrigation				
I_1-SSDI at 75 % PE	120.32	142.36	116.35	122.36
I_2-SSDI at 100 % PE	132.21	165.42	125.36	129.80
I_3-SSDI at 125 % PE	138.20	176.56	129.68	132.50
I_4-Flood irrigation	124.68	160.35	122.65	125.68
CD(p=0.05)	5.84	8.54	6.46	6.67
Nitrogen level				
50 % RDN	124.09	153.08	118.96	122.90
75 % RDN	129.03	161.80	123.77	127.85
100 % RDN	133.44	169.46	127.80	132.01
CD(p=0.05)	6.83	6.83	6.83	7.06

Important Observations: Effect of surface drip irrigation was evaluated at Faridkot and of sub-surface drip irrigation was done at Lucknow and Cuddalore in sugarcane ratoon. At Faridkot irrigation water applied was about 40% less with surface 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 60% and 80% RDN in drip irrigated crop. At Lucknow, ratoon yield was significantly influenced by irrigation and nitrogen treatments both. Highest ratoon yield of 94.43 t/ha was observed in sub-surface drip fertigation treatment with irrigation water equal to 1.25 times pan evaporation and nitrogen equal to 100 % of recommended dose. Whereas, among the methods of irrigation at Cuddalore, the sub surface drip irrigation at 125 per cent Pan Evaporation, irrigation once in two days recorded the maximum sprouting (1,38,200/ha), tiller population (176560/ha), millbale can population (176560/ha), root dry weight at 120 (132.50 Kg/ha) and 150 (134.26 Kg/ha) DAP.

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)

Summary report for the last year (2015-16)

The trial initiated during the year 20104-15 with allotment to all the centres. However, during the year 2015-16 only 23 centres carried out the trial.

North West Zone

1. FARIDKOT

Cane yield of first ratoon crop was the highest(94.3 t/ha) with application of FYM/compost @ 20 t/ ha + inorganic nutrient based on soil test (T6) which was significantly higher than all other treatments except T_5 (89.9 t/ha), T_9 (86.4 t/ha) and T_4 (84.4 t/ha). These treatments also have the residual effect of FYM applied to plant crop.

2. LUCKNOW

Significantly the highest rate of stubble sprouts (92.6%) was observed under the treatment of organic application. Highest number of tillers (254.9 thousand /ha at 120 days after initiation), shoot count (210.7 thousand/ha at 180 DAI), number of millable canes (167.9 thousand/ha), cane yield (91.7 t/ha) and sugar yield (11.07 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

Plant cane yield was significantly highest in T_5 – FYM @ 20 t/ha + 100 % RDF (120: 60:40 kg NPK/ha) followed by T_6 – FYM @ 20 ton/ha + inorganic nutrients though soil test based crop response. Higher cane yield in these two treatments was the effect of higher germination, initial shoot population, NMC, cane girth, cane length and cane weight. Organic carbon was recorded highest in T6 – FYM 20 ton/ha + inorganic nutrients on soil test based (rating chart). Available N, P and K were also higher in T_6.

Highest cane yield in first ratoon crop was recorded in T_6 – FYM applied @ 20 t/ha + inorganic nutrients applied based on soil test (NPK) followed by T_8 – FYM applied @ 10 t/ha + bio-fertilizer (*Azotobacter* + PSB) + 100 % RDF (150: 70 + 50 kg). CCS yield was also highest in T_6 followed by T_8. On the basis of soil analysis it was recorded that in general organic carbon, available N, P and K were increased significantly in the treatment T_5 – FYM @ 20 t/ha + 100 % RDF (inorganic sources) followed by T_4 – FYM @ 20 t/ha + 50 % RDF (inorganic source) and T_6 – FYM @ 20 t/ha + inorganic nutrients applied on soil test (NPK application). Available N, P, K and organic carbon was lowest in T_1 followed by T_2 – (application of trash 10 t/ha + 50 % or 100 % NPK recommended).

4. UCHANI

FYM @ 20 t/ ha + inorganic nutrient application based on soil test in plant crop and ratoon crop (T_6) and application of FYM/Compost @ 20 t/ha + 100% RDF in plant and ratoon crop (T_5) recorded highest number of tillers, millable canes and cane yield in sugarcane plant- ratoon cropping system. Whereas, treatments T_5 and T_6 being at par produced significantly highest sugar yield among all the treatments.

5. KAPURTHALA

Data reveals that the highest cane yield (93.2 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 & bio fertilizer and was also significantly higher than T_2& T_3 where no organic sources was applied.

6. SHAHJAHANPUR

Application of FYM @ 10 t/ha + bio-fertilizers (*Azotobacter* + PSB) + soil test basis NPK (T_9) produced significantly higher ratoon cane yield (98.84t/ha) followed by application of FYM @ 20 t/ha + inorganic nutrient application based on soil test (T_6). Maximum benefit cast ratio (1.96) was also obtained in T_9 treatment.

7. SRIGANGANAGAR

The application of 100% RDF and soil test based fertilizers with FYM @ 20 t/ha (T_6 and T_5) produced significantly higher cane yield over all the treatments but at par with each other. The application of bio fertilizers with FYM @ 10t/ha and inorganic fertilizers recorded significantly higher cane yield over the application of trash @ 10 t/ha with organic fertilizers.

8. KOTA

Fertilizer application based on soil test (150:50:30 kg N, P_2O_5, K_2O/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 and 85.00 t/ha), CCS yield (12.10 and 10.34 t/ha) and net returns(Rs1,15,660 and 85,376/ha) respectively, during both the years which was significantly superior over T_1,T_4 and T_7 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 (T_6) was found significantly superior and next best treatment in respect of growth, quality and for improving fertility status of soil during both the years.

Peninsular Zone

9. THIRUVALLA

Among the various treatments, T_8 (FYM/ compost @ 10 t/ ha + bio fertilizer (*Azotobacter*/ *Acetobacter* + PSB) + 100% RDF) recorded significantly higher cane length (250.54 cm), MCC (89000/ha) and resulted in highest plant cane yield (107.22 t/ha). Brix and sugar yield also followed the same trend with significantly higher value for sugar yield (12.30 t/ha) for the very same treatment. It was followed closely by T_6 (FYM/Compost @ 20 t / ha + inorganic nutrient application based on soil test (rating chart)).

10. MANDYA

The data on cane and ratoon yield indicated that, application of FYM @ 20 t/ha + inorganic nutrient application based on soil test recorded significantly higher cane and ratoon yield (96.58 and 90.33 t/ha) compared to all other treatments. However, it

was on par with application of FYM @ 20 t/ ha + 100% RDF (93.12 and 88.07 t/ha), application of FYM @ 10 t/ha + bio fertilizer (*Azotobacter*/*Acetobacter* + PSB) + 100% RDF (90.63 and 85.50 t/ha) and application of FYM @ 10 t/ha + bio fertilizer (*Azotobacter*/ *Acetobacter* + PSB) + soil test basis fertilizer application (88.73 and 84.72 t/ha).

11. SANKESHWAR

Nutrient management practices followed with either soil test based NPK application or 100% RDF along with *Azospirillum* +PSB each @ 1 kg and either 10 or 20 t/ha FYM based on the availability is beneficial in getting higher cane yield.

12. PADEGAON

Application of recommended dose of 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 nutrients based on soil test (101.85 t/ha) as compared to application of trash 10 t/ha + 50% RDF (68.62), FYM/ compost @ 20 t/ha + 50% RDF (85.29), trash 10 t/ha + 100% RDF (91.67) and trash 10 t/ha + Soil test based NPK application (92.59).

14. NAVSARI

Significantly highest cane yield (123.36 t ha^{-1}) was recorded with T_9 that remained at par with T_5 and T_6. CCS yield (13.61 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 influenced significantly due to different nutrient management treatments at 10 months stage.

15. KOLHAPUR

Different treatments significantly influenced the cane and CCS yield. The treatment T_5 (application of FYM @20 t/ha + 100% RDF) recorded significantly highest cane and CCS yield (102.2 and 14.83 t/ha, respectively) which was at par with all remaining treatments except T_1 and T_2. It was revealed that, the quality parameters were influenced significantly due to various treatments except purity percentage.

16. COIMBATORE

Integrated application of organics and inorganics i.e. application of 10 t FYM+ STCR 150+ bio-fertilizer recorded significantly higher NMC and cane yield of 186.46 t/ha over the control (no fertilizer application). Sugarcane juice analysis done at 12 months revealed that Brix, Sucrose %, Purity % and CCS % were not influenced significantly by application of organics and inorganics.

17. PUNE

The highest cane yield 150.16 t ha^{-1} was obtained with compost @ 20 t ha^{-1} + 100% RDF through inorganic fertilizer followed by the treatment having compost @ 20

t ha^{-1} with inorganic fertilizers based on soil test (149.20 t ha^{-1}) in. However, application of compost @ 10 t ha^{-1} + bio fertilizers (*Acetobacter*& PSB) along with 50% RDF (142.12 t ha^{-1}), 100% RDF (143.61 t ha^{-1}) and fertilizers based on soil test (140.96 t ha^{-1}) found at par. All the treatments of inorganic fertilizers along with compost showed significant results over the treatments without organic manure.

East Coast Zone

18. CUDDALORE

In first ratoon crop also the treatment T_8- application of FYM @ 10 t/ha + bio fertilizer (*Azotobacter* + PSB) + 100 % RDF significantly registered maximum millable canes (1, 30,500 ha^{-1}); cane yield (140.0 t ha^{-1}). However data on the CCS per cent revealed insignificant difference among the treatment. The B: C ratio was found to be numerically high with the treatment T_8 (3.87) which was closely followed by the treatment T_9 (3.71).

19. ANAKAPALLE

The results indicated that application of FYM @ 10 t/ha + bio-fertilizer + inorganic nutrient application based on soil test (95.6 t/ha) or application of FYM @ 10 t/ha+ bio-fertilizer + 100%RDF (95.4 t/ha) registered significantly higher cane yield as compared to the other treatments. Application of only 50% RDF registered lowest cane yield of 80.4 t/ha.

20. NAYAGARH

The NMC and Cane yield were 75.88 ’000/ha and 81.87 t/ha in T_7, 76.71’000/ha and 82.73 t/ha in T_8 and 77.52’000/ha and 83.93 t/ha in T_9, respectively. This exhibits the positive effect of organic manures and bio fertilizers on cane yield. The soil physico-chemical parameters like BD, pH, EC, organic carbon content as well as available N, P and K content exhibited marked improvement upon application of organic source of plant nutrients.

North Central Zone

21. SEORAHI

Application of FYM @ 10 t/ha+ bio-fertilizer (*Azotobacter* + PSB) + soil test based (NPK application) produced significantly higher cane yield. Sucrose percent was not affected significantly with different treatments.

22. PUSA

Integrated application of nutrients was found effective in improving soil fertility and ratoon cane yield. The application of fertilizers based on soil test i.e. 170 kg N, 50 kg P_2O5 and 80 kg K_2O along with organics @ 20 t/ha was found suitable for boosting ratoon cane yield and maintaining soil fertility in calcareous soil of Bihar.

North Eastern Zone

23. BURALIKSON

Like the plant crop, in the first ratoon crop, application of FYM @10 t/ha along with bio-fertilizer and inorganic fertilizer based on soil test recorded significantly the

higher cane yield (65.3 t/ha) which is statistically at par with application of FYM @ 10 t/ha along with bio-fertilizer (Azotobacter + PSB) and 100% RDF (64.3 t/ha) and the yield recorded by application of FYM @ 20 t/ha along with soil test based fertilizer (60.5 t/ha), respectively.

Current year report (2016-17)

North West Zone

1. FARIDKOT

The second ratoon was initiated on 10.01.2016. Cane yield (99.0 t/ha) was the highest with application of FYM/Compost @ 20 tonnes/ha + inorganic nutrient based on soil test (T6) which was significantly higher than T1, T2 and T7 and was at par with other treatments. Sugar yield (CCS t/ha) was also the highest in T6 (13.53 t/ha) which was at par with all treatments except T1 (**Table AS 68.1.1**). Gross and net returns were higher in T6. Application of FYM with soil test based inorganic nutrients was better than the treatments having supplied with only inorganic nutrients (**Table AS 68.1.2**).

On the basis of one plant and two ratoon crops it can be concluded that application of FYM/Compost (20 t/ha) + inorganic nutrient based on soil test (T6) is the best for getting higher mean cane yield followed by T5, T9 and T8. The Gross and net returns are also having same trend.

Table AS 68.1.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Faridkot

Treatment	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)	CCS%	CCS t/ha
T_1	169.4	132.3	237	2.37	816	79.8	18.58	13.05	10.47
T_2	186.2	143	242	2.2	830	85.7	19.06	13.49	11.56
T_3	195.6	149.6	250	2.23	863	90.9	19.14	13.53	12.27
T_4	178.8	133.8	217	2.23	869	90.6	19.35	13.69	12.42
T_5	196.1	151.4	254	2.37	878	95.1	19.70	14.15	13.46
T_6	212.1	155.1	255	2.01	916	99.0	19.29	13.68	13.53
T_7	175.1	138.3	249	2.21	749	86.2	19.09	13.62	11.73
T_8	184.9	147.7	251	2.17	870	89.1	19.30	13.74	12.27
T_9	210.8	153.3	250	2.32	904	95.5	19.35	13.69	13.11
CD (5%)	24.6	13.7	NS	NS	7	10.2	NS	NS	1.77

Table AS 68.1.2: Economics of sugarcane plant-ratoon-ratoon system

Treatment	Gross Returns (Rs/ha)				Net returns (Rs/ha)			
	Plant (2014-15)	Ratoon I (2015-16)	Ratoon II (2016-17)	Mean	Plant (2014-15)	Ratoon I (2015-16)	Ratoon II (2016-17)	Mean
T_1	207205	225421	251330	227985	66224	135071	174755	125350
T_2	225733	236363	269912	244003	82367	143813	190537	138906
T_3	259083	253247	286290	266207	112587	158697	204965	158750
T_4	257539	263877	285345	268920	109883	167852	203470	160402
T_5	280390	281072	299517	286993	129999	182347	215192	175846
T_6	292742	294829	311801	299791	140921	194354	225851	187042
T_7	245496	245431	271487	254138	99515	151581	191412	147503
T_8	274523	256373	280620	270505	125307	160323	198495	161375
T_9	283787	270130	300777	284898	133391	172330	216402	174041

2. KAPURTHALA

The experiment was conducted on sandy loam soil, tested low in organic carbon (0.25 %), medium in available P (13.5 kg/ha) and high in available K (135 kg/ha).The data presented in table no. 68.1 reveals that the highest cane yield (92.8 t/ha) was obtained in treatment T6 when FYM 20t/ ha was applied along with 100% of recommended RDF, which was significantly higher than the treatments (T1,T4 & T7) where 50% RDF was applied alone and also with combination of FYM & bio fertilizer and was also significantly higher than T2 & T3 where no organic sources was applied. Similar trend was observed in case of millable canes where these were significantly high in T6 than T1, T2, T3, T4&T7 and at par with other treatments. However the same trend was observed in case of cane length and single cane weight but the differences were not up to significant level. The differences in Pol% in all the treatments was non-significant (**Table AS 68.2.1**).

On the basis of three year (one plant and two ratoons) data it can be concluded that theapplication of FYM/Compost @ 20 tonnes / ha + in-organic nutrient based on soil test (T6) is the best for getting higher cane yield followed by T9 and T5.

Table AS 68.2.1: Performance of ratoon crop as influenced due to nutrient management in plant-ratoon system at Kapurthala

Treatment	Tiller Count (000/ha)	Cane length (cm)	Cane girth (cm)	Single Cane wt. (g)	Millable canes (000/ha)	Cane yield (t/ha)	Pol (%) in juice
T_1	113	171	2.19	700	88.9	64.0	19.37
T_2	118.6	178	2.10	740	97.1	75.1	19.40
T_3	126.2	181	2.15	760	100.8	81.6	19.90
T_4	120.4	178	2.13	745	99.7	73.3	19.65
T_5	133.4	193	2.15	801	113.2	85.2	19.78
T_6	141.4	195	2.15	820	119.4	92.8	20.02
T_7	121.2	174	2.11	733	92.6	71.3	19.45
T_8	132.5	187	2.14	753	104.0	78.9	19.88
T_9	135.9	188	2.15	787	105.9	85.9	19.95
CD (5%)	9.2	NS	NS	NS	16.0	10.7	NS

3. KOTA

Significantly higher shoot count at 30 and 45 DAI, tillers at 120 and 150 DAP, cane length and NMC were obtained with the application of inorganic nutrients based on soil test, through inorganic source enriched with FYM (10 t/ha) + 12.5 + 12.5 Kg/ha (Azotobacter + PSB) over T1,T4 and T7 treatments and at par with other treatments. Single cane weight was also higher with application of FYM (20 t/ha) along with inorganic nutrient application based on soil test, over T1, T4 and T7 and at par with rest of the treatments (**Table AS 68.3.2**). Ratoon cane yield (81.5t/ha) and CCS (9.84t/ha) were recorded significantly higher by application of inorganic nutrients based on soil test enriched with FYM (10 t/ha) + 12.5 + 12.5 Kg/ha (Azotobacter + PSB) over T1, T4 and T7 treatments and at par with rest of treatments (**Table AS 68.3.1**). The higher cane yield was the cumulative effect of higher cane length, girth and NMC. Similar trend in quality parameters (Brix, sucrose, CCS and purity), soil parameters and economics were recorded (**Table AS 68.3.3**).

Summary: Among the nutrient management practices, application of 150:50:30 Kg N, P_2O_5, K_2O/ha based on soil test through inorganic sourcesand enriched with FYM (10 t/ha) +12.5 + 12.5kg/ha (Azotobacter + PSB) was found best for increasing cane yield, CCS yield and net returns during three years. Whereas, application of 150:50:30 kg N, P_2O_5, K_2O/ha through inorganic source enriched with FYM (20 t/ha) (T6) was found

significantly superior and next best treatment in respect of cane quality and improving the status of soil during three years.

Table AS 68.3.1: Performance of ratoon crop as influenced due to nutrient management in plant-ratoon system at Kota

Treatment	Cane length (cm)	Cane girth (cm)	NMC (000/ ha)	Cane weight (g)	Cane yield (t/ha)	CCS (%)
T_1 - Application of trash @ 10 t/ha + 50% RDF	189.6	6.77	99.05	621.67	64.50	10.41
T_2 - Application of trash @ 10 t/ha + 100% RDF	212.0	7.81	112.97	726.67	74.83	10.94
T_3 -Application of trash @ 10 t/ha + soil test based recommendation	211.7	7.85	112.38	730.00	74.18	11.98
T_4 - Application of FYM/Compost @ 20t/ha +50%RDF (inorganic source)	191.4	7.50	101.04	635.00	66.52	11.54
T_5 -Application of FYM/Compost @ 20 t/ha +100%RDF (inorganic source)	224.4	8.22	117.34	740.68	75.67	12.00
T_6 -Application of FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (rating chart)	225.1	8.23	120.50	750.00	78.67	12.03
T_7 -Application of FYM/Compost @ 10 t/ ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	197.0	7.54	105.10	615.00	67.50	10.73
T_8 Application of FYM/Compost @ 10 t/ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	224.3	8.27	119.90	741.67	80.00	12.01
T_9 -Application of FYM/Compost @ 10 t/ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis	225.8	8.40	122.24	745.00	81.50	12.03
SEm ±	10.05	0.48	5.10	28.30	4.10	0.40
CD (P=0.05)	29.04	1.42	14.90	84.86	12.25	1.20
CV	7.47	10.15	8.04	7.73	8.77	5.83

Table AS 68.3.2: Effect of integrated application of organics and inorganics on soil properties and nutrient status of soil after completion of three years crop cycle (2014-2016) at Kota

Treatment	OC (%)	Soil pH	Ec (ds/m)	Bulk density (Mg/m^3)	Infiltration rate (mm/hr)	Nutrient status of soil (kg/ha) after harvest		
						N	P	K
T_1 - Application of trash 10 t/ha + 50% RDF	0.50	8.19	0.31	1.39	4.20	320	18.10	300
T_2 - Application of trash 10 t/ha + 100% RDF	0.51	8.20	0.31	1.38	4.23	322	21.50	305
T_3 -Application of trash 10 t/ha + soil test based recommendation	0.52	8.19	0.30	1.38	4.22	345	20.90	302
T_4 - Application of FYM/Compost 20t/ha +50%RDF(inorganic source)	0.54	8.13	0.29	1.36	4.61	350	25.70	322
T_5 - Application of FYM/Compost 20 t/ha +100%RDF (inorganic source)	0.54	8.14	0.29	1.35	4.61	361	26.00	325
T_6 - Application of FYM/Compost 20 t/ha + in organic nutrient application based on soil test (rating chart)	0.55	8.12	0.28	1.34	4.68	360	26.70	328
T_7 - Application of FYM/Compost 10 t/ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	0.51	8.20	0.29	1.38	4.55	318	25.00	323
T_8 Application of FYM/Compost @ 10 t/ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	0.52	8.18	0.28	1.37	4.63	356	25.70	328
T_9 -Application of FYM/Compost 10 t/ha +	0.54	8.14	0.28	1.37	4.68	360	26.50	330

biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis								
SEm ±	0.02	0.02	0.08	0.015	0.16	13.90	2.25	8.62
CD (P=0.05)	0.049	0.06	NS	0.04	0.46	39.75	6.63	25.86
CV	5.27	4.72	4.87	5.50	2.55	5.50	5.90	5.00
Initial	0.50	8.22	0.34	1.40	4.00	361	23.50	325

Table AS 68.3.3: Cost and economics of integrated application of organics and inorganics during 2016-17 at Kota

Treatment	**Treatment cost (Rs/ha)**	**Production cost (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B: C ratio**
T_1 - Application of trash 10 t/ha + 50% RDF	5002	100002	1,61,250	61,248	1.61
T_2 -Application of trash 10 t/ha + 100% RDF	8,404	1,03,404	1,87,083	83,679	1.81
T_3 -Application of trash 10 t/ha + soil test based recommendation	6,924	1,01,924	1,85,458	83,534	1.82
T_4 - Application of FYM/ Compost 20 t/ha +50%RDF (inorganic source)	19,402	1,14,402	1,66,292	50,520	1.45
T_5 - Application of FYM/ Compost 20 t/ha +100% RDF (inorganic source)	22,804	1,17,804	1,89,167	71,363	1.61
T_6 - Application of FYM/ Compost 20 t/ha + inorganic nutrient application based on soil test (rating chart)	21,324	1,16,324	1,96,667	77,076	1.69
T_7 - Application of FYM/ Compost 10 t/ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	13,202	1,08,202	1,68,750	60,548	1.56
T_8 Application of FYM/ Compost 10 t/ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	16,604	1,11,604	2,00,000	83,863	1.79
T_9 -Application of FYM/ Compost 10 t/ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis	15,124	1,10,124	2,03,750	93,626	1.85
SEm ±	-	-	9,328	8,241	0.09
CD (P=0.05)	-	-	28,292	24,996	0.26
CV	-	-	8.77	19	8.94

4. LUCKNOW

The data on second ratoon of sugarcane growth, yield and quality indicated significant variations among the treatments. Significantly the highest rate of ratoon stubble sprouts (83.6%) was observed under 20 t FYM + STRC nutrient application followed by the treatment of only organic application. Highest number of tillers (217.3 thousand/ha at 150 days after initiation), shoot count (235.7 thousand/ha at 210 DAI), number of millable canes (156.8 thousand/ha), cane yield (89.4 t/ha) and sugar yield (9.87 t/ha) were recorded under the treatment where application of FYM @ 20 t/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 bio fertilizer and soil test basis inorganic fertilizers application. The yield attributing characters viz. cane length (223.9 cm), cane girth (2.21 cm) and weight of individual cane (0.90 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**).

Table AS 68.4.1: Performance of ratoon crop as influenced due to nutrient management in plant-ratoon system at Lucknow

Tr.	**Treatment**	**Sprouts**	**120 DAI**	**150 DAI**	**270 DAI**	**NMC**	**Yield**
		%	**(000/ha)**	**(000/ha)**	**(000/ha)**	**(000/ha)**	**(t/ha)**
1.	T-10+50 %RDF	70.6	131..4	146.4	143.7	98.90	55.2
2.	T-10+100 % RDF	72.8	160.5	175.2	155.5	117.8	71.3
3.	T-10+STBR	73.2	162.1	173.3	165.6	123.3	74.2
4.	20 t 50 % RDF	79.4	168.7	172.5	158.9	120.9	71.5
5.	20 + 100% RDF	79.5	178.0	203.4	184.7	144.7	84.2
6.	20 + STRC	83.6	189.1	217.3	186.5	156.8	89.4
7.	10+ B +50 %RDF	79.5	149.3	162.1	146.4	101.7	64.8
8.	10+B+100 %RDF	80.3	169.5	186.3	171.5	148.6	79.2
9.	10+ B STBR	79.6	177.3	192.5	173.9	151.4	86.5
10.	Organic	83.2	136.4	159.0	154.7	113.4	80.3
	SEm ±	1.17	4.1	3.69	3.42	3.32	2.06
	CD (P= 0.05)	3.48	12.37	11.39	10.34	10.29	6.21

5. PANTNAGAR

Ratoon II was initiated on 10.02.2016 of sugarcane (variety Co Pant 5224) planted during 2014-15 in flat planting having 75 cm row spacing. Ratoon crop was raised as per recommended package and practices. Ratoon II was harvested on

22.12.2017.Cane yield varied in different treatments and was recorded highest (54.69 t/ha) in T6- FYM @20 t/ha + soil based test of NPK/ha) which was significantly higher over rest of the treatments. Lowest cane yield was recorded (36.21 t/ha) in T1- 50% R.D.F + 10 t trash. Higher cane yield in the treatment T6 was the result of higher NMC (68.5, 000/ha), higher cane girth, length and weight of individual cane (880 g/cane). However, shoot population was highest (95,000/ha) in the Treatment 5 (FYM 20 t/ha + 100% RDF by inorganic source), though the number of clumps were almost similar in T5 and T6.Commercial cane yield (CCS yield t/ha) was highest in the treatment T5-FYM@ 20t/ha + 100% R.D.F. (inorganic sources) which was significantly higher over rest of the treatments (**Table AS 68.5.1**).

Uptake of N by sugarcane ratoon was highest (109.3 kg N/ha) in T5, which was significantly higher over rest of the treatments. Uptake of N was lowest in T1. Uptake of P was also higher in T5 which was significantly higher over rest of the treatments except T4 and T6. However the uptake of K was higher in the treatment T5 which was significantly higher over rest of the treatments except T6. Uptake of N, P and K was lowest in T1 (**Table AS 68.5.2**).

Organic carbon in soil was recorded highest (1.06%) in the treatment which was significantly higher over rest of the treatment except T4 and T5. Organic carbon was lowest in T1. However, organic carbon (%) increased in all the treatments. Organic carbon increased more in thetreatmentswhere FYM was applied along with 100% RDF. Availability of N and P was more in the treatment T6 whereas Potassium, Zn, Fe, Mn, S were more in T5.

Summary: In Ratoon II highest cane yield (54.69 t/ha) was recorded in T6-FYM@20t/ha + inorganic fertilizer on soil test based. Millable cane, cane girth, cane length and weight of individual cane were also higher in T6. Commercial cane sugar was higher in T5 which was significantly higher over rest of the treatments.

Table AS 68.5.1: Performance of second ratoon as influenced due to nutrient management packages at Pantnagar

Treatment	Clump '000/ha	Cane yield (t/ha)	Millable canes (000/ha)	Cane girth at harvest (cm)	Cane length (cm)	Per cane weight (g)	Sucrose %	CCS (t/ha)
T_1- Application of trash at 10 t/ha + 50 % RDF	23.7	36.21	56.0	7.7	311.7	720.0	17.7	7.6
T_2- Application of trash at 10 t/ha + 100 % RDF	24.3	41.33	59.7	7.8	338.0	733.3	19.1	7.8
T_3- Application of trash at 10 t/ha + soil test basis (NPK application)	25.0	42.0	61.6	8.3	356.7	800.0	19.3	7.8
T_4- Application of FYM/ Compost @ 20 t/ha + 50 % RDF (inorganic source)	27.0	48.03	67.6	9.2	374.0	833.3	20.5	8.1
T_5- Application of FYM/Compost @ 20 t/ha + 100 % RDF (inorganic source)	28.7	50.4	68.5	9.3	374.7	880.0	20.5	8.8
T_6- Application of FYM/Compost @ 20 t/ha + inorganic nutrient application based on soil test (NPK application)	28.3	54.69	69.4	9.5	376.7	853.3	20.7	8.4
T_7- Application of FYM/Compost @ 10 t/ha + bio fertilizer (*Azotobacter/Acetobactor* + *PSB*) + 50 % RDF	26.3	42.19	62.0	8.4	360.7	786.7	18.9	7.9
T_8- Application of FYM/compost @ 10 t/ha + bio fertilizer (*Azotobacter/Acetobactor* + PSB) + 100 % RDF	26.7	47.79	63.5	8.7	372.0	600.0	19.8	8.0
T_9- Application of FYM/Compost @ 10 t/ha + bio fertilizer (*Azotobacter/ Acetobactor* + PSB) + soil test basis (NPK application)	26.0	45.92	62.7	8.5	369.7	813.3	19.7	7.9
SEm±	0.81	1.15	1.35	0.39	7.76	51.81	0.44	0.09
CD at 5 %	2.4	3.4	4.08	1.19	23.48	17.13	1.34	0.27

Table AS 68.5.2: Effect of various treatments on availability of different nutrients and organic carbon and uptake of N, P and K influenced by various treatments (at harvest of ratoon II)

Treatment	Organic carbon (%)	Avail. N (Kg/ha)	Avail. P (Kg/ha)	Avail. K (Kg/ha)	Uptake (Kg/ha)		
					N	P	K
T_1- Application of trash at 10 tonnes /ha + 50 % RDF	0.91	183.91	32.52	188.83	138.3	15.6	197.0
T_2- Application of trash at 10 tonnes /ha + 100 % RDF	0.93	185.12	33.16	186.74	149.4	16.3	207.7
T_3- Application of trash at 10 tonnes /ha + soil test basis (NPK application)	0.94	187.52	34.95	190.37	157.0	17.5	213.2
T_4- Application of FYM/ Compost @ 20 tonnes/ha + 50 % RDF (inorganic source)	1.04	202.07	41.90	202.28	180.3	23.8	238.7
T_5- Application of FYM /Compost @ 20 tonnes/ha + 100 % RDF (inorganic source)	1.05	204.95	42.46	210.04	187.3	25.2	247.0
T_6- Application of FYM / Compost @ 20 tonnes/ha + in organic nutrient application based on soil test (NPK application)	1.06	206.48	44.14	208.46	183.9	24.4	242.2
T_7- Application of FYM/Compost @ 10 tonnes/ha + biofertilizer (*Azotobacter/ Acetobactor* + *PSB*) + 50 % RDF	0.97	191.21	36.17	199.94	160.3	18.2	225.2
T_8- Application of FYM/ compost @ 10 tonnes/ha + biofertilizer (*Azotobacter/ Acetobactor* + PSB) + 100 % RDF	1.01	199.28	40.36	206.22	175.5	22.0	234.8
T_9- Application of FYM/ Compost @ 10 tonnes/ha + biofertilizer (*Azotobacter/ Acetobactor* + PSB) + soil test basis (NPK application)	1.01	192.43	38.05	204.68	168.4	20.9	230.1
SEm±	1.00	1.54	1.54	2.52	1.06	0.71	2.5
CD at 5 %	0.02	4.6	4.6	7.64	3.2	2.15	7.8

6. SHAHJAHNPUR

The second ratoon crop (CoS 08279) was started on 08.03.2016 and harvested on 10.01.2017.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 6.5. Application of FYM @ 10 tonnes/ha + bio-fertilizers (Azotobacter + PSB) @ 10 Kg/ha each + soil test basis NPK (T_9) produced significantly higher cane yield (82.16 t/ha)

than those of other treatments except application FYM @ 20 tones/ha + inorganic nutrient application based on soil test (T_6) with cane yield of 79.50 t/ha. CCS % in cane was not affected significantly with different treatments. Maximum benefit cost ratio (1.64) was also obtained in T_9treatment followed by T_6treatment with benefit cost ratio of 1.61 (**Table AS 68.6.1**).

Summary: Application of FYM @ 10 tones/ha + bio-fertilizers (Azotobacter + PSB) + soil test basis NPK (T_9)gave significantly higher second ratoon cane yield (82.16 t/ha) followed by application FYM @ 20 tones/ha + inorganic nutrient application based on soil test (T_6). Maximum benefit cost ratio (1.64) was also obtained in T_9treatment.

Table AS 68.6.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Shahjahnpur

Treatment	Stubbles (000/ha)	M. Shoots (000/ha)	Shoots (000/ha)	Millable canes (000/ha)	Cane yield (t/ha)	CCS (%)	B:C ratio
T_1	20.49	34.49	137.50	83.07	65.35	12.15	1.40
T_2	19.91	33.22	161.57	84.23	73.56	12.54	1.53
T_3	21.88	36.46	159.14	83.56	72.25	11.98	1.50
T_4	21.99	36.11	167.13	86.25	70.35	12.69	1.45
T_5	23.03	38.43	166.09	89.36	68.85	12.45	1.44
T_6	22.80	37.27	155.90	110.67	79.50	12.32	1.61
T_7	20.83	34.61	147.57	83.85	71.85	12.53	1.48
T_8	20.26	32.99	168.98	107.75	76.20	12.27	1.58
T_9	22.22	36.34	173.26	120.25	82.16	12.23	1.64
SE±	**1.67**	**1.92**	**1.01**	**0.68**	**2.03**	**0.11**	**-**
CD at 5%	**NS**	**3.87**	**4.21**	**1.43**	**4.30**	**NS**	**-**

7. UCHANI

The second ratoon crop of early maturing variety CoH 160 was initiated during last week of February 2016. Phosphorus and potash as per treatments were applied at the time of field preparation for ratoon initiation whereas, N as per treatment was applied in four equal splits as top dressing (at ratoon initiation, April, May and June months). Recommended dose for ratoon crop for Haryana state is 225-50-50 NPK Kg/ha. The values for nitrogen, phosphorus and potash on soil test basis were 212, 52 and 58 NPK kg/ha, respectively. The crop was irrigated at 8-10 days interval during pre-monsoon and at 20 days interval during post monsoon period. All other practices of ratoon crop were followed as per the package of practices of CCSHAU, Hisar. The crop was harvested on January 02, 2017.

Applications of FYM @ 10 or 20 t/ha resulted in significant increase in yield and yield attributing characters over no organic manure application irrespective of fertilizers doses. FYM @ 10 t/ha along with bio-fertilizers proved equally effective in comparison of FYM @ 20 t/ha without bio fertilizers in terms of growth characters and cane yield. Application of FYM @ 20 t/ha with 100 %RDF and soil test based fertilizer application being at par with FYM @ 10 t/ha +bio fertilizers with 100 % RDF and soil test based fertilizer recorded significantly highest number of tillers, NMC and cane yield over 50% RDF with and without FYM, 100 % RDF and soil test based fertilizer without FYM. IN other words T6, T5, T9 and T8 were found best and at par treatment in terms of yield and yield attributing characters as compared to rest of the treatments. So continuous application of FYM @ 10 t/ha + bio fertilizers in sugarcane plant-ratoon-I and ratoon-II will be equally effective in comparison to FYM @ 20 t/ha (**Table AS 68.7.1**).

Summary: Significantly highest number of tillers (137.9, 136.0 thousands/ha), NMC (114.9, 113.2 thousands/ha) and cane yield (93.6, 91.9 t/ha) and sugar yield were recorded under treatment of FYM @ 20 t/ha with soil test based fertilizer application or 100 % RDF. However these treatments were found at par with application of FYM @ 10 t/ha+ bio fertilizers along with fertilizers on soil test basis or 100 % RDF. So continuous application of FYM @ 10 t/ha + bio fertilizers in sugarcane plant-ratoon-I and ratoon-II will be equally effective in comparison to FYM @ 20 t/ha.

Table AS 68.7.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Uchani

Treatment (Ratoon-II)	**Tillers (000/ha)**	**NMC (000/ha)**	**Cane weight (g)**	**Cane yield (t/ha)**	**CCS (%)**	**Sugar yield (t/ha)**
Application of trash at 10 t/ ha + 50% RDF	83.1	64.6	620	38.7	11.85	4.59
Application of trash at 10 t/ ha + 100% RDF	122.2	97.5	785	74.1	11.91	8.83
Application of trash at 10 t/ ha + soil test basis (NPK)	124.5	99.6	780	75.1	12.08	9.07
Application of FYM/Compost @ 20 t/ ha + 50% RDF (inorganic)	100.0	81.6	684	54.0	12.12	6.54
Application of FYM/Compost @ 20 t/ ha + 100% RDF (inorganic)	136.0	113.2	840	91.9	11.90	10.94
Application of FYM/Compost @ 20 t/ ha + inorganic nutrient based on soil test (NPK)	137.9	114.9	843	93.6	12.10	11.33
Application of FYM/Compost 10 t/ ha + biofertilizer (*Azotobacter Acetobacter + PSB*) + 50% RDF	95.1	78.1	680	51.4	12.04	6.19
Application of FYM/Compost 10 t / ha + biofert. Azoto*/ Aceto*	131.5	109.8	835	88.8	12.01	10.66

+ *PSB*) + 100% RDF						
Application of FYM/Compost @ 10 t/ ha + biofert. (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis(NPK application)	133.5	111.6	832	89.9	12.10	10.88
CD at 5%	8.8	7.8	36	5.3	NS	0.48

8. SRIGANGANAGAR

The second ratoon crop (Co 6617)was initiated during second fortnight of February, 2016. In 100 % RDF (150 Kg N + 40 Kg P_2O_5), phosphorus was applied at the time of preparing field for ratoon initiation, whereas nitrogen was applied in three equal splits as top dressing (at ratoon initiation, May & June). On soil test basis Nitrogen & phosphorus were applied @ 164 & 40 kg/ha, respectively.

The result indicated that no. of tillers, NMC, single cane weight and cane yield were influenced significantly due to different nutrient treatments while, the effect on CCS % was non-significant. Cane yield (68.4 t/ha) was the highest with the application of FYM @ 20 t/ha + inorganic nutrient based on soil test (T6) which was significantly higher over other treatments except T5 – application of FYM @ 10 t/ha + bio fertilizers + soil test basis inorganic nutrients (64.3 t/ha). The results also indicated that continuous application of FYM @ 10t/ha in combination with inorganic fertilizers and bio fertilizers were equally effective in comparison to FYM @ 20 t/ha. The application of bio fertilizers with 10 t/ha FYM / hectare and inorganic fertilizers recorded significantly higher cane yield over alone application of trash @ 10 t/ha with inorganic fertilizers (**Table AS 68.8.1**).

Table AS 68.8.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Sriganganagar

Treatment	Tillers (000/ha)	NMC (000/ha)	Cane weight (g)	Cane yield (t/ha)	CCS (%)
Application of trash at 10 t/ ha + 50% RDF	75.24	58.61	605	37.8	11.81
Application of trash at 10 t/ ha + 100% RDF	89.36	71.71	778	56.6	12.01
Application of trash at 10 t/ ha + soil test basis (NPK)	91.71	75.81	789	58.9	12.08
Application of FYM/Compost @ 20 t/ ha + 50% RDF (inorganic)	81.54	65.83	751	50.5	12.11
Application of FYM/Compost @ 20 t/ ha + 100% RDF (inorganic)	110.28	92.23	803	64.9	12.2
Application of FYM/Compost @ 20 t/ ha + inorganic nutrient based on soil test (NPK application)	113.93	94.49	815	68.4	12.13
Application of FYM/Compost @ 10 t/ ha + bio fertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	82.81	65.56	619	47.6	12.19

Application of FYM/Compost @ 10 t / ha + biofert. (*Azotobacter/ Acetobacter + PSB*) + 100% RDF	101.56	89.72	789	62.5	12.08
Application of FYM/Compost @ 10 t/ ha + biofert. (*Azotobacter/ Acetobacter + PSB*) + soil test basis(NPK application)	105.28	92.84	804	64.3	12.11
	9.9	8.1	15	5.3	NS

PENINSULAR ZONE

9. COIMBATORE

A field experiment with objective of developing nutrient management strategy for sustaining soil health and sugarcane production was laid out in randomized block design during January 2015 with 9 treatments replicated thrice. The experimental field was low in available nitrogen (216.38 N kg/ha) and high in available P and K. After harvest of plant crop ratooning and treatment scheduling was done consisting of application of organics and inorganics for nutrient management in sugarcane variety Co 86032 wherein at the time of ratooning as basal dose full phosphorous, FYM, 1/3 N and K was applied as per the treatments. In two split applications i.e. at the time of partial earthing up (30 DAP) and full earthing up (60 DAP) 1/3 nitrogen and potassium were applied. In first ratoon sugarcane crop, 20 t FYM + 150 STCR based fertilizer application was found beneficial in improving cane yield over rest of the nutrient management treatments. The treatment 20 t FYM + 150 STCR based fertilizer application recorded the highest NMC (119753 NMC/ha) and cane yield (137.74 t/ha) and was closely followed by the treatments 10 t FYM+ bio fertilizers+ 150 STCR (127.27 t/ha). Sugarcane juice analysis done at 12 months revealed that Brix, Sucrose %, Purity % and CCS % were not influenced significantly by application of organics and inorganics (**Table AS 68.9.1**). Crop was ratooned during February 2017 and various INM treatments were imposed.

Table AS 68.9.1: Performance of sugarcane first ratoon as influenced due to nutrient management packages at Coimbatore

Treatment	Cane Height (Cm)	Girth (mm)	SCW (kg)	NMC	Cane yield (t/ha)	Net Returns	BC ratio
T1 : 10 t/ha trash + 50% % RDF	193.12	27.48	1.07	106378.3	96.19	231752.9	2.32
T2 : 10 t/ha trash + 100 % RDF	219.37	26.83	1.17	107921.3	103.00	271237	2.41
T3 : 10 t/ha trash + STCR 150	215.41	27.56	1.25	105144	116.50	295435	2.46
T4 : 20 t FYM + 50 % RDF	195.62	28.03	1.25	104937.7	111.10	290043	2.23
T5 : 20 t FYM + 100 % RDF	192.70	25.55	1.28	102981	121.90	271065	2.15
T6 : 20 t FYM + STCR 150	233.12	29.25	1.43	119753	137.70	246855	2.06
T7 : 10 t FYM + 50 % RDF	207.29	27.48	1.18	100411	103.60	264329	2.27
T8 : 10 t FYM + 100 % RDF	185.62	26.12	1.06	109979	121.50	260450	2.23
T9 : 10 t FYM + STCR 150	176.45	27.12	1.13	110604.7	127.30	294027	2.30
SE (d)	1.16	1.25	0.11	6125.01	7.10	-	-
CD (0.05)	2.39	NS	NS	12546.85	14.55	-	-

10. PADEGAON

The data in respect of yield and yield contributing parameters revealed that the treatment T6 receiving RDF as per soil test along with 20 t/ha FYM recorded significantly the higher number of millable canes and cane yield (92.76 '000/ha and 119.10 t/ha, respectively) and it was found at par with treatment T9, T5, T8 and T4 for cane yield. However, as far CCS yield the treatment T6 (15.35 t/ha) was found at par with the treatments T9, T5, T8, T4, T7 and T3. Significantly higher number of internodes (27), cane girth (7.31cm), millable height (230cm) was recorded in treatment T6 which was found at par with T9, T8, T5 and T4.The treatment receiving trash 10 t ha-1 + 50 % RDF (T1) recorded significantly the lowest number of millable canes, number of internodes, cane girth, cane yield and CCS yield (**Table AS 68.10.1**).Different treatments imposed on sugarcane ratoon were not exerted a significant effect on quality parameters *viz*, Brix (%), Sucrose (%), Purity (%) and CCS (%).

Table AS 68.10.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Padegaon

Treat.	Girth (cm)	Millable height (cm)	ACW (Kg)	NMC (000 ha^{-1})	Cane yield (t/ha)	CCS yield (t ha^{-1})	Brix (c)	Sucrose (%)
T_1	6.27	177	1.03	71.58	82.76	10.71	19.52	13.58
T_2	6.54	187	1.15	80.17	97.87	12.71	20.42	13.79
T_3	6.66	201	1.18	86.89	99.76	13.21	21.32	13.5
T_4	6.86	216	1.19	87.82	103.55	13.43	21.12	14.23
T_5	7.13	224	1.22	90.43	110.31	14.22	20.05	14.27
T_6	7.31	230	1.25	92.76	119.10	15.35	19.52	14.35
T_7	6.63	202	1.23	84.67	101.78	13.29	20.52	13.64
T_8	6.84	217	1.19	89.45	104.15	13.71	21.00	13.58
T_9	7.14	228	1.36	92.66	112.68	15.13	21.52	13.25
SE+	**0.32**	**7.63**	**0.07**	**4.12**	**5.77**	**0.80**	**1.66**	**2.11**
CD at 5%	**0.92**	**21.82**	**NS**	**12.34**	**17.29**	**2.39**	**NS**	**NS**

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 (7.2) was recorded in treatment of T7 receiving 50 % RDF along with 10 t/ha FYM + bio fertilizers and the highest value was observed in treatment T1 receiving 50 % RDF (7.38). The soil EC was increased in all the treatments over the initial. Significantly the lowest EC was noted in the treatment T1 and it was found highest in treatment T9.

Soil organic carbon content reduced in the treatment T1, however; it increased in all the integrated nutrient management treatments over the initial status. The treatments T6 receiving RDF as per soil test along with 20 t ha-1 FYM were recorded significantly the higher organic carbon (0.80 %) and it was found at par with treatment T8, T9 T7, T3, T2 and T5. The lowest organic carbon concentration was recorded in the treatment T1. Treatment T6 recorded significantly the higher soil available N, P and K (246, 26.23 and 260.69 Kg/ha, respectively). However, the lowest soil nutrient status of soil available N, P and K was found in the treatment T1 (**Table AS 68.10.2**).

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 FYM (T6) recorded significantly the higher per hectare gross monetary returns (Rs.267975), followed by T9 receiving RDF as per soil test along with 10 t/ha FYM + bio fertilizers (Rs.253525) and lowest in the treatment T1 (Rs.186205). The highest

benefit-cost ratio was reported in the treatment T3 receiving only RDF as per soil test (2.28) and it was found lowest in the treatment T4 (1.34).

Table AS 68.10.2: Sugarcane soil health as influenced by nutrient management at Padegaon

Treatment	pH	EC (dS/m)	O C (%)	Available nutrients (Kg/ha)		
				N	P	K
Initial	*7.41*	*0.41*	*0.68*	*236.21*	*22.83*	*262.68*
T_1	7.38	0.41	0.63	221.83	19.16	241.14
T_2	7.30	0.49	0.71	234.50	22.30	251.69
T_3	7.37	0.59	0.77	240.63	21.33	252.21
T_4	7.27	0.66	0.70	240.08	22.08	255.56
T_5	7.33	0.80	0.74	235.70	20.60	258.09
T_6	7.23	0.70	0.80	246.04	26.23	260.69
T_7	7.20	0.82	0.75	237.69	24.20	255.06
T_8	7.28	0.74	0.75	238.62	24.83	252.29
T_9	7.26	0.84	0.78	242.69	25.33	259.79
SE+	**0.01**	**0.03**	**0.03**	**0.51**	**0.26**	**0.65**
CD at 5%	**0.02**	**0.08**	**0.09**	**1.53**	**0.79**	**1.94**

11. PUNE

The highest first ratoon cane yield 108.77 t/ha was obtained in the treatment of compost (10 t/ha) with inorganic fertilizer based on soil test and bio-fertilizer followed by 107.93 t/ha in the treatment of compost @ 20 t/ha with inorganic fertilizers based on soil test. All the treatments were found on par with each other and showed significant results over the treatments of without organic manure. Commercial cane sugar yield was recorded significantly higher in 100 % RDF than 50 % RDF without organics. Recommended dose of fertilizers and soil test based fertilizer recommendation were responded more or less same. All the treatments except 50% RDF without organics gave at par results with respect to CCS yield (**Table AS 68.11.1**).

The plant population showed that maximum significant plant population (94.42 ‘000/ha) was recorded in treatment T9 where compost @ 10 t/ha with inorganic fertilizer based on soil test and bio fertilizer was applied, it was followed by treatment T6 (93.89 ‘000/ha) where compost @ 20 t/ha was applied with inorganic fertilizer based on soil test. All the treatment combinations comprising of organic and inorganic sourceswere found significantly better over treatment T2 where only 100 % of recommended dose of fertilizers was applied.

The maximum cane length (223.17) was found in treatment T9 followed by treatment T6 (223.11 cm) that was found significantly superior over treatment T2. Cane girth and number of internodes remained more or less same in all the treatments. The juice quality was not affected.

SUMMARY: The treatment of soil test based fertilizer application without organic fertilizer was found numerically superior over 100 % RDF. All the treatments were found at par to each other. Compost application @ 20 t/ha and 10 t/ha with 100 % RDF, 50% RDF and soil test based fertilizer with bio fertilizer were at par to each other and superior over 100% RDF without organics. With respect to cane yield, application of 100% RDF with organic fertilizers was showed significant results over 50% RDF without organics.

Table AS 68.11.1: Performance of sugarcane first ratoon crop as influenced due to nutrient management at Pune

Treatment	Cane yield (t/ha)	CCS yield (t/ha)	NMC (000/ha)	Cane height (cm)	Girth (cm)	CCS %
T1- No organic + 50% RDF	82.66	10.77	79.49	208.33	9.15	13.05
T2- No organic + 100% RDF	94.76	13.41	84.58	216.87	9.17	14.16
T3– No organic + soil test based recommendation	98.81	13.64	87.18	220.56	9.32	13.79
T4- FYM/compost @ 20 t/ha + 50% RDF (inorganic source)	103.5	13.45	91.84	217.00	9.30	12.98
T5 –FYM/compost @ 20 t/ha + 100% RDF (inorganic source)	105.2	14.57	92.59	219.44	9.33	13.85
T6 –FYM/compost @ 20 t/ha+ inorganic nutrient application based on soil test (rating chart)	107.9	14.44	93.89	223.11	9.30	13.38
T7 –FYM/compost @ 10 t/ha + bio fertilizer Azotobacter/Acetobacter + PSB) + 50% RDF	105.4	13.74	93.56	221.22	9.34	13.03
T8 –FYM/compost @10 t/ha + bio fertilizer Azotobacterr/Acetobacter + PSB) +100% RDF	107.0	13.38	93.47	222.49	9.30	12.49
T9 –FYM/compost @10 t ha^{-1} + bio fertilizer (Azotobacter/Acetobacter + PSB) + soil test basis	108.7	14.86	94.42	223.17	9.34	13.66
SED	2.66	1.00	1.70	2.80	0.40	0.86
CD at 5%	5.65	2.14	3.61	5.94	NS	NS

12. NAVSARI

Second ratoon crop (CoN 05071) was initiated on 30.01.2016. Significantly higher numbers of tillers were recorded with application of FYM @10 t/ha+bio fertilizer (*Acetobacter* + PSB) + soil test basis (NPK application) (T9) over application of trash at 10 t/ha + 50 % RDF (T1). However it remained at par with T6 at 120 & 150 DAP.

NMC (100.22 '000/ha) was recorded significantly higher with treatment T9 over T1 and at par with T3, T6 and T7. Millable cane length (249.29 cm) was significantly higher with T9 over T1, however it remained at par with almost all the treatments except T4 and T7. Cane diameter was not significantly influenced due to different treatments. Significantly highest single cane weight was observed with T9 and remained at par with the treatment T5 and T6 (**Table AS 68.12.1**).

Cane yield (117.59 t/ha) was recorded significantly higher with T9 over T1 and remained at par with T3, T6 and T8. CCS yield was significantly influenced due to various nutrient management treatments. Various quality parameters were not significantly influenced due to different nutrient management treatments except purity % at 10 month. Almost, all the treatment round equally effective over T5. While at 12 month, quality parameters were not significantly influenced due to different treatments.

There was no significant difference observed due to various inorganic and organic treatments on soil pH, EC (1:2.5) ds/m, available K_2O and BD g/cc. Available nitrogen recorded significantly highest with T8 over T1 and T2 and remained at par with all the treatments while available phosphorus was also recorded highest with T8 and remained at par with T1 and T4 (**Table AS 68.12.2**).

Table AS 68.12.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Navsari

Treatment	No. of tillers at 120 DAP (000/ha)	No. of tillers at 150 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)
T_1	116.47	120.08	74.28	209.01	1.19	88.34	11.59
T_2	119.51	124.12	86.54	222.32	1.26	100.19	13.58
T_3	141.65	143.33	88.96	235.88	1.15	105.64	13.52
T_4	128.33	132.31	84.93	192.71	1.34	97.22	13.22
T_5	117.49	121.47	87.14	236.05	1.42	101.82	13.62
T_6	143.92	148.28	96.44	240.89	1.45	114.13	16.14
T_7	126.77	130.94	90.19	205.68	1.11	101.39	13.56
T_8	121.19	125.71	86.05	225.67	1.05	111.57	14.49
T_9	158.95	166.26	100.22	249.29	1.56	117.59	15.07
S.Em ±	6.81	6.83	4.06	11.52	0.07	5.23	0.85
C.D.at 5%	20.42	20.48	12.18	34.53	0.21	15.67	NS
C.V.%	9.04	8.78	7.97	8.90	9.56	8.69	10.62

Table AS 68.12.2: Soil properties after harvest of crop as influenced by different organic and inorganic treatments

Treatment	pH	EC (1:2.5) dsm^{-1}	OC%	Available N (Kg/ha)	Available P_2O_5 (Kg/ha)	Available K_2O (Kg/ha)	BD (g/cc)
T_1	7.87	0.87	0.82	138.67	101.33	722.33	1.61
T_2	8.00	0.57	0.79	153.67	86.67	660.33	1.61
T_3	7.96	0.73	0.82	164.00	84.67	690.00	1.64
T_4	8.05	0.58	0.74	158.33	106.33	771.00	1.65
T_5	8.03	0.66	0.78	155.33	87.33	784.67a	1.61
T_6	7.97	0.72	0.76	161.33	75.00	619.33	1.61
T_7	7.96	0.77	0.71	162.67	65.67	671.33	1.61
T_8	8.01	0.69	0.69	168.00	111.00	772.00	1.61
T_9	8.00	0.74	0.71	166.33	89.33	733.33	1.60
S.Em ±	0.04	0.06	0.05	4.50	5.84	79.33	0.02
C.D.at 5%	NS	NS	NS	13.49	17.50	NS	NS
Initial	8.67	0.280	0.240	301	83.84	282	1.22

13. THIRUVALLA

The experiment to study the impact of integrated application of organics an inorganics in improving soil health and sugarcane productivity (plant crop) was planted on 20.1.2016 and harvested on12.1.2017. The ratoon crop of the previous year was also harvested on the same date itself.

The germination and tiller count (**Table AS 68.13.1**) remained unaffected due to various treatments tried. Variation due to different treatments were significant for growth and yield parameters. In plant crop, among the various treatments, T8 (FYM/compost @ 10 t/ha + bio fertilizer(Azotobacter/Acetobacter+PSB) +100% RDF) recorded significantly higher values for cane length(255.61 cm), MCC(91000/ha) and resulted in highest yield(108.50 t/ha). Brix and sugar yield also followed the same trend with significantly higher values for sugar yield (12.42t/ha) for the very same treatment. It was followed by T6(FYM/Compost @ 20 t/ha + inorganic nutrient application based on soil test (rating chart).

With regard to ratoon crop also, the same trend was visible where T8 itself recorded the highest values for cane length(262.07 cm), MCC(93240/ha), cane yield (111.10 t/ha) and sugar yield (12.74 t/ha).Slight variation in the soil fertility parameters (**Table AS 38.13.2**) 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 the conduct of the experiment. The treatment T8 recorded the highest BC ratio(1.38).

Table AS 68.13.1: Performance of sugarcane as influenced due to nutrient management at Thiruvalla

Treatment	Tiller count (000/ha)		Cane length (cm)	Cane girth (cm)	MCC ('000/ ha)	CCS (%)	Cane yield (t/ha)	BC ratio
	120 DAP	150 DAP						
T_1 No organic + 50% RDF	84.18	76.25	191.06	8.40	68.7	8.63	72.00	0.80
T_2 No organic + 100% RDF	98.00	94.16	233.51	9.60	86.0	10.17	99.27	1.25
T_3 No organic + soil test based recommendation	99.00	91.25	230.72	9.55	84.9	10.03	92.51	1.26
T_4 FYM/Compost @ 20 tonnes / ha + 50% RDF (inorganic source)	99.91	93.00	237.13	9.80	88.1	10.25	100.62	1.15
T_5 FYM/Compost @ 20 tonnes / ha + 100% RDF (inorganic source)	96.30	88.43	229.92	9.52	83.5	9.93	86.04	1.26
T_6 FYM/Compost @ 20 tonnes / ha + in organic nutrient application based on soil test (rating chart)	105.60	96.33	240.24	9.90	90.0	10.30	102.25	1.20
T_7 FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 50% RDF	87.41	78.30	227.55	9.40	82.8	9.85	76.34	1.18
T_8 FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + 100% RDF	110.16	100.10	262.07	10.2	93.2	11.47	111.10	1.38
T_9 FYM/Compost @ 10 tonnes / ha + biofertilizer (*Azotobacter/ Acetobacter* + *PSB*) + soil test basis	90.04	85.24	228.80	9.44	80.1	9.90	81.74	1.23
CD (0.05)	**NS**	**NS**	**8.14***	**0.38***	**9.08***	**0.15***	**8.50***	**NS**

Table AS 68.13.2: Effect of various treatments on soil health at ratoon harvest

Parameter	Initial	At harvest
Bulk density(g/cc)	1.43	1.40
Organic carbon (%)	1.82	1.96
Available N (Kg/ha)	326.32	355.38
Available P (Kg/ha)	102.12	110.51
Available K (Kg/ha)	218.67	227.51
Soil pH	4.6	4.5
EC (ds/m)	0.12	0.12

14. MANDYA

The second ratoon crop (Co 86032) was initiated on 05.02.2016. Application of FYM (20 t/ha) + inorganic nutrient application based on soil test results recorded significantly higher ratoon yield (74.84 t/ha) compared to all other treatments. However, it was on par with application of FYM (20 t/ ha) + 100% RDF (65.71 t/ha), application of FYM (10 t/ha) + bio fertilizer (Azotobacter + PSB) + 100% RDF (67.54 t/ha), and application of FYM (10 t/ha) + bio fertilizer (Azotobacter + PSB) + soil test basis fertilizer application (68.42 t/ha). The increased ratoon yield in above treatments was mainly attributed to increased yield parameters viz., single cane weight, cane length, cane girth, inter-nodal length, number of internodes, and number of millable cane (1.07kg, 1.92 m, 2.51 cm, 8.89 cm, 22.2 and 78.4 thousand/ha, respectively) in T6; (0.90 kg, 1.86 cm, 2.24 cm, 8.13 cm 19.07 and 69.3thousand/ha, respectively) in T5; (0.86 kg, 1.73 m, 2.25 cm, 8.70 cm, 20.10 and 77.1 thousand/ha, respectively) in T8 and 0.98 kg, 1.81 m, 2.31 cm, 8.73 cm, 20.21 and 77.0 thousand/ha, respectively in T9 (**Table AS 68.14.1**).

Soil physical and chemical properties of soil viz., pH, EC, OC and BD after harvest of crop did not influenced significantly due to integrated application of organics and inorganics . The soil available N, P_2O_5 and K_2O content of soil differed significantly due to integrated application of organics and inorganics. Among the treatments, significantly higher amount of available N was observed in the treatment T6 (278.50 Kg/ha) as compared to other treatments. However, it was on par with T5, T8 and T9 (266.08, 262.58 and 270.25 Kg/ha, respectively). While, significantly lower amount of soil available N was registered in control plots (168.13 Kg/ha). The soil available P_2O_5 content was significantly higher in the treatment T6 (37.41 Kg/ha) as compared to T1 (22.63 Kg/ha) T2 (25.15 Kg/ha) and T3 (26.32 Kg/ha). However, it was on par with rest of the treatments. A similar trend was also observed with respect to availability of soil K_2O content after the harvest of the crop (**Table AS 68.14.2**).

Summary: The data on cane and ratoon I and II yield indicated that, application of FYM (20 t/ha) + inorganic nutrient application based on soil test results recorded significantly higher cane, ratoon I and ratoon II yield (96.58, 90.33 and 74.84 t/ha,

respectively) compared to all other treatments. However, it was on par with application of FYM (20 t/ha) + 100% RDF (93.12, 88.07 and 65.71 t/ha, respectively), application of FYM (10 t/ha) + biofertilizer (Azotobacter + PSB) + 100% RDF (90.63, 85.50 and67.54 t/ha, respectively) and application of FYM (10 t/ha)+ bio fertilizer (Azotobacter + PSB) + soil test basis fertilizer application (88.73, 84.72 and 68.42 t/ha, respectively).

Table AS 68.14.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Mandya

Treat-ment	Single cane weight (kg)	Cane length (m)	Cane girth (cm)	No. of inter nodes	Millable cane ('000/ha)	Cane yield (t/ha)	Sucrose %	CCS %	CCS (t/ha)
T_1	0.57	1.38	1.39	12.78	62.2	41.07	19.22	13.39	5.49
T_2	0.74	1.67	1.49	14.19	67.7	52.91	18.57	12.70	6.72
T_3	0.89	1.76	2.37	16.58	75.4	55.96	18.84	13.00	7.27
T_4	0.82	1.79	2.09	14.98	64.5	58.87	19.01	12.92	7.68
T_5	0.90	1.86	2.24	19.07	69.3	65.71	18.02	12.06	7.92
T_6	1.07	1.92	2.51	22.23	78.4	74.84	19.96	13.95	10.44
T_7	0.82	1.67	2.24	19.58	75.5	63.65	18.42	12.52	7.97
T_8	0.86	1.73	2.25	20.10	77.1	67.54	19.76	13.27	8.95
T_9	0.98	1.81	2.31	20.21	77.0	68.42	19.41	13.15	8.98
S.Em±	**0.06**	**0.04**	**0.15**	**0.93**	**3.40**	**3.74**	**0.48**	**0.34**	**0.49**
CD@5 %	**0.18**	**0.13**	**0.46**	**2.78**	**10.18**	**11.22**	**NS**	**NS**	**1.47**
CV%	**11.96**	**4.26**	**12.77**	**9.04**	**8.30**	**10.63**	**4.33**	**4.51**	**10.81**

Table AS 68.14.2: Effect of various treatments on soil health at the end of crop cycle

Treatment	pH	EC (dS/m)	OC (%)	BD (Mg/m^3)	Soil Available Nutrients (Kg/ha)		
					N	P_2O_5	K_2O
T_1	7.25	0.238	0.342	1.38	168.13	22.63	102.38
T_2	7.22	0.241	0.365	1.29	214.20	25.15	128.95
T_3	7.21	0.243	0.368	1.28	225.05	26.32	130.52
T_4	7.18	0.273	0.405	1.21	236.12	30.52	132.52
T_5	7.12	0.285	0.415	1.20	266.08	34.78	145.85
T_6	7.05	0.321	0.418	1.18	278.50	37.41	165.24
T_7	7.15	0.312	0.412	1.22	258.98	35.62	145.20
T_8	7.16	0.315	0.415	1.19	262.58	36.12	159.85
T_9	7.10	0.316	0.416	1.19	270.25	36.85	152.32
SEm	**0.220**	**0.032**	**0.082**	**0.10**	**6.82**	**0.96**	**8.82**
CD @ 5%	**NS**	**NS**	**NS**	**NS**	**20.42**	**2.82**	**26.42**

15. SANKESHWAR

Pooled data indicates significant differences among the treatments in growth parameters except number of internodes (**Table AS 68.15.1**). Significantly the higher cane height was recorded in T9 (2.27 m) and was on par with all the other treatments except T1 and T3 (2.05 m) which recorded lower cane height. Number of tillers per row were significantly higher in T9 (74.80) and was on par with T5, T7 and T8. The lower number of tillers per row was recorded in T2 (64.92).The pooled data revealed non-significant differences among the treatments in yield and yield attributing parameters except single cane weight.Significantly higher single cane weight was recorded in T8 (1.57 Kg) and was on par with other treatments except T5 & T7 (1.45 Kg) which recorded lower weight.

Brix, Pol and CCS content recorded significant differences. Whereas, juice weight purity and CCS yield recorded non-significant differences among the treatments. Significantly higher brix unit was recorded in T1 (21.11) and was on par with T2, T4 and T5. The lowest brix was recorded in T3 (19.61). Significantly higher pol was recorded in T1 (18.54) and was on par with T9 (17.80). The lowest POL was recorded in T6 (16.88).

SUMMARY: The treatment differences did not exist due to severe drought for the last 3 years. Hence, most of the parameters recorded in the experiment did not show any variation due to moisture stress.

Table AS 68.15.1: Performance of sugarcane as influenced due to nutrient management at Sankeshwar

Treatment	Cane yield (t/ha)			CCS (%)		
	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled
T1	91.30	37.96	64.63	12.78	12.78	12.78
T2	93.50	36.17	64.83	12.04	12.04	12.04
T3	86.99	41.57	64.28	11.64	11.64	11.64
T4	95.65	38.01	66.83	12.00	12.15	12.07
T5	95.37	38.89	67.13	12.12	11.87	11.99
T6	101.81	41.36	71.58	11.54	11.22	11.38
T7	84.44	38.07	61.26	11.47	11.72	11.60
T8	92.08	31.57	61.83	11.39	11.19	11.29
T9	96.67	33.67	65.17	12.35	12.24	12.30
CD 5%	NS	NS	NS	0.86	0.77	0.76

EAST COAST ZONE

16. ANAKAPALLE

The experiment was reinitiated during the year 2015-16 as plant crop was severely damaged due to cyclone and no results could be obtained for the year 2014-15. Initial soil analysis indicated that soil was neutral in pH (7.81), normal in E.C (0.1 dSm^{-1}), low in organic carbon (0.51%), low in available nitrogen (230 kg N/ha), medium in available phosphorus (40.25 Kg/ha) and high in available potassium (386 Kg K_2O/ha).

In the first ratoon crop at 120 days after ratooning , integrated application of FYM, bio-fertilizer along with inorganic fertilizers found to give significantly higher number of tiller population (153472/ha) followed by application of FYM (10 t/ha) + Bio fertilizer + inorganic nutrient application on soil test basis (151736/ha) as compared to the other treatments. Spreading of trash (10t/ha) and application of 50 % RDF treatment (T1) recorded lowest number of tillers (126389/ha).

Significant differences were observed in number of millable canes due to different organic and inorganic treatments (**Table AS 68.16.1**). Application of FYM (10 t/ha) + Bio fertilizer (Azotobacter + PSB) + inorganic nutrient application based on soil test basis (82639/ha) or application of 100% RDF (82630/ha) recorded significantly higher number of millable canes at harvest. Number of millable canes recorded in application of FYM (20 t/ha) + inorganic nutrient application based on soil test (81597/ha) or application of FYM (20 t/ha) + 100% RDF through inorganic source (80555/ha) or application of trash (10 t/ha) + Soil Test based recommendation (78117/ha) treatments were on par. Significantly lower number of millable canes were recorded in trash at (10 t/ha) + 50% RDF (65,972/ha).

Application of FYM (10 t/ha) + bio fertilizer+100% RDF (89.9 t/ha) or application of FYM (10 t/ha) + bio fertilizer + inorganic nutrient application based on soil test registered significantly higher cane yield of 89.3 t/ha as compared to application of 50 % RDF+FYM (20 t/ha) (71.2 t/ha) or application of FYM (10 t/ha) + bio fertilizer (*Azatobacter*+ PSB)+50% RDF (81.2 t/ha) or application of trash at 10 t/ha + fertilizers based on soil test (83.3 t/ha) or application of trash at 10 t/ha + 100% RDF (84.6 t/ha) but found on par with application of FYM (20 t/ha) + inorganic nutrient application based on soil test (89.4 t/ha) or application of FYM (20 t/ha) + 100% RDF through inorganic source (88.5 t/ha).

Summary: Studies on impact of integrated application of organics and in-organics in improving soil health and ratoon sugarcane productivity indicated that application of FYM (10t/ha) + bio fertilizer + 100% RDF (89.9 t/ha) or application of FYM (10 t/ha) + bio fertilizer+inorganic nutrient application based on soil test (89.6 t/ha) registered significantly higher cane yield as compared to the other treatments. Application of trash at 10 t/ha + 50% RDF registered lowest cane yield of 76.4 t/ha.

Table AS 68.16.1: Performance of sugarcane first ratoon as influenced due to nutrient management at Anakapalle

Treatment	Tiller population at 120 DAR	NMC/ ha	Cane yield (t/ha)	Juice Sucrose (%)	CCS (%)	Sugar yield (t/ha)
Application of trash at 10 t/ha + 50% RDF	126389	65972	76.4	15.96	11.6	8.9
Application of trash at 10 t/ha + 100% RDF	140972	76389	84.6	16.30	11.8	10.0
Application of trash at 10 t/ha + Soil Test based recommendation	138889	78117	83.3	15.94	11.6	9.7
Application of FYM @20 t/ha + 50% RDF(inorganic source)	134028	69444	79.2	16.91	11.9	9.4
Application of FYM @20 t/ha + 100% RDF(inorganic source)	133680	80555	88.5	16.14	11.1	9.8
Application of FYM @20 t/ha + inorganic nutrient application based on soil test	145139	81597	89.2	16.23	11.4	10.2
Application of FYM @10 t/ha + Biofertilizer (Azatobacter + PSB)+50% RDF	146527	72829	81.6	16.31	12.4	10.1
Application of FYM @10 t/ha + biofertilizer+100% RDF	153472	82630	89.9	16.54	12.5	11.2
Application of FYMt@10 t/ha + Biofertilizer + inorganic nutrient application on soil test basis	151736	82639	89.6	17.80	13.3	11.9
SEm+	1132.0	1317.0	1.20	0.54	0.45	-
C.D (0.05)	3393.0	3944.0	3.40	NS	NS	-
CV(%)	8.9	6.0	4.7	5.7	5.2	-

17. CUDDALORE

The experiment was initiated during 2014-15 with combinations of inorganic fertilizers with micro nutrients and FYM. This experiment was continued in the same undisturbed plots for ratoon crop with three replications. The initial soil status 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 kg NPK ha-1. The second ratoon crop (2016-17) was allowed to grow in the same field from March 2016 with same set of treatments combinations. The data on sprouting count resulted significant variation among the treatments. The application of FYM/Compost (10 t/ha) + bio fertilizers (Acetobacter + PSB) + soil test based NPK

fertilizer application (T9) recorded significantly the highest sprouting of 238690/ha.The application of FYM/Compost (10 t/ha) + bio fertilizers (Acetobacter + PSB) + soil test based NPK fertilizer application (T9) recorded significantly the maximum tiller population of 169520/ha and was on par with T8 application of FYM/Compost (10 t/ha) + bio fertilizers (Acetobacter + PSB) + soil test basedNPK fertilizer which recorded 168960/ha tillers (**Table AS 68.17.1**).

Treatment, T9 recorded significantly highest millable cane population of 136250/ha and was on par with T8 (application of FYM/Compost @ 10 tonnes/ha + bio fertilizers (Acetobacter + PSB) + soil test basedNPK fertilizer) which recorded 132560/ha NMC. The same treatment recorded significantly the maximum individual cane weight (1.48 kg), cane length (277.45 cm) and cane girth (2.72 cm) and was on par with T8. The highest ratoon cane yield (137.26 t/ha) and sugar yield (16.83 t/ha) was recorded with T9 and was on par with (T8) which recorded cane yield (135.62 t/ha) and sugar yield (16.71 t/ha). Similarly, T9 recorded significantly higher Brix (20.48 %), Pole (12.65 %), Purity (88.76 %) and Commercial Cane sugar (12.26 %) and was on par with T8 which recorded Brix (20.56 %), Pole (13.54 %), Purity (88.57 %) and Commercial Cane sugar (12.32 %).

The application of FYM/Compost (10 t/ha) + bio fertilizers (Acetobacter + PSB) + soil test based NPK fertilizer application (T9) recorded the maximum B:C ratio of 3.40 and was on par with T8 application of FYM/Compost @ 10 tonnes/ha + bio fertilizers (Acetobacter + PSB) + soil test based NPK fertilizer which B:C ratio of 3.34 (**Table AS 68.17.2**).

Summary: Application of FYM/Compost @ 10 tones/ha + bio fertilizers (Acetobacter + PSB) + soil test based NPK fertilizer recorded significantly the maximum cane yield (137.26 t/ha), CCS (12.26 %) and sugar yield (16.83) with B:C ratio of 3.40 and it was comparable with treatment (T8) application of FYM/Compost @ 10 tonnes ha-1 + bio fertilizer (Azotobacter + PSB) + 100 % RDF.

Table AS 68.17.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Cuddalore

Treatment	Brix (%)	Pole (%)	Purity (%)	CCS (%)	Cane yield (t/ha)	Sugar yield (t/ha)	B:C ratio
T_1	19.53	12.05	83.25	11.56	65.32	7.55	1.84
T_2	19.56	12.32	85.29	11.68	112.32	13.12	2.98
T_3	19.63	12.46	85.46	11.78	118.56	13.97	3.17
T_4	19.88	12.14	85.23	11.23	98.65	11.08	2.49
T_5	20.12	12.98	86.56	11.68	126.89	14.82	3.03
T_6	20.25	12.99	86.45	11.79	128.95	15.20	3.10
T_7	19.32	12.22	85.35	11.35	108.56	12.32	2.83
T_8	20.48	13.54	88.57	12.32	135.62	16.71	3.34
T_9	20.56	12.65	88.76	12.26	137.26	16.83	3.40
CD (P=0.05)	1.06	NS	4.56	0.62	6.08	0.72	0.10

Table AS 68.17.2: Effect of various treatments on soil health at Cuddalore

Treatment	B.D g/cc	Infiltration rate (cm/hr)	OC (%)	EC (dS/m)	pH	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)
T_1	1.09	1.25	0.32	0.75	6.52	113.26	22.36	128.56
T_2	1.23	1.36	0.35	0.74	6.54	152.63	32.25	142.56
T_3	1.26	1.33	0.39	0.75	7.12	166.32	38.56	162.35
T_4	1.64	1.32	0.76	0.76	7.22	202.36	42.25	173.56
T_5	1.66	1.37	0.77	0.76	7.32	212.32	47.98	179.65
T_6	1.67	1.39	0.78	0.78	7.36	205.38	48.98	182.35
T_7	1.66	1.32	0.75	0.78	7.21	203.85	45.69	185.65
T_8	1.66	1.39	0.75	0.79	7.45	213.24	48.98	187.65
T_9	1.67	1.39	0.78	0.78	7.23	213.52	49.78	188.56
CD(P=0.05)	0.06	0.09	0.02	NS	0.38	9.91	2.22	9.02

18. NAYAGARH

Results obtained from second ratoon crop indicated that application of 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 sprouting at 45 DAR i.e. 39.29 and 41.23%, respectively (**Table AS 68.18.1**). 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 3.06 & 2.44 cm in T8 and 2.96 & 2.57 cm in T9, respectively. The NMC and cane yield were 68.42'000 & 75.03 t/ha in T8 and 69.85'000 & 75.93 t/ha in T9, respectively. This exhibits the positive effect of organic manures and bio fertilizers on cane yield.The soil physico-chemical parameters like BD, pH, EC, organic carbon content as well as available N, P and K content exhibited marked improvement upon application of organic source of plant nutrients (**Table AS 68.18.2**).

Table AS 68.18.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Nayagarh

Treatments		No of shoots (000/ha)		Length of cane (cm)	Girth of cane (cm)	Weight of cane (kg)	NMC (000/ha)	Cane yield (t/ha)
		120 DAP	150 DAP					
T_1	50% RDF	44.26	46.01	2.48	1.58	1.18	53.75	58.22
T_2	100% RDF	52.25	53.29	2.72	1.94	1.28	59.76	65.63
T_3	Soil test based fert. application (NPK)	52.82	54.58	2.96	2.03	1.36	62.22	67.21
T_4	Application of FYM/Compost @ 20t/ha+ 50% RDF	53.77	53.88	2.27	2.14	1.22	60.84	65.44
T_5	Application of FYM/Compost @ 20t/ha+ 100% RDF	54.34	54.77	2.78	2.28	1.36	62.87	68.72
T_6	Application of FYM/Compost @ 20t/ha+ Soil test based fert. application (NPK)	56.56	56.82	2.91	2.33	1.40	63.46	70.46

T_7	Application of FYM/Compost @ 10t/ha+(Azotobacter+PSB)+50% RDF	57.29	58.11	3.12	2.38	1.28	65.88	71.75
T_8	Application of FYM/Compost @ 10t/ha+(Azotobacter+PSB)+100% RDF	61.94	62.62	3.06	2.44	1.43	68.42	75.03
T_9	Application of FYM/Compost @ 10t/ha + Azotobacter + PSB + Soil test based fert application (NPK)	62.88	64.98	2.96	2.57	1.42	69.85	75.93
	CD at 5 %	5.19	7.25	3.93	0.27	0.27	5.64	6.65

Table AS 68.18.2: Effect of treatments on soil health at Nayagarh

Treatment		BD (g/cc)	pH	EC (dS/m)	OC (%)	Available Nutrient (Kg/ha)		
						N	P	K
T_1	50% RDF	1.32	5.8	0.206	0.43	220	14.0	125.0
T_2	100% RDF	1.35	5.6	0.24	0.45	228	18.8	132.6
T_3	Soil test based fert. application (NPK)	1.34	5.6	0.278	0.47	238	20.2	135.7
T_4	Application of FYM/Compost @ 20t/ha+ 50% RDF	1.41	5.8	0.305	0.497	241	21.6	128.2
T_5	Application of FYM/Compost @ 20t/ha+ 100% RDF	1.40	5.9	0.33	0.512	244	22.5	130.5
T_6	Application of FYM/Compost @ 20t/ha+ Soil test based fert. application (NPK)	1.42	5.8	0.328	0.519	245	23.4	132.6
T_7	Application of FYM/Compost@ 10t/ha +(Azotobactor+PSB) + 50% RDF	1.45	5.8	0.322	0.526	251	23.9	130.2
T_8	Application of FYM/Compost@ 10t/ha +(Azotobactor+PSB)+100 % RDF	1.44	6.0	0.311	0.528	255	25.2	134.1
T_9	Application of FYM / Compost @ 10t/ha + Azotobactor + PSB + Soil test based fert application (NPK)	1.43	6.0	0.314	0.516	253	24.8	135.2

NORTH CENTRAL ZONE

19. PUSA

The experimental soil was calcareous, low in organic carbon (0.49%) and available N (244.0 kg/ha) & K (82.4 kg/ha) and medium in P (16.7 kg/ha). The midlate 'BO 154' variety of sugarcane was planted on 08.02.2014 and harvested on 04.03.2015. Then, first ratoon crop was taken which was harvested on 12.01.2016 thereafter second ratoon crop was taken which was harvested on 20.01.2017.

The results indicated that tillers, number of millable canes (NMC) , girth and cane yield were significantly affected due to different treatments but, effect on plant height and single cane weight (SCW) were non-significant (**Table AS 68.19.1**). The tillers ranged from 61330 -109250 and 86270– 149330 /ha at 120 & 150 DAR, respectively while, number of millable canes (NMC) varied from 61250– 108320/ha Table 1. The maximum number of tillers and NMC were recorded in treatment T6 receiving fertilizers on soil test basis alongwith organics @ 20 tonnes/ha and lowest in treatment T1 receiving 50% RDF along with trash @ 10 t/ha. The cane yield was significantly higher in treatment T2 (61.8 t/ha) receiving 100% RDF and T3 (64.2 t/ha) in which fertilizer on based on soil test basis over T1 (37.3) having 50% RDF along with trash @ 10 t/ha in each treatment. Addition of organics @ 20 & 10 t/ha alongwith fertilizers further increased the cane yield. The highest cane yield (80.2 t/ha) was recorded in treatment T6 followed by T5 (79.0 t/ha) which was significantly higher over T2. The cane juice quality viz. brix, sucrose and purity percent was not affected due to different treatments. However, Sugar yield and nutrient uptake (N, P & K t/ha) followed the similar trend of cane yield. The uptake of N, P & K by second ratoon crop ranged from 107.5 - 267.3, 7.31 – 21.70 and 100.2 – 253.3 kg/ha while, sugar yield varied from 4.13 – 8.91 t/ha. The maximum nutrient uptake of NPK and sugar yield was noticed in T6 while, lowest in T1. The post-harvest soil showed significant improvement in available soil nutrients viz. N, P, K, treated plots over control. The available N, P, K ranged from 252.2 – 316.1, 15.07 – 21.10, and 76.65 – 89.57 kg/ha. The highest N, P, K was recorded in T6 and lowest in control. Integration of nutrients with compost @ 20 & 10 t/ha significantly improved the organic carbon of the post-harvest soil over inorganics alone. The organic carbon in compost added soil ranged from 0.56 - 0.61%. However, the integration of nutrients had not significant effect on pH and EC (**Table AS 68.19.2**).

Summary: Integrated application of nutrients was found effective in improving soil fertility and second ratoon cane yield. The application of fertilizers on soil test i.e. 170 kg N, 50 kg P_2O_5 and 80 kg K_2O alongwith organics (20 t/ha) was found suitable for boosting ratoon cane yield and maintaining soil fertility in calcareous soil of Bihar.

Table AS 68.19.1: Performance of second ratoon crop as influenced due to nutrient management in plant-ratoon system at Pusa

Treatment	Nutrient status on post-harvest soil					
	pH	EC (dS/m)	Org. C (%)	Avail. N (Kg/ha)	Avail. P (Kg/ha)	Avail. K (Kg/ha)
T_1	8.21	0.27	0.52	246.2	15.07	66.65
T_2	8.20	0.29	0.54	262.6	17.93	80.98
T_3	8.20	0.27	0.53	261.8	18.13	81.98
T_4	8.16	0.28	0.56	300.1	19.60	80.31
T_5	8.14	0.28	0.59	309.7	20.00	84.95
T_6	8.16	0.29	0.61	316.1	21.10	89.32
T_7	8.14	0.28	0.55	286.9	17.60	81.53
T_8	8.16	0.28	0.59	298.2	18.20	85.02
T_9	8.17	0.28	0.60	300.5	19.00	89.57
SEm ±	0.04	0.01	0.01	9.3	0.79	1.61
CD (P=0.05)	NS	NS	0.03	28.3	2.39	4.88
CV (%)	0.88	7.01	3.8	5.6	7.40	3.36

Table AS 68.19.2: effect of treatments on soil health at the end of plant-ratoon cycle at Pusa

Treatment	Tillers ('000/ha)		Plant height (cm)		NMC ('000/ha)	Girth (cm)	SCW (g)	Cane yield (t/ha)
	120 DAR	150 DAR	150 DAR	180 DAR				
T_1	61.33	86.27	176	225	61.25	1.96	610	37.3
T_2	115.25	131.47	199	234	96.00	1.99	637	61.8
T_3	119.50	138.33	208	245	100.24	2.11	650	64.2
T_4	95.33	113.73	188	229	88.10	2.15	704	61.9
T_5	108.50	142.47	207	245	107.45	2.21	736	79.0
T_6	107.00	149.33	208	248	108.32	2.36	740	80.2
T_7	87.75	104.87	186	234	76.18	2.16	723	54.8
T_8	102.75	135.60	201	253	98.39	2.20	734	72.2
T_9	109.25	136.33	193	240	100.54	2.11	710	71.4
SEm ±	7.69	8.72	12.8	14.6	7.96	0.05	40.7	5.6
CD (0.05)	23.24	23.37	NS	NS	24.08	0.15	NS	16.8
CV (%)	13.22	11.94	11.3	10.6	14.84	4.13	10.2	14.9

20. SEORAHI

The experimental field was medium in organic carbon (0.57), medium in available phosphorus (18.30 kg/ha) and low in potash (102.29 kg/ha) with pH 8.34. Ratoon crop was started from 21 Feb -2016 and harvested on 02 Jan-2017. Application of FYM (10 t/ha) + bio-fertilizers (Azotobacter + PSB) + soil test basis (NPK Application) resulted in significantly higher clumps (32.82 thousand /ha), shoot population (94.75 thousand /ha) and cane yield (75.93 t/ha) as compared to other treatments but at par with T8 treatment (**Table AS 68.20.1**). NMC was produced significantly higher with T9 treatment (92.69 thousand /ha) but at par with T6 (88.99 thousand /ha). T6 treatment obtained significantly higher sucrose per cent over T1, T4 and T7 treatments.

Summary: Application of FYM (10 t/ha) + bio-fertilizer (Azotobacter + PSB) + soil test basis (NPK Application) produced significantly higher cane yield. Sucrose percent was recorded significantly higher in application of FYM (20 t/ha) + inorganic nutrient application based on soil test.

Table AS 68.20.1: Performance of ratoon crop as influenced due to nutrient management in plant-ratoon system at Seorahi

Treatment	Clump (000/ha)	Shoot (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Sucrose (%)
T1	25.00	74.38	73.76	57.51	16.96
T2	25.72	75.62	74.79	58.85	17.05
T3	27.47	78.81	77.88	60.90	17.27
T4	28.50	84.46	83.64	64.71	17.00
T5	31.17	92.90	91.77	70.78	17.62
T6	30.35	90.23	88.99	70.27	18.04
T7	29.94	84.67	83.74	65.84	16.90
T8	32.30	93.83	72.84	73.15	17.08
T9	32.82	94.75	92.69	75.93	17.64
SEm±	0.68	1.67	3.76	0.99	0.33
CD(P=0.05)	2.06	5.02	11.29	2.98	0.99

NORTH EASTERN ZONE

21. BURALIKSAON

The ratoon crop was initiated on 13th April, 2016 and harvested on 18th January, 2017. 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 5.13. In the second year ratoon crop, application of FYM (10 t/ha) along with bio-fertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield (44.79 t/ha) which is statistically at par with application of FYM (10 t/ha) along with bio-fertilizer (Azotobacter + PSB) and 100% RDF (44.09t/ha) and the yield recorded by application of FYM (20 t/ha) along with soil test based fertilizer (40.39t/ha) respectively (**Table AS 68.21.1 &2**) .

Table AS 68.21.1: Performance of ratoon crop as influenced due to nutrient management in plant-ratoon system at Buraliksaon

Treat-ment	Plant Population 45DAI	No. of shoots (000/ha) 120DAI	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Cane yield (t/ha)	Sucrose (%)	CCS (%)
T_1	58.01	62.30	39.35	2.00	2.30	27.08	17.14	12.33
T_2	63.42	67.24	48.84	2.14	2.34	34.14	17.40	12.56
T_3	66.20	71.64	49.31	2.14	2.40	35.07	17.52	12.65
T_4	70.02	74.30	46.18	2.25	2.43	34.83	17.33	12.50
T_5	63.54	70.13	50.22	1.83	2.36	36.62	17.45	12.40
T_6	72.80	78.12	60.41	2.34	2.48	40.39	17.52	12.52
T_7	65.28	71.29	51.04	2.08	2.41	37.27	17.31	12.47
T_8	79.51	85.64	60.24	2.32	2.48	44.09	17.63	12.40
T_9	81.13	89.58	62.95	2.34	2.52	44.79	17.65	12.40
CD 5 %	7.14	7.22	9.43	0.17	0.06	8.10	0.18	0.18

Table AS 68.21.2: Effect of treatments on economics of sugarcane cultivation at Buraliksaon

Treatments	Cost of cultivation/ha (Rs)	Gross return/ha (Rs)	B:C
Trash + 50% RDF	65,475.00	94780	1.45
Trash + 100% RDF	79,725.00	119490	1.50
Trash + soil test based RD	81,625.00	122745	1.50
FYM @20 tonnes/ha + 50% RDF	106,475.00	121905	1.14
FYMt@20 tonnes/ha + 100% RDF	120,725.00	128170	1.17
FYM/Compost@20 tonnes/ha + soil test basis	122,625.00	141365	1.06
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 50% RDF	88,025.00	130445	1.50
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF	101,025.00	154315	1.55
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test basis.	102875.00	156765	1.52

IMPORTANT OBSERVATIONS:

The experiment was carried out at 21 stations out of allotted 24. Following salient points emerged from findings:

- Combined application of organic and inorganic sources of nutrients was found conspicuously better over the use of fertilizers alone across the centres located in different agro-climatic conditions.
- Sugarcane trash used as mulch in ratoon crops has little contribution as a source of nutrients as organic amendments like FYM or compost recorded significant improvement in cane and sugar yield over that with trash mulching under the use of recommended dose of fertilizers across the locations.
- Use of organic sources of nutrients in plant ratoon system brings about substantial enhancement of soil health parameters in most of the sugarcane growing soils.

PROJECT No. : AS 69

Title: Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane

Objectives

1. To accelerate rate and extent of sugarcane germination through the use of PGRs
2. To assess the effect of PGRs on sugarcane growth, yield and juice quality

Year of Start	**:**	2015-16
Year of Completion	**:**	2017-18
Participating centres	**:**	All centres

Treatments*(8) **:**

1. Conventional planting/ Farmers' practice (3-bud setts)
2. Planting of setts after overnight soaking in water
3. Planting of setts after overnight soaking in 50 ppm ethrel solution
4. Planting of setts after overnight soaking in 100 ppm ethrel solution
5. T_1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP
6. T_2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP
7. T_3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP
8. T_4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP

Design **:** Randomized Block Design

Replication **:** 3

Observations to be recorded **:**

1. Germination count at 10 days interval starting from 10 DAP and up to 50 DAP
2. Monthly tiller/ shoot count beginning 90 DAP
3. Leaf area and biomass accumulation (above ground plant dry weight) at monthly interval starting from 90 DAP
4. Plant height at monthly interval
5. Root dry weight at 50, 120 and 180 DAP
6. Yield attributes and yield
7. Juice quality and CCS parameters

SUMMARY OF RESULTS OBTAINED DURING LAST YEAR (2015-16)

The trial was initiated during 2015-16 with an objective to assess the response of sugarcane crop to plant growth regulators for improvement in germination, growth and yield of the crop. The trial was allocated to all the centres however, only 20 centres conducted the trial. Centre wise summary is given below.

NORTH WEST ZONE

1. FARIDKOT

Germination of sugarcane was better with treating the setts by 100 ppm ethrel solution than no treatment. The highest cane yield (82.8 t/ha) was observed in T_8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA_3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than all other treatments except T_7, T_4 and T_3.

2. KOTA

Planting of setts after overnight soaking in 100 ppm ethrel solution + GA_3 spray at 90,120,150 DAP was found effective for increasing dry matter production, leaf area, root dry weight, NMC (1,45,330/ha), cane weight (857 g/plant), cane yield (98.77 t/ha),^{o} Brix (21.10 %), sucrose (18.59 %), CCS (12.84 %), CCS (12.68 t/ha) and purity (88.09 %), GR and NR (Rs 2,46,917 and 1,31,467 /ha) which was significantly superior over T_1 and T_2 treatments.

3. KAPURTHALA

Germination of sugarcane under the treatments, where setts were soaked in water and ethrel solution was significantly better than the treatment where no soaking was done. There was improvement in germination when soaked in ethrel solution than soaking only in water but the differences were non-significant. The highest cane yield (82.8 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA_3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than all other treatments except T_7, T_6, T_4 and T_3.

4. LUCKNOW

The experiment on use of plant growth regulators (PGRs) on yield and quality of sugarcane conducted during 2015-16 at IISR, Lucknow revealed that planting of three budded setts after overnight soaking in 100 ppm ethrel solution and GA_3 (35 ppm) spay at 90,120 and 150 days after planting resulted early cane sett germination in sugarcane and enhanced cane yield (96.67 t/ha) over the conventional planting (74.11 t/ha) without affecting the cane juice quality.

5. PANTNAGAR

Germination hastened (20 days earlier than conventional) in case if sugarcane setts being soaked overnight in 100 ppm ethrel. Cane yield and commercial cane sugar yield

were higher in the treatment with overnight sett soaking in ethrel @ 100 ppm followed by GA_3 spray @ 35 ppm applied at 90, 120 and 150 DAP.

6. SHAHJAHANPUR

Planting of setts after overnight soaking in 100 ppm ethrel solution + GA (35 ppm) resulted in significantly higher leaf area , root dry weight , plant height , tillers, millable canes and cane yield than that of other treatments. Germination (%) recorded at different stages under overnight soaking in 100 ppm ethral solution were significantly superior to conventional and overnight soaking in water but it was at par with overnight soaking in 50 ppm ethrel solution.

7. UCHANI

Soaking of sugarcane setts in water or 50 ppm or 100 ppm ethrel solutions resulted in significant increase in sugarcane germination, tillers, millable canes and cane and sugar yield over conventional practice. Spraying of GA_3 (35 ppm) resulted in significant increase in number of millable canes, cane and sugar yield in comparison to their untreated treatments. Treatments T_7 and T_8 being at par produced significantly higher number of tillers, NMC, cane yield and sugar yield.

8. SRIGANGANAGAR

Soaking of sugarcane setts in water or 50 or 100 ppm ethrel solutions resulted in significant increase in sugarcane germination, millable canes and cane yield over farmers/conventional practice. The application of GA_3 (35 ppm) resulted in significant increase in number of millable canes and cane yield as compared to their untreated treatments. The overnight soaking with 100 ppm ethrel solution recorded at par cane yield with 50 ppm ethrel solution.

PENINSULAR ZONE

9. PADEGAON

Germination at 30, 40, and 50 DAP (22.94%, 37.31%, and 45.72%,) was found significantly higher with planting of setts after overnight soaking in 50 ppm ethrel solution (T_3) while it was found at par with treatments T_7, T_4, T_8 and T_6. Planting of setts after overnight soaking in 50 ppm ethrel solution with GA_3 spray (35 ppm) at 90, 120 and 150 DAP (T_7) recorded significantly the highest cane and CCS yield (132.33 and 20.13 t/ha). However, it was at par with planting of setts after overnight soaking in 100 ppm ethrel solution and GA_3 spray (35 ppm) at 90, 120 and 180 DAP (129.07 and 18.90 t/ha), planting of setts after overnight soaking in water with GA_3 spray (35 ppm) at 90, 120 and 150 DAP (126.07 and 18.57 t/ha), planting of setts after overnight soaking in 50 ppm ethrel solution (124.53 and 18.54 t/ha) and planting of setts after overnight soaking in 100 ppm ethrel solution (125.27 and 18.37 t/ha).

10. NAVSARI

Germination (%) at 10 and 50 DAP was recorded significantly highest with treatment T_4 (planting of setts after overnight soaking in 100 ppm ethrel solution) over

other treatments and remained at par with treatment T_3 and T_8. However, at 20, 30 and 40 DAP it was recorded significantly highest with treatment T_3 that remained at par with T_4.NMC (110.19 x 000 ha^{-1}) was significantly higher with treatment T_2 and remained*at par* with almost all the treatments except T_1& T_3. Cane length at harvest was recorded significantly highest with treatment T_2 over other treatments and remained at par with T_8, T_6, T_3 and T_7. Significantly highest Cane yield (126.03 t ha^{-1}) was noticed with treatment T_2 (planting of setts after overnight soaking in water) but remained at par with T_4, T_8, T_7, and T_6 over T_1, T_3 and T_5.

11. MANDYA

Overnight soaking of setts in 50 or 100% ethrel solution followed by 35 ppm GA3 spray at 60, 120 and 150 DAP found to enhance the germination percentage and cane yield.

12. POWARKHEDA

The cane yield (t/ha) increased significantly due to planting of setts after overnight soaking in 50 ppm ethrel solution (129.22 t/ha) as compared to T_6 (120.37), T_2 (120.68), T_5 (121.50) and conventional planting/Farmers practice (3- bud setts) (121.71).

13. PUNE

The results of the first plant crop indicated that, highest germination (63.66%) at 30 DAP, tillering (1.04 lac/ha) at 120 DAP, NMC (0.73 lac/ha),cane girth (12.08 cm),single cane weight (1.76 kg),CCS (13.75 %), cane yield (137.50 t/ha) and B:C ratio (2.44) was recorded when the setts were overnight soaked in 100 ppm ethrel before planting and foliar spraying of GA_3 (35ppm) at 90,120 &150 DAP followed by cane yield of 127.50 t/ha in overnight soaking of setts in 50ppm ethrel and spraying of GA_3 (35ppm).

14. THIRUVALLA

The highest germination percentage and tiller population were recorded with T_8 (T_4 +GA_3 spray (35ppm) at 90,120 and 150 DAP) and the lowest value for the above parameters were recorded by T_2 (planting of setts after overnight soaking in water). Highest cane length (256.00 cm), MCC (91450 /ha), cane yield (115.72 t/ha) were recorded under T_8. Sugar yield also showed same trend and recorded significantly higher value (13.38 t/ha) for the very same treatment (T_8). This was closely followed by T_4 (planting of setts after overnight soaking in 100 ppm ethrel solution. BC ratio of 1.40 was also recorded by T_8.

15. SANKESHWAR

The higher germination count, cane height, number of internodes among the growth parameters and higher cane yield, cane girth, NMC, CCS yield and single cane weight among the yield and yield attributing parameters clearly indicates the benefit of

overnight soaking of setts in 50 ppm ethrel solution before planting as it was beneficial without altering the quality parameters.

EAST COAST ZONE

16. ANAKAPALLE

Results indicated that significantly higher cane yield was recorded in planting of setts after overnight soaking in 100 ppm (92.0 t/ha) or 50 ppm ethrel solution (90.6 t/ha) followed by spraying of GA_3 at 90,120 and 150 days after planting (90.6 t/ha). Conventional 3 budded sett planting recorded significantly lower cane yield of 80.0 t/ha.

17. CUDDALORE

Adoption of overnight soaking of setts in 100 ppm ethrel solution along with GA_3 (35 ppm) spray at 90, 120 and 150 DAP recorded the maximum millable canes and cane yield.

18. NAYAGARH

Planting of setts after soaking in 100 ppm ethrel solution along with GA_3 spray at 90, 120 and 150 DAP performed better with highest number of millable canes (82.47 th/ha), cane yield (114.45 t/ha) and CCS yield (11.45 t/ha). The treatment next in order was T_7 where planting of setts was done after soaking in 50 ppm ethrel solution along with GA_3 spray at 90, 120 & 150 DAP produced NMC of 81.37 ('000 /ha) with cane and CCS yield of 111.26 and 10.84 t/ha, respectively.

NORTH CENTRAL ZONE

19. PUSA

Planting of setts after overnight soaking in 50 ppm ethrel solution + GA_3 spray (35 ppm) at 90, 120 and 150 DAP (T_7) produced higher cane yield (103.2 t/ha) followed in order by planting of setts after overnight soaking in 100 ppm ethrel solution + GA_3 spray (35 ppm) at 90, 120 and 150 DAP (T_8).

NORTH EASTERN ZONE

20. BURALIKSON

Planting of setts after overnight soaking in water (T_2), or overnight soaking in 50 ppm ethrel solution (T_3), or overnight soaking in 100 ppm ethrel solution(T_4) significantly increased the germination (%) over conventional planting (T_1). Likewise, in terms of cane yield all the treatments recorded significantly the higher cane yield than conventional planting. Out of all treatments, planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA_3 (35ppm) at 90,120 and 150 DAP recorded significantly the highest cane yield (63.7 t/ha) which is statistically at par with the cane yield (63.3 t/ha) recorded by the treatments T_6 ((63.3 t/ha), T_7 (59.7t/ha), T_2 (57.3 t/ha) respectively.

CURRENT YEAR (2016-17) REPORT

NORTH WESTERN ZONE

1. FARIDKOT

Germination of sugarcane (Co 118) was better with treating the seed by 50 and 100 ppm ethrel solution than control (**Table AS 69.1.1**). Ethrel helped in advancing the germination process helping in higher germination at early stage. The highest cane yield (107.6 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA_3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than T1, T2 and T5 (**Table AS 69.1.2**).

Table AS 69.1.1: Influence of PGR on germination in sugarcane at Faridkot

Treatment	20 DAP	30 DAP	40 DAP	50 DAP	60 DAP
T_1	2.26	21.03	26.77	28.63	32.27
T_2	21.03	33.52	41.10	45.50	46.37
T_3	37.43	40.65	45.90	51.07	51.77
T_4	33.67	37.19	45.60	48.63	51.07
T_5	2.07	22.62	28.73	30.97	31.93
T_6	20.80	38.17	42.17	45.83	47.20
T_7	27.80	41.52	46.93	51.90	52.97
T_8	33.03	36.15	43.83	49.13	49.47
CD (5%)	5.18	5.94	5.4	5.62	6.05

Table AS 69.1.2: Influence of PGR on sugarcane growth and yield at Faridkot

Treatment	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)	CCS %	CCS t/ha
T_1	112.2	73.6	234	2.63	1699	83.1	18.02	12.43	10.32
T_2	123.6	83.6	252	2.67	1737	93.3	18.08	12.64	11.77
T_3	129.4	90.8	258	2.80	1796	99.6	18.00	12.70	12.64
T_4	127.5	92.8	252	2.91	1850	104.0	17.55	12.39	12.87
T_5	114.4	80.6	255	2.85	1799	89.3	17.71	12.50	11.18
T_6	138.6	87.2	259	2.90	1873	97.8	18.07	12.72	12.46
T_7	143.9	97.5	263	2.82	1834	101.8	17.92	12.33	12.53
T_8	142.5	98.6	265	2.91	1849	107.6	18.19	12.66	13.62
CD (5%)	21.1	8.5	NS	NS	NS	13.6	NS	NS	2.11

2. KOTA

A field experiment was planted on 7th March, 2016 to accelerate rate and extent of sugarcane germination, growth, yield and juice quality through the use of PGRs. Sugarcane variety CoPK 05191 was planted at 75 cm row distance, keeping 3 budded 4 setts per meter row length. Uniform application of RDF was applied and cultural operations were followed as per recommendation as and when desired. Significant variation on germination was observed at all the germination stages with the application of Ethrel treatments. Significant enhancement in percent germination at 10, 30, 40, and 50 DAP, was recorded with the planting of setts after overnight soaking in 50 ppm ethrel solution along with spray of GA3 at 90,120,150 DAP treatment over T1, T2, T5 and T6 and at par with the rest of treatments. Whereas, significantly higher germination at 20 DAP was observed under T8 treatment. Tillers count significantly increased at all the stages under the treatment planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP over T1, T2, T5 and T6 and at par with the rest of treatments. Gibberellic acid stimulated cane growth cell elongation, stem growth as well as root growth and helped in extensive root system development. This treatment had also significant effect on leaf area (cm^2/plant) over T1, T2, T3 and T4 and at par with rest. Whereas, significantly higher leaf area at harvest (389.73cm^2/plant) was also observed under the same treatment. Dry matter accumulation in the sugarcane at 120,150 and 180 DAP significantly increased by the application of planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP treatment over T1 and T2 and at par with the rest. While Dry matter accumulation at early growth (90 DAP) and harvest stage, recorded significantly higher under the same treatment over T1, T2, T5 and T6 and at par with the rest of treatments. Hence DMA in sugarcane took place with faster rate after 90 upto 180 DAP. Thereafter, the rate of accumulation reduced drastically at harvest under either control or no use of ethrel and GA3 treatment. Application of planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP treatment had significant effect on plant height at all the stages over T1, T2,and T5,whereas recorded significantly higher plant height (257.73cm) at harvest only over T1, T2 and at par with the rest of treatments. Root dry weight significantly increased at 50 and 120 DAP by the application of planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP over T1, T2,and T5, and at par with the rest. Whereas, significantly higher root dry weight at 180 DAP and at harvest, recorded under the same treatment over T1, T2, T3, T5 and T6 and at par with rest. Data revealed that significantly higher NMC (1,45,330/ha), cane weight (855g/plant), cane yield (98.17 t/ha), ^{o}Brix (21), sucrose (18.48 %), CCS (12.76 %), CCS (12.52 t/ha) and purity (88.02%) were obtained with the application of planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP over T1 and T2 treatments and at par with rest of treatments. It is an eco-friendly chemical and has tremendous potential to augment cane yield and sugar productivity. The main effects of applying ethrel to sugarcane as a ripener are to the increase sucrose

percent, cane and juice purity without producing a noticeable effect on stalk mass within treatments (**Table AS 69.2.1**).

There were differences in cost of cultivation, GR, NR owing to different treatment cost. The higher GR and NR recorded with application of T8 treatment which was significantly higher over T1 and T2 and at par with rest of treatments. Significantly the highest BCR recorded in T4 treatment over T1, T2, T 5 and T6 and at par with rest. However, maximum cane production cost (Rs1, 15,450 /ha) recorded in T8 treatment owing to higher cost of GA3 including spray labour cost. Whereas, lowest production cost, GR and NR recorded in T1 (**Table AS 69.2.2**).

Summary: Among treatment combination of PGR, planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP treatment was found excellent for increasing DMA, leaf area, root dry weight, NMC, cane weight, cane yield ,^{o}Brix, sucrose , CCS % , CCS yield and purity , GR and NR which was significantly superior over T1 and T2 treatments and at par with rest of treatments. Whereas, significant enhancement in germination at 10, 30, 40, and 50 DAP, recorded with the planting of setts after overnight soaking in 50 ppm ethrel solution over T1, T2, T5 and T6 and at par with the rest of treatments during both the years.

Table AS 69.2.1: Influence of PGR on germination in sugarcane at Kota

Treatment	**Germination (%)**				
	10 DAP	**20 DAP**	**30 DAP**	**40 DAP**	**50 DAP**
T_1 : Conventional planting / Farmers' practice (3-bud setts)	5.23	18.02	37.57	43.10	46.80
T_2 : Planting of setts after overnight soaking in water	5.67	18.56	39.23	43.77	47.13
T_3 : Planting of setts after overnight soaking in 50 ppm ethrel solution	6.49	20.26	43.48	47.80	53.63
T_4 : Planting of setts after overnight soaking in 100 ppm ethrel solution	6.98	20.35	43.62	47.40	52.97
T_5 : T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	5.83	19.40	39.03	43.63	47.80
T_6 : T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	5.88	19.70	39.13	43.37	48.13
T_7 : T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	7.24	21.72	44.25	49.13	55.38
T_8 : T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	7.09	21.87	44.15	48.70	54.75
CD (P=0.05)	1.50	2.12	4.72	4.50	6.00

Table AS 69.2.2: Influence of PGR on sugarcane growth and yield at Kota

Treatment	NMC (000/ ha)	Cane weight (g)	Cane yield (t/ha)	Brix (%)	Sucrose (%)	CCS (%)	CCS (t/ha)	Purity (%)
T_1	124.53	700.00	78.67	19.23	16.66	11.41	9.01	86.58
T_2	125.33	698.33	79.77	19.26	16.69	11.44	9.15	86.65
T_3	136.20	817.83	91.43	20.25	17.71	12.19	11.15	87.44
T_4	139.67	824.50	92.33	20.38	17.85	12.29	11.35	87.56
T_5	136.53	798.20	89.67	20.53	18.00	12.40	11.13	87.67
T_6	138.07	809.20	90.77	20.60	18.07	12.45	11.29	87.72
T_7	145.40	850.87	96.97	20.93	18.42	12.71	12.32	87.97
T_8	146.53	855.20	98.17	21.00	18.48	12.76	12.52	88.02
CD (P=0.05)	15.01	103.20	12.12	1.20	1.30	0.90	1.75	0.95

3. KAPURTHALA

Germination of sugarcane under the treatments, where setts were soaked in water and ethrel solution, was significantly better than the treatment where no soaking was done. There was improvement in germination when soaked in ethrel solution than soaking water but the differences were non-significant (**Table AS 69.3.1**). The highest cane yield (97.8 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better thanT1, T2 & T5 and was at par with others (Table AS 69.3.2). The number of shoots (121.5 thousands/ha), millable canes (95.8 thousand /ha) and single cane wt. (1467 g) was also higher in T8 than other treatments (**Table AS 69.3.2**).

Table AS 69.3.1: Germination (%) of sugarcane under various treatments at Kapurthala

Treatment	20 DAP	30 DAP	40 DAP	50 DAP	60 DAP
T_1	5.2	15.2	23.5	28.4	30.6
T_2	11.9	18.0	24.6	30.5	34.6
T_3	9.3	17.8	25.0	30.9	35.3
T_4	10.8	18.4	25.9	30.4	35.2
T_5	5.4	16.3	25.0	28.2	31.2
T_6	11.7	18.6	25.2	30.1	34.2
T_7	10.4	18.9	25.9	30.9	35.9
T_8	11.6	19.8	26.3	31.3	36.0
CD (5%)	2.9	2.2	NS	1.7	2.8

Table AS 69.3.2: Growth, yield and quality of Sugarcane under various treatments at Kapurthala

Treatments	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane girth (cm)	Single cane wt. (g)	Cane yield (t/ha)	Pol (%)
T_1	102.7	86.5	245	2.52	1389	82.4	18.87
T_2	111.1	95.7	247	2.48	1400	90.6	18.69
T_3	114.1	95.2	247	2.61	1456	93.3	18.96
T_4	112.7	95.7	255	2.52	1467	95.2	19.00
T_5	102.3	87.0	259	2.43	1422	89.9	18.99
T_6	118.3	93.2	259	2.51	1406	94.7	19.10
T_7	118.9	94.8	262	2.53	1411	95.6	19. 00
T_8	121.5	95.8	270	2.46	1467	97.8	19.07
CD (5%)	8.3	5.8	NS	NS	51	6.0	NS

4. LUCKNOW

A field experiment was conducted for performance evaluation of plant growth regulators (PGRs) on yield and quality of sugarcane. Soaking of cane setts with 100 ppm ethrel solution recorded significantly higher cane setts germination at 20, 30, 40 and 50 DAP (**Table AS 69.4.1**). Whereas, the soaking of cane setts with 50 ppm ethrel solution recorded statistically at par results of cane sett germination as it were achieved in 100 ppm ethrel soaked cane setts treatment at 20, 30, 40 and 50 DAP. The both 100 and 50 ppm ethrel soaked treatments were significantly superior over the water soakedas well as with control treatments at 20, 30, 40 and 50 DAP. The significantly higher cane length 289.4 cm, single cane weight 1247 g, number of millable canes 129.34 thousands/ha and cane yield 98.17 t/ha was recorded in planting of cane setts after overnight soaking in 100 ppm ethrel solution and three GA3 (35 ppm) spray at 90, 120 and 150 days after planting of cane setts (**Table AS 69.4.2**). However, the cane diameter was not significantly influenced by the different plant growth regulator treatments.

Summary: The findings during 2016-17 revealed that planting of three budded cane setts after overnight soaking in 100 ppm ethrel solution and three GA3 (35 ppm) spay at 90, 120 and 150 DAP resulted early cane setts germination and enhanced the cane yield to 98.17 t/ha over the conventional planting treatment cane yield 80.67 t/ha without affecting the cane juice quality.

Table AS 69.4.1: Germination (%) of sugarcane under various treatments at Lucknow

Treatment	Germination (%)				
	10 DAP	20 DAP	30 DAP	40 DAP	50 DAP
Conventional planting	0.0	1.67	10.33	18.44	26.44
Planting of setts after overnight soaking in water	0.0	13.78	27.44	31.67	35.11
Planting of setts after overnight soaking in 50 ppm ethrel solution	0.0	20.89	33.78	37.67	43.56
Planting of setts after overnight soaking in 100 ppm ethrel solution	0.0	21.00	34.11	38.67	43.89
T1 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	0.0	1.78	13.44	20.67	27.44
T2+ GA3 Spray (35ppm) at 90, 120 and 150 DAP	0.0	13.00	26.89	32.33	34.89
T3 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	0.0	19.00	32.67	37.22	42.89
T4 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	0.0	20.33	33.22	36.33	43.22
CD (P=0.05)	NS	5.24	4.45	4.32	4.86

Table AS 69.4.2: Growth, yield and quality of Sugarcane under various treatments at Lucknow

Treatment	Cane length (cm)	Cane diameter (cm)	Cane weight (g)	NMC (000/ha)	Cane Yield (t/ha)	Sucrose (%)
Conventional planting	266.1	2.20	1053	105.33	80.67	17.53
Planting of setts after overnight soaking in water	266.4	2.22	1067	113.62	82.70	17.59
Planting of setts after overnight soaking in 50 ppm ethrel solution	269.3	2.23	1193	123.97	94.64	17.41
Planting of setts after overnight soaking in 1000 ppm ethrel solution	271.5	2.24	1240	125.34	96.05	17.50
T1 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	274.6	2.24	1080	107.37	82.33	17.61
T2+ GA3 Spray (35ppm) at 90, 120 and 150 DAP	282.5	2.26	1120	114.01	85.15	17.80
T3 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	287.7	2.30	1207	126.35	96.77	17.50
T4 + GA3 Spray (35ppm) at 90, 120 and 150 DAP	289.4	2.34	1247	129.34	98.17	17.43
CD (P <0.5)	NS	NS	138.9	11.23	8.71	NS

5. PANTNAGAR

Sugarcane (Co Pant 3220) was planted on 22.03.2016 in flat bed planting in 75 cm apart rows. Highest germination% (49.0%) was recorded at 50 DAP in the treatments T4 and T8 in which sugarcane setts were dipped in the ethrel solution (100 ppm)

overnight. Germination (%) hastened in the treatment of ethrel 50 or 100 ppm soaking overnight from 10 DAP and enhanced till 20, 30 and 40 DAP. Germination % also improved 20 DAP onwards with water soaking of setts. Low and delayed germination was observed in conventional method (no treatment). Higher germination (45%) over conventional was recorded at 50 DAP withethrel 100 ppm overnight soaking. Germination under 100 ppm ethrel was significantly higher than that under ethrel 50 ppm (**Table AS 69.5.1**).

Highest cane yield (110.6 t/ha) was recorded where setts were soaked overnight in the solution of ethrel 100 ppm + GA3 spray (35 ppm) sprayed at 90, 120 and 150 DAP. However, there was no significant difference in the treatment T4 (only ethrel 100 ppm soaking setts overnight), T8 (ethrel 100 ppm fb GA3 (35 ppm) applied at 90, 120 and 150 DAP) and T7 (ethrel 50 ppm fb GA3 (35 ppm) at 90, 120 and 150 DAP. Higher cane yield was the result of higher and hasten germination of setts, resulted higher shoot population at all the stages of crop growth, cane girth, length of the stalk and ultimately heavier cane (higher cane weight). Similar NMC were recorded in the treatments T8, T4 and T7.Commercial cane yield (CCS t/ha) was recorded highest (11.3) in treatment T4 which was significantly higher over rest of the treatments except T6, T7 and T8 (**Table AS 69.5.2**).

Summary: Higher germination, higher shoot population, higher NMC, higher cane weight and longer canes were recorded in the treatment T4 (soaking of setts inethrel100 ppm solution)and T8 (T4 + GA3 35 ppm sprayat 90, 120 and 150 DAP). Germination also improvedthroughovernight sett soaking with water.

Table AS 69.5.1: Germination (%) of sugarcane under various treatments at Pantnagar

Treatment	Germination % (DAP)				
	10	**20**	**30**	**40**	**50**
T_1-Conventional (No treatments)	0.0	2.8	10.4	17.6	22.1
T_2-Overnight soaking of setts in water	0.0	24.3	18.1	32.7	35.3
T_3- Overnight soaking of setts in 50 ppm ethrel	4.5	26.4	30.2	35.4	41.0
T_4- Overnight soaking of setts in 100 ppm ethrel	7.4	39.1	45.0	47.9	49.0
T_5- T_1 + GA_3 spray @35 ppm 90, 120, 150 DAP	0.0	2.5	17.3	18.6	28.3
T_6- T_2 + GA_3 spray @35 ppm 90, 120, 150 DAP	0.5	25.6	31.5	36.7	39.4
T_7- T_3 + GA_3 spray @35 ppm 90, 120, 150 DAP	5.0	28.0	37.5	42.8	48.9
T_8- T_4 + GA_3 spray @35 ppm 90, 120, 150 DAP	8.6	31.5	42.9	47.7	49.5
SEm±	0.3	1.1	2.7	1.2	0.9
CD at 5 %	1.0	3.2	7.9	3.6	2.7

Table AS 69.5.2: Growth, yield and quality of Sugarcane under various treatments at Pantanagar

Treatment	NMC (000/ha)	Cane length (cm)	Cane girth (cm)	Individual cane weight (g)	Cane yield (t/ha)	Sucrose %	CCS (t/ha)
T_1-Conventional (No treatments)	68.0	203.3	9.3	1000.0	81.2	15.9	8.3
T_2-Overnight soaking of setts in water	69.1	215.7	9.7	1300.0	84.1	16.3	9.0
T_3- Overnight soaking of setts in 50 ppm ethrel	77.5	219.7	9.7	1366.7	94.0	16.4	9.6
T_4- Overnight soaking of setts in 100 ppm ethrel	81.2	266.0	10.7	1400.0	109.3	16.7	11.3
T_5- T_1 + GA_3 spray @35 ppm 90, 120, 150 DAP	76.2	201.7	9.7	1083.0	83.0	16.4	8.9
T_6- T_2 + GA_3 spray @35 ppm 90, 120, 150 DAP	77.2	216.3	9.8	1233.3	95.0	16.6	10.2
T_7- T_3 + GA_3 spray @35 ppm 90, 120, 150 DAP	78.7	245.7	10.2	1400.0	102.5	16.4	10.8
T_8- T_4 + GA_3 spray @35 ppm 90, 120, 150 DAP	81.5	251.7	10.8	1500.0	110.6	16.9	10.5
SEm±	0.7	3.4	0.05	85.0	3.7	0.02	0.4
CD at 5 %	1.9	10.0	1.0	253.0	11.0	0.07	1.3

SHAHJAHANPUR

Sugarcane (CoS 03251) was planted at 75 cm row to row distance. Soil of the experimental field was sandy loam in texture, low in organic carbon (0.36 %), phosphorus (11.35 kg/ha) and potassium (122.0 kg/ha) with soil pH6.8. The experimental crop was planted on 18.02.16 and harvested on 25.02.17. The experimental results (**Table AS 69.6.1**) showed that germination % recorded under overnight soaking in 100 ppm ethrel solution was at par with overnight soaking in 50 ppm ethrel solution whereas, overnight soaking in 100 ppm ethrel solution was significantly superior to conventional and overnight soaking in water. Planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) spray at 90, 120 and 150 DAPproduced significantly highernumber of shoots, millable canes and cane yield (87.50 t/ha) than those of other treatments**.** CCS % in cane was not significantly affected with various treatments.

Summary: Germination (%) recorded under overnight soaking in 100 ppm ethrel solution was at par with overnight soaking in 50 ppm ethrel solution and it was significantly superior to conventional and overnight soaking in water. Planting of setts

after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) resulted significantly higher number of shoots, millable canes and cane yield than those of other treatments.

Table AS 69.6.1: Germination (%) of sugarcane under various treatments at Shahjahanpur

Treatments	Germination (%)	Shoots (000/ha)	Millable canes (000/ha)	Cane yield (t/ha)	CCS (%)
T_1- Conventional planting/ farmers practices (3 budded setts)	24.27	127.89	106.25	53.60	12.20
T_2- Planting of setts after overnight soaking in water	29.48	143.98	112.96	64.40	11.74
T_3- Planting of setts after overnight soaking in 50 ppm ethrel solution	35.83	144.91	121.76	75.30	11.82
T_4- Planting of setts after overnight soaking in 100 ppm ethrel solution	42.81	157.52	127.08	82.60	12.08
T_5- T_1 + GA_3 spray (35 ppm) at 90,120 and 150 DAP	29.90	136.92	109.72	59.60	11.84
T_6- T_2 + GA_3 spray (35 ppm) at 90,120 and 150 DAP	31.25	148.49	117.13	70.40	11.90
T_7- T_3 + GA_3 spray (35 ppm) at 90,120 and 150 DAP	35.94	157.06	136.34	83.30	12.05
T_8- T_4 + GA_3 spray (35 ppm) at 90,120 and 150 DAP	40.52	179.74	139.70	87.50	11.06
SE±	**5.42**	**6.51**	**2.60**	**1.03**	**0.29**
CD at 5%	**10.93**	**13.57**	**5.57**	**2.20**	**NS**

6. UCHANI

Mid maturing variety CoH 167 was planted at 75 cm row spacing in spring season on March14, 2016. The experiment consisting of eight treatments was conducted in randomized block design with three replications. The soil of experimental field was loam in texture having pH 7.8, EC 0.4 dS/m, organic carbon 0.38, available P 11.9 Kg/ha and available K 193 Kg/ha. The crop was raised as per package of practices for the Haryana state. The crop was harvested on March 05, 2017.

Dipping of setts in 50 ppm and 100 ppm ethrel being at par recorded significantly higher germination at 20, 30, 40 and 50 DAP as compared to control and water soaked treatments. Lowest germination was recorded in conventional practices i.e. T1 and T5 treatments. Germination was hastened in soaking of setts in 50 ppm and 100 ppm ethrel treatments. Even at 20 days after planting, 14-16 % germination was recorded in soaking of setts in 50 ppm and 100 ppm ethrel treatments (**Table AS 69.7.1**).

Treatments of soaking of setts in 50 ppm ethrel+ GA3 spray (T7) and 100 ppm ethrel+GA3 (T8) being at par recorded significantly higher number of tillers, NMC,

cane yield (101.3, 103.4 t/ha) and sugar yield were recorded in treatments as compared to soaking of setts in ethrel at 50 and 100 ppm ethrel alone, conventional practices with and without GA3 and water soaking treatments with and without GA3 spray at 90, 120 and 150 Days after planting (**Table AS 69.7.2**).

Summary: Overnight soaking of setts in 50 ppm and 100 ppm ethrel being at par recorded significantly higher germination at 20, 30, 40 and 50 DAP as compared to control and water soaked treatments. Soaking of setts in 50 ppm ethrel+ GA3 spray (T7) and 100 ppm ethrel+GA3 (T8) being at par recorded significantly higher number of tillers, NMC, cane yield and sugar yield as compared to soaking of setts in ethrel at 50 and 100 ppm ethrel alone, conventional practices with and without GA3 and water soaking treatments with and without GA3 spray at 90, 120 and 150 Days after planting.

Table AS 69.7.1: Germination and shoot count of sugarcane under various treatments at Uchani

Treatment		**Germination (%)**					**Shoot population (000/ha)**			
		10 DAP	**20 DAP**	**30 DAP**	**40 DAP**	**50 DAP**	**90 DAP**	**120 DAP**	**150 DAP**	**180 DAP**
1	Conventional planting/ (3-bud setts)	0.4	4.3	22.5	37.5	38.2	94.0	128.9	126.5	105.8
2	Planting of setts after overnight soaking in water	0.7	8.6	27.9	41.9	42.8	106.9	145.0	142.0	112.9
3	Planting of setts after overnight soaking in 50 ppm ethrel solution	3.6	14.0	34.2	48.3	50.0	126.0	168.6	166.6	128.9
4	Planting of setts after overnight soaking in 100 ppm ethrel solution	4.2	16.4	36.8	52.8	54.2	130.8	173.4	171.9	130.6
5	T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0.6	4.4	22.9	37.2	38.5	95.3	130.3	129.5	112.2
6	T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0.7	8.5	27.8	42.4	43.1	107.7	147.4	145.5	119.9
7	T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	3.5	14.3	33.8	48.6	49.7	124.7	168.4	166.1	134.4
8	T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	4.4	16.1	36.8	52.5	54.4	130.0	173.8	172.6	137.2
	CD at 5%	0.4	0.9	3.3	5.8	6.0	14.3	15.6	14.3	13.1

Table AS 69.7.2: Growth and yield of sugarcane under various treatments at Uchani

Treatment		NMC (000/ha)	Single cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
1	Conventional planting/ (3-bud setts)	101.6	774	76.1	12.01	9.14
2	Planting of setts after overnight soaking in water	109.2	788	82.3	12.16	10.01
3	Planting of setts after overnight soaking in 50 ppm ethrel solution	123.0	795	94.6	12.33	11.66
4	Planting of setts after overnight soaking in 100 ppm ethrel solution	124.2	797	95.7	12.18	11.66
5	T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	106.9	802	82.9	11.98	9.93
6	T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	112.6	817	89.1	12.11	10.79
7	T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	126.5	826	101.1	12.28	12.41
8	T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	129.0	829	103.4	12.08	12.50
	CD at 5%	7.2	32	5.1	NS	0.60

7. SRIGANGANAGAR

The field experiment was conducted to study the response of plant growth regulators (PGRs) for enhancing cane yield and quality of sugarcane. The soil of the experimental field being sandy loam in texture, alkaline in reaction (8.2), tested low in organic carbon (0.30%), medium in available P_2O_5 (21 kg/ha) and high in available K_2O (380 kg/ha). The experiment was conducted on early maturing variety Co 6617 in RBD with three replication in spring season.

The data presented in **table AS 69.8.1** indicated that soaking of sugarcane setts in water or 50 ppm or 100 ppm ethrel solutions resulted in significant increase in sugarcane germination. Overnight soaking of setts in 50 ppm or 100 ppm ethrel being at par resulted significantly improvement in sugarcane germination as compared to farmers' practice and water soaked treatments. The highest cane yield (98.4 t/ha) was recorded in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than T1, T2 and T5 but at par with T3, T4, T6 & T7.

Table AS 69.8.1: Growth, yield and quality of Sugarcane under various treatments at Sriganganagar

Treatments		Germination (%)	NMC (000/ha)	Single cane weight (g)	Cane yield (t/ha)	CCS (%)
1	Conventional planting/ (3-bud setts)	34.5	91.2	904	79.4	12.02
2	Planting of setts after overnight soaking in water	41.7	96.6	924	84.6	12.16
3	Planting of setts after overnight soaking in 50 ppm ethrel solution	46.8	104.3	943	90.7	12.31
4	Planting of setts after overnight soaking in 100 ppm ethrel solution	48.4	106.7	950	92.4	12.32
5	T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	35.8	98.8	927	85.3	12.16
6	T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	41.2	103.4	947	90.9	12.43
7	T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	47.3	107.7	964	96.3	12.47
8	T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	48.7	111.3	971	98.4	12.51
	CD at 5%	4.1	9.4	38	9.7	NS

PENINSULAR ZONE

8. PADEGAON

The data of second year trial on cane and CCS yields, growth observations and quality parameters of different treatments revealed no germination at 10 DAP and the effect due to different treatments on germination was found to be non-significant at 20 DAP. Significantly higher germination (24.61and 39.98%)was found with planting of setts after overnight soaking in 50 ppm ethrel solution (T3) at par with T7, T8, T4, and T6 at 30 and 40 DAP. While at 50 DAP treatment T7 recorded significantly higher germination (55.39%) at par with T8 and T3 (**Table AS 69.9.1**).

Planting of setts after overnight soaking in 50 ppm ethrel solution followed with GA3 spray (35 ppm) at 90, 120 and 150 DAP (T7) recorded the significantly highest cane yield (135.59 t/ha). However, it was found at par(132.47 t/ha) with planting of setts after overnight soaking in 100 ppm ethrel solution followed with GA3 spray (35 ppm) at 90, 120 and 150 DAP (T8),planting of setts after overnight soaking in water followed with GA3 spray (35 ppm) at 90, 120 and 150 DAP (T6) (131.19 t/ha), planting of setts after overnight soaking in 50 ppm ethrel solution (T3) (129.74 t ha-1) and Planting of setts after overnight soaking in 100 ppm ethrel solution (T4)

(128.62 t ha-1). The CCS yield was found to be non-significant due to different treatments.

The data revealed that the planting of setts after overnight soaking in 50 ppm ethrel solution with spraying of GA3 (35 ppm) at 90, 120 and 150 DAP (T7) recorded significantly higher tillering ratio (1.62, 2.37, 2.50, 2.46, 2.12, 2.07, 2.03, 1.99, 1.98, and 1.98) at 90, 120, 150, 180, 210, 240, 270, 300, 330 and harvest, millable cane height (126.00 cm, 145.98cm, 161.62cm, 186.19cm, 212.08cm, 238.09cm, and 256.44cm) at 180, 210, 240, 270, 300, 330 and harvest, millable cane (103296) at harvest, respectively. However, it was found at par with planting of setts after overnight soaking in water and GA3 spray (35 ppm) at 90, 120 and 150 DAP (T6), planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 spray (35 ppm) at 90, 120 and 150 DAP (T8), planting of setts after overnight soaking in 50 ppm ethrel solution (T3), planting of setts after overnight soaking in 100 ppm ethrel solution (T4) at 150, 180, 210, 240,270, 300, 330 DAP, and at harvest. Millable height was found non-significant at 60, 90 and 120 DAP. Effect of different treatments on girth, number of internodes and average cane weight found to be non-significant (**Table AS 69.9.2**).

The data regarding juice quality parameters revealed that all quality parameters like, brix (c), sucrose (%), purity (%) and CCS% were found to be not affected due to different treatments.

Summary: Germination was found significantly higher with planting of setts after overnight soaking in 50 ppm ethrel solution while it was found at par with treatments T7, T4, T8 and T6 at 30, 40, and 50 DAP. The planting of setts after overnight soaking in 50 ppm ethrel solution with GA3 spray (35 ppm) at 90, 120 and 150 DAP recorded significantly the highest cane while CCS yield was not affected significantly by different treatments. However, it was at par with planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 spray (35 ppm) at 90, 120 and 180 DAP, Planting of setts after overnight soaking in water with GA3 spray (35 ppm) at 90, 120 and 150 DAP, planting of setts after overnight soaking in 50 ppm ethrel solution and planting of setts after overnight soaking in 100 ppm ethrel solution. All quality parameters like, brix (c), sucrose (%), purity (%) and CCS% were not affected by different treatments.

Table AS 69.9.1: Germination (%) of sugarcane under various treatments at Padegaon

Treatment	Germination (%) (DAP)				
	10	**20**	**30**	**40**	**50**
T_1 : Conventional planting/ Farmers' practice (3-bud setts)	0	10.84	20.11	31.48	38.89
T_2 : Planting of setts after overnight soaking in water	0	13.87	21.77	33.81	44.22
T_3 : Planting of setts after overnight soaking in 50 ppm ethrel solution	0	14.03	24.61	39.98	54.72
T_4 : Planting of setts after overnight soaking in 100 ppm ethrel solution	0	13.38	23.91	37.35	51.36
T_5 : T_1 + GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0	12.84	19.98	31.68	41.09
T_6 : T_2 + GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0	13.52	22.25	37.44	49.88
T_7 : T_3+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0	14.84	23.61	38.31	55.39
T_8 : T_4+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0	13.50	23.25	37.95	55.03
SE+	**0**	**0.91**	**0.78**	**0.87**	**1.92**
C.D at 5%	**0**	**NS**	**2.36**	**2.63**	**5.81**

Table AS 69.9.2: Growth, yield and quality of Sugarcane under various treatments at Padegaon

Treatment	Cane yield (t/ha)	CCS yield (t/ha))
T_1 : Conventional planting/Farmers' practice (3-bud setts)	114.61	16.60
T_2 : Planting of setts after overnight soaking in water	116.41	16.84
T_3 : Planting of setts after overnight soaking in 50 ppm ethrel solution	129.74	19.51
T_4 : Planting of setts after overnight soaking in 100 ppm ethrel solution	128.62	18.80
T_5 : T_1 + GA_3 spray (35 ppm) at 90, 120 and 150 DAP	118.52	17.10
T_6 : T_2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	131.19	18.69
T_7 : T_3+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	135.59	19.97
T_8 : T_4+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	132.47	19.10
SE+	**5.16**	**2.57**
C.D at 5%	**15.64**	**NS**

9. NAVSARI

Germination (%) at 20, 40 and 50 DAP were recorded significantly highest with T3 (planting of setts after overnight soaking in 50 ppm ethrel solution) over other treatments and remained at par with T4, T7 and T8 (AS 69.10.1). Tiller population was not significantly influenced due to different treatment at 90, 120 and 150 DAP; while at 180 DAP significantly higher number of tillers were observed with the treatment T7 over T1 and remained at par with T3, T4 and T8 (**Table AS 69.10.1**).

Leaf area index at 120, 150, 180, 210 and 360 DAP were recorded significantly highest with treatment T8 (T4 + GA3 (35 ppm) spray at 90, 120 and 150 DAP) and remained at par with the treatments T3, T4, T6 and T7 at almost all the growth stages. Leaf area index was not significantly influenced due to different treatments at 90, 240, 270, 300 and 330 DAP.

Biomass accumulation from 90 to 150 DAP were recorded significantly highest with treatment T7 and remained at par with almost all the treatments except T1; while at 180 to 300 DAP it was recorded significantly highest with the treatment T7 and remained at par with treatment T3, T4 and T8. At 330 and 360 DAP, different growth treatments were failed to show any significant effect on biomass accumulation.

NMC (111.08 000/ha) was significantly recorded higher with treatment T7 and remain at par the treatments T3, T4, T6 and T8. Cane length and cane diameter at harvest is failed to show any significant effect due to different treatment. Single Cane weight was recorded significantly highest with treatment T7 over other treatment and remained at par with T3 and T8 (**Table AS 69.10.2**).

Significantly highest cane yield (127.27 t/ha) was noticed with treatment T8 (planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) spray at 90, 120 and 150 DAP) but remained at par with T3, T4, and T7 over T1. CCS yield was not significantly influenced due to various treatments.Various quality parameters were not significantly influenced.

Table AS 69.10.1: Germination (%) of sugarcane under various treatments at Navsari

Treatment	**Germination (%)**				
	10 DAP	**20 DAP**	**30 DAP**	**40 DAP**	**50 DAP**
T_1	9.01	17.60	38.36	43.85	52.03
T_2	9.59	16.19	35.15	40.31	48.28
T_3	10.67	20.22	44.75	50.39	61.13
T_4	10.33	18.17	41.93	47.35	57.22
T_5	8.93	17.79	38.84	43.11	53.79
T_6	8.39	17.47	35.84	42.49	51.75
T_7	10.16	19.53	41.00	46.03	56.84
T_8	9.72	19.27	38.29	44.67	54.71
SEM.±	0.48	0.78	1.89	1.77	2.37
C.D. at 5%	NS	2.38	NS	5.38	7.17
C.V.%	8.64	7.42	8.33	6.86	7.52

Table AS 69.10.2: Growth, yield and quality of Sugarcane under various treatments at Navsari

Treatment	NMC at harvest (000/ha)	Cane length (cm) at harvest	Cane Diameter (cm) at harvest	Single cane wt. at harvest (kg)	Cane yield (t/ha)	CCS yield (t/ha)
T_1	84.37	257.20	2.56	1.19	100.58	14.06
T_2	94.61	263.66	2.61	1.05	105.35	14.09
T_3	107.17	280.47	2.71	1.42	121.40	16.68
T_4	103.01	280.42	2.66	1.26	124.73	17.01
T_5	95.44	263.78	2.61	1.25	105.01	15.12
T_6	100.29	270.31	2.67	1.22	106.87	14.05
T_7	111.08	296.98	2.78	1.50	124.13	16.12
T_8	106.86	290.64	2.79	1.33	127.27	17.61
SEM.±	5.14	15.62	0.11	0.06	6.53	0.98
C.D. at 5%	15.60	NS	NS	0.19	19.81	NS
C.V.%	8.88	9.82	7.23	8.60	9.89	10.89

10. MANDYA

To accelerate rate and extent of sugarcane germination, the seed setts were treated with plant growth hormones. The results indicated that, planting of setts after overnight soaking in 100 ppm ethrel solution resulted in significantly higher germination percentage (68.52 to 71.30% at 50 DAP) as compared to other treatments, but was on par with overnight soaking of setts in 50 ppm ethrel solution (64.81 to 65.28%). The sett treatment with 50 or 100 ppm ethrel solution accelerated the germination of cane buds and recorded more than 40% germination in 30 DAP itself as compared to control (water soaking) which recorded 50% germination at 50 DAP (**Table AS.69.11.1**).

The cane yield was significantly higher in the treatment receiving overnight soaking of cane setts in 100 ppm ethrel solution followed by 35 ppm GA3 spray at 90, 120 and 150 DAP (85.2 t/ha) as compared to other treatments. However, it was on par with overnight soaking of setts in 50 ppm ethrel solution followed by 35 ppm GA3 spray at 60, 120 and 150 DAP (83.2 t/ha) (Table AS 69.11.2). The increased cane yield in above treatments was mainly attributed to increase in yield parameters viz., single cane weight, cane length, cane girth, inter-nodal length, number of internodes and number of millable cane/ha (1.21 kg, 2.27 m, 2.59 cm, 10.66 cm, 22.39 and 105.9, respectively) in 100 ppm ethrel solution followed by 35 ppm GA3 spray at 90, 120 and 150 DAP; 1.17 kg, 2.06 m, 2.31 cm, 10.19 cm, 20.16 and 88.9 thousand/ha, respectively in overnight soaking of setts in 50 ppm ethrel solution followed by 35 ppm GA3 spray at 60, 120 and 150 DAP).

Summary: Overnight soaking of setts in 50 or 100% ethereal solution followed by 35ppm GA3 spray at 90, 120 and 150 DAP found to enhance the germination percentage and cane yield.

Table AS 69.11.1: Germination (%) of sugarcane under various treatments at Mandya

Treatment	Germination %				
	10 DAP	**20 DAP**	**30 DAP**	**40 DAP**	**50 DAP**
T_1: Conventional planting/ Farmers' practice (3-bud setts)	3.70	8.80	20.37	35.65	55.09
T_2: Planting of setts after overnight soaking in water	5.56	13.89	25.46	49.07	61.57
T_3: Planting of setts after overnight soaking in 50 ppm ethrel solution	10.65	20.83	42.59	57.87	64.81
T_4: Planting of setts after overnight soaking in 100 ppm ethrel solution	18.98	25.93	49.07	62.96	71.30
T_5: T1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	4.17	9.26	26.85	39.81	53.70
T_6: T2+ GA_3 spray (35 ppm) at 90, 120 and 150 DAP	8.33	16.67	34.72	47.69	62.50
T_7: T3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	13.89	20.37	42.13	58.33	65.28
T_8: T4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	20.37	26.85	47.69	64.81	68.52
S.Em. ±	**1.27**	**1.83**	**2.04**	**3.53**	**2.89**
CD@5%	**3.86**	**5.54**	**6.18**	**10.71**	**8.76**

Table AS 69.11.2: Growth, yield and quality of Sugarcane under various treatments at Mandya

Treatment	**Single cane weight (kg)**	**Cane length (m)**	**Cane girth (cm)**	**Internodal length (cm)**	**No. of internodes**	**Millable cane ('000/ ha)**	**Cane yield (t/ha)**	**Sucrose %**	**CCS %**	**CCS (t/ha)**
T_1	0.77	1.39	1.55	6.12	12.77	75.2	69.1	18.34	11.85	8.21
T_2	0.80	1.74	1.78	7.54	16.34	79.7	73.4	18.63	12.82	9.42
T_3	1.11	1.85	1.84	8.79	18.65	83.4	75.9	18.66	13.10	9.95
T_4	1.13	1.87	2.25	10.78	20.30	98.4	77.1	19.12	13.12	10.64
T_5	0.85	1.52	1.77	7.59	14.97	77.6	71.3	18.16	12.68	9.05
T_6	0.86	1.81	1.86	9.33	17.77	82.3	75.6	18.78	13.05	10.09
T_7	1.17	2.06	2.31	10.19	20.16	88.9	83.2	18.98	13.24	11.00
T_8	1.21	2.27	2.59	10.66	22.39	105.9	85.2	19.63	13.45	11.47
SEm.±	0.08	0.07	0.14	0.35	0.69	2.67	2.55	0.52	0.34	0.61
CD (P=0.05)	0.23	0.22	0.43	1.06	2.10	8.09	7.72	NS	NS	1.84

11. POWARKHEDA

The germination percentage was influenced significantly due to various treatments (**Table AS 69.12.1**).Significantly higher germination was recorded (72.66%)

in planting of setts after overnight soaking in 50 ppm ethrel solution as compared to that (64.41), in T6 (T2 + GA3 (35 ppm) spray at 90, 120 and 150 DAP), planting of setts after overnight soaking in water (65.28), T1 + GA3 (35 ppm) spray at 90, 120 and 150 DAP (66.41) and conventional planting/Farmers' practice (3- bud setts) (66.23%). The number of shoots ('000/ha) increased significantly due to planting of setts after overnight soaking in 50 ppm ethrel solution (145.47) as compared to T6 (136.01), T2 (136.52), T5 (137.97) and conventional planting/Farmers' practice (137.65).

The NMC was influenced significantly due to treatments.Significantly higher NMC ('000/ha) was recorded under planting of setts after overnight soaking in 50 ppm ethrel solution (129.73) as compared to T6 (119.34), planting of setts after overnight soaking in water (120.58), T5 (121.71) and conventional planting/Farmers practice (122.12). The NMC obtained was at par in T7, T3, T4 and T8.The cane yield increased significantly after overnight soaking of setts in 50 ppm ethrel solution (125.93 t/ha) as compared to T6 (117.08 t/ha), planting of setts after overnight soaking in water (117.80 t/ha), T5 (118.11 t/ha) and conventional planting/Farmers' practice (118.83 t/ha). Similar cane yield was obtained in T7 (T3 + GA3 35 ppm spray), T3 (planting of setts after overnight soaking in 50 ppm ethrel solution), T4 (planting of setts after overnight soaking in 100 ppm ethrel solution) and T8 (T4 + GA3 35 ppm spray) treatments. Juice quality did not differ significantly due to various treatments.

Summary: The cane yield increased significantly due to planting of setts after overnight soaking in 50 ppm ethrel solution (125.93 t/ha) as compared to T2 + GA3 (35 ppm) spray at 90, 120 and 150 DAP (117.08 t/ha), planting of setts after overnight soaking in water (117.80 t/ha), T1 + GA3 (35 ppm) spray at 90, 120 and 150 DAP (118.11 t/ha) and conventional planting/Farmers practice (3- bud setts) (118.83 t/ha). The cane yield obtained at par in between T7 (T3 + GA3 (35 ppm) spray), T3 (planting of setts after overnight soaking in 50 ppm ethrel solution), T4 (planting of setts after overnight soaking in 100 ppm ethrel solution) and T8 (T4 + GA3 (35 ppm) spray).

Table AS 69.12.1: Growth, yield and quality of Sugarcane under various treatments at Powarkheda

S. No.	Treatment	Germination (%)	Tillers (000'/ha)	Height (cm)	NMC (000'/ha)	Brix (%)	Yield (t/ha)
1	Conventional planting/Farmers' practice (3- bud setts).	66.23	137.65	258	122.12	21.28	118.83
2	Planting of setts after overnight soaking in water.	65.28	136.52	256	120.58	21.40	117.80
3	Planting of setts after overnight soaking in 50 ppm ethrel solution.	72.66	145.47	269	129.73	21.43	125.93
4	Planting of setts after overnight soaking in	71.18	143.42	267	126.75	21.33	124.07

	100 ppm ethrel solution.						
5	T_1 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	66.41	137.96	258	121.71	21.33	118.11
6	T_2 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	64.41	136.01	256	119.34	21.33	117.08
7	T_3 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	72.66	145.16	268	129.84	21.40	125.82
8	T_4 + GA_3 (35 ppm) spray at 90, 120 and 150 DAP	70.92	143.11	266	126.85	21.90	124.28
	S Em ±	1.70	2.02	2.38	1.78	0.15	1.77
	CD at 5%	5.09	6.05	7.12	5.33	NS	5.30

12. PUNE

The field trial was conducted with planting of setts (VSI 08005) after overnight soaking in 50 & 100 ppm Ethrel solution and spraying of GA3 (35ppm) at 90,120 and 150 DAP and compared with conventional planting. The cane yield was significantly affected due to various treatments. The highest cane yield (158.67 t/ha) was obtained in planting of setts after overnight soaking in 50 ppm ethrel solution and spraying of GA3 (35ppm) at 90,120 and 150 days of planting. This was followed by (147.33 t/ha) planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA3 (35ppm) at 90,120 and 150 days of planting. Lowest cane yield of 119.33 t/ha was obtained in conventional practice where no ethrel and GA3 was given.

Sugar yield (t/ha) was numerically higher (21.34) in planting of setts after overnight soaking in 50 ppm ethrel solution and spraying of GA3(35ppm) at 90,120 and 150 days of planting, followed by (20.69) planting of setts after overnight soaking in 100 ppm ethrel solution and spraying of GA3 (35ppm) at 90,120 and 150 days of planting. Lowest sugar yield of 18.03 t/ha was obtained in conventional practice. Benefit cost ratio was affected due to various treatments. It was maximum (1:2.71) when setts were planted after overnight soaking in 50 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 days of planting. This was followed by (1:2.68) planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 DAP (**Table AS 69.13.1**).

The highest germination (70.40%), tillering at 120DAP (1.41 lac/ha),number of millable canes (0.76 lac/ha), cane girth (11.25 cm), were obtained in the treatment, planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 days of planting, Whereas, single cane weight (2.63 kg), number of internodes on cane (28.16) and total plant height (373 cm) were obtained in the treatment, planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 DAP

The juice quality parameters measured in terms of Brix, Sucrose (%) and CCS (%) differed significantly due to different treatments. Highest^{o}Brix (21.23), CCS (15.67%) and Sucrose (20.92%) was noticed when setts were planted after overnight

soaking in 100 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 days of planting. Followed by planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA3 35ppm at 90,120 and 150 days of plantingi.e. 20.96 %, 15.15 % and 20.61 % of brix, CCS and sucrose content respectively.

Summary: The results of the second year trial indicated that, highest germination (70.40%) at 30 DAP, tillering (1.41 lac/ha) at 120 DAP, NMC (0.76 lac/ha),cane girth (11.25 cm), cane yield (158.67 t/ha) and B:C ratio (2.71) was recorded when the setts were overnight soaked in 50 ppm ethrel before planting and foliar spray of GA3(35ppm) at 90,120 and 150 DAP followed by cane yield of 155.67 t/ha in overnight soaking of setts in 100 ppm ethrel and spraying of GA3 (35ppm).

Table AS 69.13.1: Growth, yield and quality of Sugarcane under various treatments at Pune

Treatment	Germination (%)			Tillering (lac/ha) 120 DAP	NMC (lac/ha)	Cane Yield (t/ha)	B:C Ratio	CCS t/ha
	10 DAP	20 DAP	30 DAP					
Conventional planting/ Farmers practice	12.40	33.81	59.47	1.23	0.63	119.33	2.23	18.03
Planting of setts after overnight soaking in water.	13.43	35.48	63.20	1.28	0.66	138.0	2.40	18.27
Planting of setts after overnight soaking in 50 ppm ethrel solution.	**14.26**	**38.32**	**67.33**	**1.37**	0.68	138.67	2.59	19.92
Planting of setts after overnight soaking in 100 ppm ethrel solution	12.94	37.61	65.67	1.30	0.67	136.0	2.59	18.95
T1 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	12.74.	34.69	58.67	1.15	0.66	121.0	2.37	18.87
T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	13.09	35.82	59.87	1.24	0.72	147.33	2.54	20.68
T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	**14.07**	**37.99**	**70.40**	**1.41**	**0.76**	**158.67**	**2.71**	**21.34**
T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	13.40	37.62	63.73	1.40	0.74	155.67	2.68	20.69
C.D.at 5 %	NS	2.84	9.08	0.38	0.19	52.10		5.31

13. THIRUVALLA

The crop was planted on 25.01.2016 and was harvested on 16.01.2017. The results revealed that the different treatments have significantly influence on the germination percentage and tiller count (**Table AS 69.14.1**). The highest germination percentage and tiller population were recorded by T8 (T4 +GA3 spray (35ppm) at 90,120 and 150

DAP) and the lowest value for the above parameters were recorded by T2 (planting of setts after overnight soaking in water). The highest cane length (261.76 cm), MCC (93180/ ha), cane yield (118.11 t/ha) were recorded under T8. Sugar yield also showed same trend and recorded significantly higher value (13.24 t/ha) for the very same treatment (T8). The highest BC ratio of 1.32 was also recorded by T8.

Table AS 69.14.1: Growth, yield and quality of Sugarcane under various treatments at Thiruvalla

Treatment	Germination (%)		Tiller count (000/ha)		Cane length (cm)	Cane girth (cm)	MCC ('000/ ha)	Cane yield (t/ha)	Sugar yield (t/ha)	B: C ratio
	30 DAP	45 DAP	120 DAP	150 DAP						
Conventional planting/ Farmers' practice (3-bud setts).	54.84	60.15	92.00	86.01	241.8	9.54	69.11	91.15	9.01	1.20
Planting of setts after overnight soaking in water.	44.11	50.00	75.25	70.92	234.2	9.35	64.25	88.20	8.11	1.12
Planting of setts after overnight soaking in 50 ppm ethrel solution	56.50	59.92	96.25	90.28	239.4	9.40	66.34	90.04	8.82	1.19
Planting of setts after overnight soaking in 100 ppm ethrel solution	60.33	65.25	102.2	92.70	246.3	9.66	73.57	100.73	10.89	1.32
T_1 + GA_3 spray (35ppm) at 90,120 and 150 DAP	57.10	61.11	97.05	90.95	250.8	9.75	77.64	102.29	11.15	1.22
T_2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	58.50	62.20	95.42	92.07	254.8	9.84	82.50	106.62	11.90	1.25
T_3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	59.84	63.75	98.21	92.24	252.5	9.78	79.05	105.47	11.44	1.28
T_4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	61.52	68.75	108.1	96.37	261.7	9.96	93.18	118.11	13.24	1.32
CD (0.05)	1.75*	2.05*	3.30*	2.65*	6.83*	0.11*	9.25*	5.04*	0.25*	NS

14. SANKESHWAR

For the growth parameters the pooled data recorded over 2015-16 and 2016-17 indicated that none of the treatments recorded significant differences except for germination count and number of tillers. Significantly higher germination and tiller number was recorded in T3-(Planting of setts after overnight soaking in 50 ppm ethrel solution). The lowest germination count was recorded in T5 (Conventional planting of

three budded setts and GA3 spray (35 ppm) at 90, 120 and 150 DAP).The insignificance of growth parameters for treatment variation was mainly attributed to severe drought prevailed during both the years (**Table AS 69.15.1**).

Summary: The treatment variation due to use of growth regulators was not conspicuous owing to occurrence of drought during both years. However, T3 (Planting of setts after overnight soaking in 50 ppm ethrel solution) recorded few of the growth (germination and tiller number). Yield (NMC) and quality parameters (juice purity) significantly higher.

Table AS 69.15.1: Growth, yield and quality of Sugarcane under various treatments at Sankeshwar

Treatment	Germination (%) at 30 days			Cane yield (t/ha)		
	2015-16	2016-17	Pooled	2015-16	2016-17	Pooled
T1	61.11	40.31	51.06	94.21	46.99	70.92
T2	68.21	38.38	53.68	96.76	45.20	71.21
T3	86.57	39.13	65.40	99.54	45.20	72.94
T4	66.36	37.88	53.31	89.74	43.40	69.33
T5	52.16	34.50	45.14	89.35	43.61	66.25
T6	69.29	32.94	50.03	93.60	42.30	67.26
T7	72.22	34.75	55.69	95.45	42.57	71.00
T8	76.08	34.94	57.52	87.56	44.57	64.71
CD 5%	9.87	NS	7.00	NS	NS	NS

EAST COAST ZONE

15. ANAKAPALLE

Germination recorded at 45 DAP under sett soaking in 50 ppm (70.6%) or 100 ppm (70.7%) ethrel solution was significantly higher as compared to other treatments. Conventional 3 bud sett planting recorded significantly lower per cent germination of 53.1. Number of tillers at 90 days after planting, before spraying of GA3,showed thatovernight soaking in 100 ppm (T4-87500/ha and T8- 87760/ha) or 50 ppm (T3-82,552/ha and T7- 87,760/ha) ethrel solution recorded significantly more number of tillers as compared to other treatments. Planting of setts after overnight soaking in water recorded significantly lower tiller population (76,479/ha) at 90 DAP.At 180 days, significant variations were observed in tiller population among the treatments. Planting of setts after overnight soaking in 50 ppm (122321/ha) or 100 ppm (123809/ha) ethrel solution followed by spraying of GA3 at 90, 120 and 150 days after planting recorded significantly higher number of tillers as compared to other treatments. Planting of setts after overnight soaking in water recorded significantly lower number of tillers (90703/ha).

Significant differences were observed in number of millable canes due to application of different plant growth regulators. Significantly higher number of miillable canes were recorded in planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA3 at 90,120 and 150 days after planting (75,852/ha) as compared to other treatments but found on par with planting of setts after overnight soaking in 50 ppm ethrel solution (74,148/ha) followed by spraying of GA3 at 90,120 and 150 days after planting. Conventional three budded sett planting recorded significantly lower number of millable canes (67,898/ha) at harvest (**Table AS 69.16.1**). Significantly highest cane yield (88.1 t/ha) was recorded in planting of setts after overnight soaking in 100 ppm ethrel solution and spraying of GA3 at 90,120 and 150 days after planting but found on par with planting of setts after overnight soaking in 50 ppm ethrel solution (85.8 t/ha) and spraying of GA3 at 90,120 and 150 days after planting. Conventional 3 budded sett planting recorded significantly lower cane yield of 73.3 t/ha.Per cent juice sucrose did not vary significantly due to application of PGRs. Sugar yield did not vary significantly due to different treatments but highest sugar yield (10.2 t/ha) was recorded with T8 treatment i.e. planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA3 at 90,120 and 150 days after planting.

Summary: The experimental results indicated that significantly higher cane yield was recorded in planting of setts after overnight soaking in 100 ppm (88.1 t/ha) or 50 ppm ethrel solution (85.8 t/ha) followed by spraying of GA3 at 90,120 and 150 days after planting. Conventional 3 budded sett planting recorded significantly lower cane yield of 73.3 t/ha.

Table AS 69.16.1: Growth, yield and quality of Sugarcane under various treatments at Anakapalle

Treatment	Germination % at 20 DAP	Germination % at 45 DAP	Tiller population at 90 DAP/ha	Tiller population at 180 DAP/ha	Plant height at 180 DAP (cm)	NMC /ha	Cane yield (t/ha)	Sugar Yield (t/ha)
T1:Conventional 3 bud sett planting	43.2	53.1	76,479	90,703	161.8	67,898	73.3	8.7
T2:Planting of setts after over night soaking in water	45.6	59.5	78,125	1,05,159	160.0	68,182	74.4	9.5
T3:Planting of setts after overnight soaking in 50 ppm ethrel solution	50.4	70.6	82,552	1,07,656	162.8	69,886	79.0	9.1
T4:Planting of setts after overnight soaking in 100 ppm ethrel solution	52.9	70.7	87,500	1,17,261	165.0	71,023	79.5	9.5
T5:T1+GA_3 Spray (35 ppm) at 90,120 and 150 DAP	45.3	61.7	80,110	99,479	182.0	71,875	81.5	9.4
T6:T2+GA3 Spray (35 ppm) at 90,120 and 150 DAP	49.5	65.9	82,180	1,03,125	187.0	72,727	82.4	9.4
T7: T3+GA_3 Spray (35 ppm) at 90,120 and 150 DAP	51.5	70.7	88,542	1,22,321	198.0	74,148	85.8	9.4
T8: T4+GA_3 Spray (35 ppm) at 90,120 and 150 DAP	55.0	70.8	87,760	1,23,809	197.0	75,852	88.1	10.2
C.D (0.05)	NS	6.1	2062.0	2407	11.3	2847	4.10	-

16. CUDDALORE

The second year plant crop was raised on 01.04.2016 with the same objectives and treatments. The result indicated that, the highest germination was recorded with ethrel 100 ppm solution, which recorded 7.35,67.85,84.35,84.85 and 84.98 per cent on 10th , 20th , 30th , 40th and 50th days after planting, respectively and was closely followed by 50 ppm solution treated plots. The same trend was also recorded on root bio mass from 50th to 180th DAP of sugarcane, which recorded 1.28, 4.68 and 7.68 t/ha of root dry weight on 50th , 120th and 180th days after planting and was comparable with 50 ppm solution treated sugarcane setts (**Table AS 69.17.1**).

The significantly highest millable cane (172650/ha) and single cane weight (1.56 Kg) was recorded with the treatment -T8where setts were treated with ethrel 100 ppm followed by foliar spray of GA3 (35 ppm)at 90, 120 and 150 DAP and was on par

with 50ppm of ethrel setts treatment and foliar spray of GA3 35 ppm, which recorded millable cane (163250/ha) and single cane weight (1.51 Kg).The significantly highest cane yield (145.36 t/ha) and sugar yield (18.53 t/ha) was recorded with the treatment - T8 followed by T7 which recorded 141.26 t/ha cane yieldand 17.78 t/ha sugar yield.The maximum B: C ratio of 3.53 was recorded with the treatment T8 closely followed by T7 that recorded 3.43 B: C ratio (**Table AS 69.17.2**).

Summary: Among the treatments, the setts treated with ethrel 100 ppm with foliar spray of GA3 (35 ppm) on 90, 120 and 150 DAS was recorded significantly the highest millable cane (172650/ha), cane yield (145.36 t/ha), CCS (12.75) and sugar yield (18.53).

Table AS 69.17.1: Germination and root dry weight of Sugarcane under various treatments at Cuddalore

Treatment	Germination (%)					Root dry weight (t/ha)		
	10th DAP	20th DAP	30th DAP	40th DAP	50th DAP	50th DAP	120th DAP	180th DAP
T_1: FP	2.12	45.60	68.23	69.23	70.12	0.92	4.21	6.12
T_2: ONSW	2.86	46.30	74.56	75.68	78.19	0.98	4.25	6.23
T_3: ONSE 50	6.15	52.90	80.43	80.86	81.23	1.21	4.32	7.02
T_4: ONSE 100	6.72	65.35	83.07	83.65	83.98	1.22	4.35	7.12
T_5: T_1+GA spray	3.28	47.69	70.12	70.89	71.23	1.10	4.24	6.26
T_6: T_2+GA spray	3.86	45.31	72.12	72.96	73.23	1.12	4.35	6.35
T_7: T_3+GA spray	7.21	54.62	78.32	78.89	79.89	1.24	4.64	7.56
T_8: T_4+GA spray	7.35	67.85	84.35	84.85	84.98	1.28	4.68	7.68
CD (p=0.05)	0.31	4.04	5.32	6.02	5.06	0.06	0.23	0.36

Table AS 69.17.2: Effect of treatments on growth and yield of sugarcane at Cuddalore

Treat-ment	Brix %	Pole %	Purity %	Single cane weight (kg)	Millable cane '000 ha^{-1}	Cane yield t ha^{-1}	CCS (%)	Sugar yield (t/ha)	B:C ratio
T_1	20.45	12.89	88.13	1.35	136.91	128.56	12.12	15.58	3.12
T_2	20.59	12.95	89.32	1.44	140.25	129.65	12.19	15.80	3.15
T_3	20.86	12.96	89.49	1.51	146.35	132.36	12.36	16.36	3.22
T_4	20.51	12.92	88.69	1.46	152.36	137.56	12.45	17.13	3.33
T_5	20.56	12.96	88.43	1.35	145.32	134.25	12.32	16.54	3.26
T_6	20.59	12.95	89.48	1.44	151.23	136.25	12.42	16.92	3.31
T_7	20.96	12.96	89.69	1.51	163.25	141.26	12.59	17.78	3.43
T_8	20.86	12.99	88.89	1.56	172.65	145.36	12.75	18.53	3.53
CD(p= 0.05)	NS	NS	NS	NS	11.83	8.55	NS	1.22	

17. NAYAGARH

Planting of setts after soaking in 100 ppm ethrel solution along with GA3 spray at 90, 120 and 150 DAP proved to be the best (**Table AS 69.18.1**) with highest number of millable canes (81200/ha), cane (121.4 t/ha) and CCS yield (12.82.t/ha). The treatment next in order was T7 where planting of setts after soaking in 50 ppm ethrel solution along with GA3 spray at 90, 120 & 150 DAP produced NMC of 78870/ha with cane and CCS yield of 118.43 and 12.74 t/ha, respectively (**Table AS 69.18.2**). Planting of setts after overnight soaking in water along with GA3 spray at 90, 120 & 150 DAP produced NMC of 74330/ha, cane and CCS yield of 115.5 and 12.18 t/ha, respectively. These three treatments were at par. The higher yield parameters i.e. number of shoots/ha, length and girth of cane in the above mentioned treatments were the factors of higher cane and CCS yield.

Table AS 69.18.1: Growth, yield and quality of Sugarcane under various treatments at Nayagarh

Treatment		Germination%			Plant height (cm)		No of shoots (000/ha)	
		20 DAP	30 DAP	40 DAP	120 DAP	At harvest	120 DAP	180 DAP
T_1	Conventional planting/ Farmers practice (3 bud setts)	11.17	39.47	49.96	121.70	278.90	79.03	83.57
T_2	Planting of setts after overnight soaking in water	10.84	40.03	52.23	119.67	279.40	80.03	82.90
T_3	Planting of setts after overnight solution in 50 PPM ethrel solution	11.60	43.93	54.67	123.63	278.37	79.00	82.43
T_4	Planting of setts after overnight solution in 100 PPM ethrel solution	12.30	43.33	55.18	129.97	286.20	76.13	83.10
T_5	T_1 + GA_3 spray at 90, 120 & 150 DAP	11.23	44.70	56.79	123.93	294.80	85.73	85.93
T_6	T_2 + GA_3 spray at 90, 120 & 150 DAP	11.43	41.03	55.37	126.07	296.30	84.27	87.10
T_7	T_3 + GA_3 spray at 90, 120 & 150 DAP	12.41	44.80	57.87	132.37	309.27	85.03	84.83
T_8	T_4 + GA_3 spray at 90, 120 & 150 DAP	12.80	48.30	58.18	136.53	312.07	86.07	86.37
CD at 5 %		1.237	4.993	4.885	9.154	16.34	6.351	2.996

Table AS 69.18.2: Effect of different treatments on sugarcane growth, yield and quality at Nayagarh

	Treatment	Brix %	Sucrose %	Purity %	NMC (000/ha)	Cane yield (t/ha)	CCS %	CCS (t/ha)
T_1	Conventional planting/ Farmers practice (3 bud setts)	18.03	16.8	86.8	69.83	92.15	10.87	11.76
T_2	Planting of setts after overnight soaking in water	18.09	17.0	87.3	70.83	96.79	10.70	11.54
T_3	Planting of setts after overnight solution in 50 PPM ethrel solution	18.48	17.5	86.47	71.50	106.47	11.60	12.12
T_4	Planting of setts after overnight solution in 100 PPM ethrel solution	17.95	17.8	85.16	74.33	117.14	11.37	12.58
T_5	T_1 + GA_3 spray at 90, 120 & 150 DAP	16.98	16.6	85.2	73.80	111.87	11.58	12.42
T_6	T_2 + GA_3 spray at 90, 120 & 150 DAP	18.31	16.8	83.55	74.37	115.51	11.35	12.18
T_7	T_3 + GA_3 spray at 90, 120 & 150 DAP	17.71	17.5	86.14	78.87	118.43	11.78	12.74
T_8	T_4 + GA_3 spray at 90, 120 & 150 DAP	18.76	18.2	85.77	81.20	121.40	11.90	12.82
	CD at 5 %	NS	NS	NS	6.108	13.130	NS	1.52

NORTH CENTRAL ZONE

18. PUSA

Significant differences were observed among the treatments with respect to germination, plant population, plant height, millable canes and cane yield (**Table AS 69.19.1**). Planting of setts after overnight soaking in 50 ppm ethrel solution + GA3 spray at 90, 120 and 150 DAP (T7) recorded higher periodic germination percentage followed by planting of setts after overnight soaking in 50 ppm ethrel solution (T3) at 10, 20, 30, 40 and 50 DAP. Maximum plant population (242400/ha), millable canes (152100/ha) and cane yield (98.6 t/ha) was obtained with T3 + GA3 spray (35 ppm) at 90, 120 and 150 DAP (T7) followed by planting of setts after overnight soaking in 50 ppm ethrel solution (T3) in case of plant population and millable canes and T4 + GA3 (35 ppm) spray at 90, 120 and 150 DAP in case of cane yield. Sucrose content juice did not varied significantly with different treatments.

Summary: Planting of setts after overnight soaking in 50 ppm ethrel solution + GA3 spray (35 ppm) at 90, 120 and 150 DAP (T7) produced higher cane yield (98.6 t/ha) followed in order by planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray (35 ppm) at 90, 120 and 150 DAP (T8).

Table AS 69.19.1: Growth, yield and quality of Sugarcane under various treatments at Pusa

Treatment		Germination (%)					Plant population (x 10^3/ha) 120 DAP	Plant height (cm) at harvest	Millable canes (x10^3/ha)	Cane yield (t/ha)	Sucrose (%)
		10 DAP	20 DAP	30 DAP	40 DAP	50 DAP					
T_1	Conventional planting/ Farmers practice (3-bud setts)	0.16	8.2	18.7	5.7	35.2	166.7	270	119.2	72.5	17.22
T_2	Planting of setts after overnight soaking in water	3.61	14.0	24.8	29.5	44.9	203.1	277	131.3	80.8	17.13
T_3	Planting of setts after overnight soaking in 50 ppm ethrel solution	5.01	18.6	27.7	35.6	55.7	229.9	294	145.6	95.7	17.51
T_4	Planting of setts after overnight soaking in 100 ppm ethrel solution	3.84	15.8	26.7	32.1	49.2	226.5	286	144.2	92.4	17.45
T_5	T_1+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	0.33	8.7	19.6	26.5	36.4	171.8	310	126.7	76.7	16.88
T_6	T_2+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	3.72	14.8	25.2	30.2	45.4	205.6	319	132.5	84.3	17.31
T_7	T_3+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	5.22	19.4	29.5	36.8	56.2	242.4	328	152.1	98.6	17.03
T_8	T_4+GA_3 spray (35 ppm) at 90, 120 and 150 DAP	3.76	15.2	25.9	31.7	48.6	225.3	323	142.5	96.3	16.95
CD (P=0.05)		0.46	1.9	3.7	5.3	8.6	36.2	37	18.9	13.2	NS

19. BETHUADHARI

The trial was initiated during the year with sugarcane planting on 03.02.2016 (CoB 99161). There was significant improvement (**AS 69.20.1**) in germination at 40 and 50 DAP under soaking of setts in ethrel solution (50 or 100 ppm). Significant increase in cane yield was also recorded under these treatments. Spray of GA3 registered increase in cane yield but that was not significant over T4 (**Table AS 69.20.2**).

Table AS 69.20.1: Effect of different treatments on germination of sugarcane at Bethuadhari

Treatment	10DAP	20DAP	30DAP	40DAP	50DAP
T1	00	10.20	19.25	31.33	37.46
T2	00	11.35	20.11	32.45	39.11
T3	00	15.22	23.45	47.88	49.20
T4	00	15.27	23.95	48.23	50.11
T5	00	10.28	19.33	30.95	35.78
T6	00	12.23	20.57	32.05	38.19
T7	00	15.19	23.65	47.85	47.95
T8	00	16.20	23.80	49.11	49.23
SEm(±)	….	0.38	0.76	1.74	1.68
CD at 5%	NS	1.15	2.27	5.22	5.04
CV(%)	6.47	5.35	6.58	1.47	2.45

Table AS 69.20.2: Effect of different treatments on sugarcane growth, yield and quality at Bethuadhari

Treatment	NMC(000/ha)	Stalk Length(cm)	Stalk diameter(cm)	Single cane weight (kg)	Cane Yield(t/ha)	CCS(t/ha)
T1	65.7	267.5	2.20	0.785	61.5	6.70
T2	67.2	270.1	2.21	0.791	63.1	7.08
T3	72.5	288.5	2.29	0.795	67.8	7.64
T4	75.1	289.3	2.30	0.807	70.7	7.98
T5	80.2	310.6	2.39	0.925	84.1	9.60
T6	81.5	312.5	2.42	0.927	85.7	9.79
T7	85.7	320.6	2.46	0.997	87.8	10.15
T8	86.5	322.1	2.47	0.999	89.5	10.37
SEm(±)	1.88	3.53	0.06	0.008	1.89	0.82
CDat 5%	5.65	10.60	0.19	0.025	5.67	2.45
CV(%)	2.54	6.31	5.78	1.45	2.47	2.56

NORTH EASTERN ZONE

20. BURALIKSON

The germination percentage counted at 10 days interval after planting revealed that there was significance difference in germination among all the treatments. Planting of setts after overnight soaking in water (T2), Planting of setts after overnight soaking in 50 ppm ethrel solution (T3), planting of setts after overnight soaking in 100 ppm ethrel solution(T4) significantly increased the germinationover conventional planting

(T1) (TableAS69.21.1). However, throughout germination period the highest germination (%) was recorded with treatment planting of setts after overnight soaking in 100 ppm ethrel solution i.e. T4 and T8 (10.64,13.4%) (28.31, 28.7%) (48.00, 48.32%) and (49.21, 51.77%) at 20, 30, 40 and 50 days after planting, respectively (**Table AS 69.21.1**).

Likewise, in terms of cane yield all the treatments recorded significantly the higher cane yield than conventional planting. Out of all treatments, planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA3 (35ppm) at 90,120 and 150 DAP i.e. T8 recorded significantly the highest cane yield (57.75t/ha) which is statistically at par with the cane yield recorded by the treatments T6 (54.80 t/ha), T7 (53.21 t/ha), respectively (**Table AS 69.21.2**).

Table AS 69.21.1: Germination (%) of sugarcane under various treatments at Buralikson

Treatment	**20 DAP**	**30 DAP**	**40 DAP**	**50 DAP**
T_1: Conventional planting	7.94	15.73	35.10	36.80
T_2: Planting of setts after Overnight soaking in water.	10.02	24.45	45.75	47.06
T_3: Planting of setts after overnight soaking in 50 ppm ethrel solution	9.80	26.54	43.13	44.67
T_4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	10.64	28.31	48.00	49.21
T_5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	8.17	21.98	38.00	40.43
T_6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	12.00	27.00	48.68	49.70
T_7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	10.64	24.15	46.75	48.91
T_8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	13.42	28.70	48.32	51.77
CD(0.05)	3.96	4.95	5.35	5.44

Table AS 69.21.2: Growth, yield and quality of Sugarcane under various treatments at Buralikson

Treatment	NMC (000/ha)	Cane length (cm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
T_1: Conventional planting	60.41	192.3	2.36	17.2	39.58	12.4
T_2: Planting of setts after overnight soaking in water.	69.44	212.0	2.43	17.5	44.90	12.6
T_3: Planting of setts after overnight soaking in 50 ppm ethrel solution	75.11	213.3	2.42	17.3	46.60	12.5
T_4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	77.67	217.3	2.43	17.8	48.77	12.8
T_5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	65.40	199.7	2.38	17.1	42.36	12.3
T_6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	77.72	220.7	2.45	17.9	54.80	12.9
T_7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	74.4	209.3	2.46	17.6	53.21	12.7
T_8:T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	81.00	224.7	2.46	17.8	57.75	12.9
CD(0.05)	4.74	9.66	0.06	0.22	7.82	0.19

PROJECT NO.: AS 70

PROJECT TITLE: **Scheduling irrigation with mulch under different sugarcane planting methods**

Objectives : To enhance crop and water productivity in sugarcane

Year of Start **:** 2016-17
Year of Completion **:** 2019-20
Participating centres **:** All centres

Treatment (A) :

North West, North Central and North East Zones

Combination of planting methods and mulch practices

P_1: Conventional flat planting (75 cm row spacing) with organic mulching @ 6 t/ha (sugarcane trash/paddy straw/any other available crop residue)

P_2: Conventional flat planting (75 cm row spacing) without mulch

P_3: Paired row trench planting (30:120 cm row spacing) with organic mulching @ 6 t/ha.

P_4: Paired row trench planting (30:120 cm row spacing) without mulch.

Peninsular, East Coast Zones

Combination of planting methods, green manure and mulch practices

P_1: Furrow planting (120 cm row spacing) without mulching

P_2: Furrow planting (120 cm row spacing) with green manure (*dhaincha*/sunnhemp/cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP.

P_3: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation* after earthing-up without mulching.

P_4: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation* after earthing-up + green manure/brown mulching.

*First irrigation to be given in furrow nos. 1, 3, 5. Second irrigation to be given in furrow nos. 2 & 4. Similar schedule should be followed in successive irrigation.

Treatment (B) :

Irrigation schedule (IW/CPE)

I_1: 0.60
I_2: 0.80
I_3: 1.00

Irrigation water depth: 7.5 cm

Details of Methodology:

Recommended variety of sugarcane will be planted in spring season. Entire dose of N, P and K fertilizers as per recommendation of the region will be applied before onset of monsoon as per the recommendation.

Treatments (12):

Planting methods: 4
Irrigation regime: 3

Design : Strip plot design

Replication : 3

Plot size : 6m width x 8m length

Observations to be recorded:

A. Soil parameters

1. Initial and final soil fertility status as well as physical parameters (bulk density and infiltration rate)
2. Moisture (%) before each irrigation up to onset of monsoon
3. Quantity of water applied
4. Water use efficiency

B. Sugarcane:

1. Germination (%)
2. Periodic tiller population 90, 120, 180 DAP/DAR
3. Plant height at 90, 120, 180 DAP/DAR
4. Growth parameters i.e., NMC, cane length, diameter and cane weight
5. Juice quality (brix, pol % and purity %)
6. Cane and sugar yields (t/ha).

CURRENT YEAR (2016-17) REPORT

NORTH WEST ZONE

1. FARIDKOT

Planting methodscould not exert significant effect on growth characters of sugarcane but numerically paired row trench planting was better in germination, number of shoots and millable canes. Cane weight was better in flat planting (Table AS 70.1.1).

Among the planting methods paired row trench planting with trash mulching recorded maximum (106.0 t/ha) and significantly higher cane yield than all methods of planting. Trash mulching resulted in significantly higher cane yield than without trash mulching irrespective of planting methods. Cane yield increased successively and significantly with increase in irrigation water application from 0.6 to 1.0 IW/CPE. Interaction effects between method of planting and irrigation schedules revealed highest cane productivity was obtained from paired row planting with mulching and irrigation at 1.0 IW/CPE, which was statistically at par with paired row planting with mulching and irrigation at 0.8 IW/CPE and paired row planting without mulching and irrigation at 1.0 IW/CPE but significantly higher than all other combinations. Thus, data manifested that trash mulching resulted in saving of 20 % evaporation equivalent and 26.6 % irrigation water input than no mulching in paired row trench planting (**Table AS 70.1.2**).

Apparent water productivity (AWP) and Total water productivity (TWP) were significantly higher in paired row trench planting than conventional planting because of 52.5 cm less irrigation water input irrespective of mulching. Among irrigation schedules AWP decreased successively with increase in water input from 0.6 to 1.0 IW/CPE, differences were statistically at par between 0.8 and 0.6 IW/CPE (**Table AS 70.1.3**).

Table AS 70.1.1: Effect of planting methods and irrigation regime on sugarcane growth and yield at Faridkot

Planting methods/ Irrigation schedule (IW/CPE)	**Cane Yield (t/ha)**				**Irrigation water input(cm)**				**Total water input (cm)#**			
	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean
P1	95.8	96.3	98.3	96.8	67.5	82.5	112.5	87.5	113.6	128.6	158.6	133.6
P2	71.8	92.8	100.3	88.3	67.5	82.5	112.5	87.5	113.6	128.6	158.6	133.6
P3	96.0	110.3	111.7	106.0	27.0	33.0	45.0	35.0	73.1	79.1	91.1	81.1
P4	79.3	93.1	109.5	94.0	27.0	33.0	45.0	35.0	73.1	79.1	91.1	81.1
Mean	85.7	98.1	105.0		47.3	57.8	78.8		93.4	103.9	124.9	
LSD (p=0.05	MOP=7.1; IS=6.1; Interaction=12.1											

Irrigation water input + total rainfall i.e. 46.1 cm

Table AS 70.1.2: Cane Yield and water application under varying methods of planting and irrigation schedule

Planting methods/ Irrigation schedule (IW/CPE)	**Apparent water productivity (kg/m^3)**				**Total water productivity (kg/m^3)**			
	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean
P1	14.2	11.7	8.7	11.5	8.4	7.5	6.2	7.4
P2	10.6	11.3	8.9	10.3	6.3	7.2	6.3	6.6
P3	35.6	33.4	24.8	31.3	13.1	13.9	12.3	13.2
P4	29.4	28.2	24.3	27.3	10.8	11.8	12	11.5
Mean	22.4	21.1	16.7		9.7	10.1	9.2	
LSD (p=0.05)	MOP=1.4; IS=1.6; Interaction=3.1				MOP=0.7; IS=0.7; Interaction=1.4			

Table AS 70.1.3: Water productivity under varying methods of planting and irrigation schedule

Treatment	**Germ. (%)**	**No. of Shoots 000/ha**	**NMC 000/ ha**	**Cane length (cm)**	**Cane diameter (cm)**	**Single cane wt. (g)**	**Sucrose (%)**	**CCS (%)**	**CCS (t/ha)**
Planting methods									
P1	40.1	125.4	99.2	245	3.01	1813	17.27	12.11	11.73
P2	42.1	118.9	95.9	232	2.90	1642	17.63	12.31	10.86
P3	45.8	130.6	102.2	243	2.88	1621	18.00	12.59	13.37
P4	49.6	127.1	97.2	235	2.73	1414	17.79	12.45	11.68
CD (5%)	NS	NS	NS	NS	NS	204	NS	NS	1.31
Irrigation schedule (IW/CPE)									
I1: 0.60	45.6	119.6	94.6	221	2.90	1558	17.63	12.34	10.56
I2: 0.80	44.8	127.5	99.7	243	2.86	1610	17.84	12.48	12.27
I3: 1.00	42.7	129.4	101.7	254	2.88	1708	17.54	12.28	12.91
CD (5%)	NS	6.7	4.2	9	NS	NS	NS	NS	0.94

2. KOTA

Sugarcane (CoPK05191) planting was done on 10th March, 2016. Significant variation in germination and tiller population at different stages was observed under

paired row trench planting (30:120 cm row spacing) with mulching of sugarcane trash @ 6 t/ha. Paired row trench planting (30:120 cm row spacing) with organic mulching had significant effect on plant height, NMC,cane weight over flat planting with or without mulching and at par with the paired row trench planting (30:120 cm row spacing) without mulch treatments. Significantly higher NMC (146540/ha), average cane weight (968.11 g/plant), cane yield (91.40 t/ha) were obtained with the paired row trench planting (30:120 cm row spacing) with organic mulching over P1 and P2 treatments and at par with P4 treatments. The effect of planting methods with and without mulch on quality parameters was not significant (**Table AS 70.2.1**).

A higher B: C ratio was recorded with paired row trench planting (30:120 cm row spacing) with organic mulching, which was significantly higher over P1 and P2 and at par with rest of treatments. The water use efficiency was significantly higher under paired row trench planting (30:120 cm row spacing) with organic mulching over P1 and P2 and at par with the paired row trench planting (30:120 cm row spacing) without mulch treatments. The lowest water use efficiency was recorded under conventional planting without mulching. This was mainly due to lower soil moisture contribution and water storage in the root zone depth leads to lower tonnage of in conventional planting method.

Irrigation regimes had significant impact on growth and yield attributes. Significantly higher germination, tiller population, cane height, NMC and cane weight recorded at IW: CPE ratio of 0.80 over IW: CPE ratio of 0.60 and at par with an IW: CPE ratio of 1.00. The higher cane yield and quality parameters were recorded at IW: CPE ratio of 0.80 over IW: CPE ratio of 0.60 but at par with an IW: CPE ratio of 1.00. Since cane yield is the result of additive and complementary effect of plant growth and yield attributing characters and the growth and yield attributes had better expression at optimum irrigation owing to adequate quantity and balanced proportion of water supply during the crop growth stages. Maximum WUE was recorded at IW: CPE ratio of 0.80 which was significantly higher over IW: CPE ratio of 1.00 but statistically on par with an IW: CPE ratio of 0.60.

The cost of production/ha was higher under irrigation regime of IW: CPE ratio of 1.00 than 0.60.Thus, irrigation regime of IW: CPE ratio of 0.80 recorded significantly higher net return, gross return and B: C ratio than IW: CPE 0.60 and on par with IW: CPE 1.00. Economics increased significantly with each successive increase in irrigation regimes from 0.60 to 0.80 IW: CPE ratio. After that it did not increased proportionally with each successive increase in irrigation regimes from 0.80 to 1.00 IW: CPE ratio (**Table AS 70.2.2**).

Summary: Based on the one year of study, it can be concluded that paired row trench planting (30:120 cm row spacing) with mulching (sugarcane trash 6 t/ha) was found better with respect to millable canes, cane yield and water use efficiency. It resulted in significantly higher net return over P1 and P2 planting methods. However, irrigation at IW: CPE ratio of 0.80 was found economical in sugarcane yield when compared with

0.60 and 1.00 IW: CPE ratios and also noted significant enhancement in economics with each successive increase in irrigation regimes from 0.60 to 0.80 IW: CPE ratio.

Table AS 70.2.1: Effect of planting method, mulching and irrigation regime on growth and yield of sugarcane at Kota

Treatment	Cane diameter (cm)	NMC (000/ ha)	Cane weight (g)	Cane yield (t/ha)	Sucrose (%)	CCS (%)	CCS yield (t/ha)
A. Combination of planting methods and mulch practices							
P_1 : Conventional flat planting (75 cm row spacing) with organic mulching sugarcane trash @ 6 t /ha	2.84	124.18	875.00	82.51	16.77	11.49	9.54
P_2 : Conventional flat planting (75 cm row spacing) without mulch	2.87	117.88	832.33	80.88	16.92	11.60	9.42
P_3: Paired row trench planting (30:120 cm row spacing) with organic mulching sugarcane trash @ 6 t/ha.	3.04	146.54	968.11	91.40	17.15	11.77	10.80
P_4: Paired row trench planting (30:120 cm row spacing) without mulch.	2.93	138.66	888.00	87.01	17.02	11.68	10.17
SEm ±	0.07	3.21	24.89	1.75	0.48	0.36	0.44
CD (P=0.05)	0.24	11.12	86.14	6.07	NS	NS	NS
CV	7.18	7.31	8.38	6.16	8.58	9.24	13.35
B. Irrigation schedule (IW/CPE)							
I_1 : 0.60	2.88	124.44	850.92	78.39	15.90	10.85	8.50
I_2 : 0.80	2.93	137.10	932.08	90.22	17.84	12.28	11.10
I_3 : 1.00	2.96	133.90	889.58	87.74	17.15	11.78	10.34
SEm ±	0.01	2.43	14.74	1.44	0.32	0.24	0.18
CD (P=0.05)	0.05	9.53	57.85	5.64	1.27	0.94	0.69
CV	1.52	6.38	5.73	5.82	6.61	7.12	6.13

Table AS 70.2.2: Effect of treatments on water use efficiency and economics at Kota

Treatment	Total Irrigation water (mm)	WUE (kg/ha-mm)	Production cost (Rs/ha)	Gross returns (Rs/ha)	Net returns Rs/ha)	B: C ratio
A. Combination of planting methods and mulch practices						
P_1 : Conventional flat planting (75 cm row spacing) with organic mulching sugarcane trash @ 6 t /ha	900	43.17	104204	206278	102074	1.98
P_2 : Conventional flat planting (75 cm row spacing) without mulch	900	42.42	102404	202194	99790	1.97

P_3: Paired row trench planting (30:120 cm row spacing) with organic mulching sugarcane trash @ 6 t/ha.	900	48.04	104804	228500	123696	2.18
P_4: Paired row trench planting (30:120 cm row spacing) without mulch.	900	45.68	103004	217528	114524	2.11
SEm ±		0.93		4384	4384	0.043
CD (P=0.05)		3.20		15170	15170	0.147
CV		6.20		6	12	6.201
B. Irrigation schedule (IW/CPE)						
I_1 : 0.60	675	46.38	100004	195979	95975	1.96
I_2 : 0.80	900	47.11	103604	225542	121938	2.18
I_3 : 1.00	1125	41.00	107204	219354	112150	2.05
SEm ±		0.80		3590	3590	0.035
CD (P=0.05)		3.14		14091	14091	0.139
CV		6.18		6	11	5.945

3. KAPURTHALA

Although no significant effect of planting method was observed on growth characters of sugarcane but numerically paired row trench planting was better in germination, number of shoots and millable canes (**Table AS 70.3.1**). Cane weight increased significantly with mulching in both the planting systems. Highest single cane weight was obtained where mulch was applied with single row planting at 75 cm.

Table AS 70.3.1: Effect of planting methods and irrigation regime on sugarcane at Kapurthala

Treatment	Germination %	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt.(g)	CCS %	CCS t/ha
Planting methods								
P1	42.1	115.0	84.0	265	2.81	1354	12.31	11.84
P2	43.4	108.1	80.8	251	2.63	1281	12.41	10.57
P3	44.9	120.0	94.3	269	2.66	1296	12.47	12.48
P4	47.0	117.2	91.2	257	2.53	1220	12.36	11.26
CD (5%)	NS	NS	NS	NS	NS	53	NS	0.92
Irrigation schedule (IW/CPE)								
I1: 0.60	44.2	104.6	84.3	244	2.68	1196	12.30	10.44
I2: 0.80	44.9	119.5	87.4	263	2.63	1319	12.47	11.94
I3: 1.00	44.0	121.1	91.0	275	2.66	1348	12.39	12.21
CD (5%)	NS	5.7	2.8	8	NS	68	NS	0.85

Among the planting methods the highest cane yield was obtained under the paired row trench planting with trash mulching (100.1 t/ha) and significantly higher cane yield than other methods of planting (**Table 70.3.2**). The cane yield increased significantly with trash mulching over that of without trash mulching irrespective of planting methods. The significant increase in cane yield was obtained with increase in irrigation water application from 0.6 to 1.0 IW/CPE. Interaction effects between methods of planting and irrigation schedules revealed maximum cane productivity was obtained from paired row planting with mulching and irrigation at 1.0 IW/CPE, which was statistically at par with paired row planting with mulching and irrigation at 0.8 IW/CPE and paired row planting without mulching and irrigation at 1.0 IW/CPE but significantly higher than all other combinations.

Apparent water productivity (AWP) and Total water productivity (TWP) were significantly higher in paired row trench planting than conventional planting because of 45.0 cm less irrigation water input irrespective of mulching (**Table 70.3.3**). Among irrigation schedules AWP decreased significantly with increase in water input from 0.6 to 1.0 IW/CPE.

Table AS 70.3.2: Cane Yield and water applied under varying methods of planting and irrigation scheduling

Planting methods/ Irrigation schedule (IW/CPE)	**Cane Yield (t/ha)**				**Irrigation water input(cm)**				**Total water input (cm)#**			
	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean
P1	92.5	96.8	99.2	96.2	52.5	75	97.5	75	88.2	106.5	126.4	107.0
P2	70.9	90.5	94.2	85.2	52.5	75	97.5	75	88.2	106.5	126.4	107.0
P3	96.6	101.7	102.1	100.1	21	30	39	30	56.7	61.5	67.9	62.0
P4	79.5	94.2	99.6	91.1	21	30	39	30	56.7	61.5	67.9	62.0
Mean	84.9	95.8	98.8		36.75	52.5	68.25		72.5	84.0	97.2	
LSD (p=0.05	MOP=3.1; IS=5.9; Interaction=5.1											

Table AS 70.3.3: Water productivity under varying methods of planting and irrigation scheduling

Planting methods/ Irrigation schedule (IW/CPE)	**Apparent water productivity (kg/m^3)**				**Total water productivity (kg/m^3)**			
	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean	I1 (0.6)	I2 (0.8)	I3 (1.0)	Mean
P1	17.6	12.9	10.2	13.6	10.5	9.1	7.8	9.1
P2	13.5	12.1	9.7	11.8	8.0	8.5	7.4	8.0
P3	46.0	31.4	26.2	34.5	17.0	16.5	15.0	16.2
P4	37.9	31.9	25.5	31.8	14.0	15.3	14.7	14.7
Mean	28.8	22.1	17.9		12.4	12.4	11.2	
LSD (p=0.05)	MOP=2.4; IS=2.7; Interaction=5.1				MOP=0.8; IS=0.6; Interaction=2.6			

4. LUCKNOW

A field experiment was initiated during second week of February, 2016, to enhance crop and water productivity in sugarcane (CoPk 05191). The experiment comprising twelve treatment combinations was laid out in split plot design with four replications. Two irrigations were applied at the time of planting and 35 days after planting (time of germination) and subsequent irrigations were scheduled on the basis of IW/ CPE ratio in the respective plots.

Cane yield varied significantly due to different planting methods. Paired-row trench planting with trash mulching (120.97 t/ha) being at par with conventional flat method of planting along with trash mulching (115.19 t/ha) resulted in significantly higher cane yield than that of conventional flat method of planting (109.86 t/ha). The higher cane yield under paired row trench planting was attributed to more number of millable cane (1.38 and 1.34 lakh / ha) than paired-row trench planting and conventional flat method of planting with no trash mulching. The trash application led to higher sugarcane yields irrespective of irrigation scheduling. The irrigation schedules though did not influence the cane yield significantly but the irrigation at IW: CPE 0.8 recorded 2.3 and 3.9 per cent higher cane yield compared to 0.6 and 1.0 IW: CPE ratio, respectively (**Table AS 70.4.1**).

The WUE was found highest under paired-row trench planting with trash mulching (0.80 t/ha- cm) followed by conventional flat method of planting with trash mulching (0.76 t/ha-cm) and paired-row trench planting (0.75 t/ha-cm). The cane yield and water use efficiency can be increased significantly by trash mulching.

Table AS 70.4.1: Effect of planting methods and irrigation scheduling on sugarcane at Lucknow

Treatment	NMC (Lakh/ha)	Total Water expense (cm)	Cane yield (t/ha)	WUE (t/ha cm)
Planting method				
1**) Conventional flat + no mulch** (75 cm row spacing)	1.13	151.13	109.86	0.73
2) Conventional flat + trash mulch (75 cm row spacing)	1.34	151.13	115.19	0.76
3) Paired- row trench planting (30:120 cm row spacing)	1.18	151.13	112.73	0.75
4) Paired- row trench planting + trashmulch (30:120 cm row spacing)	1.38	151.13	120.97	0.80
CD (P=0.05)	0.10	-	7.21	-
Irrigation schedule (IW:CPE)				
0.60	1.25	161.7	114.38	0.71
0.80	1.28	152.5	117.02	0.77
1.00	1.26	139.2	112.68	0.81

CD (P=0.05)	0.10	-	7.21	-

5. PANTNAGAR

Germination (%) at 40 days after planting was highest (32.5%) in paired row planting (30: 90 cm) with trash which was significantly higher over rest of the treatments. Higher millable cane (88200/ha), cane yield (86.2 t/ha), sucrose (17.7%) and CCS yield(14.3 t/ha) were recorded in the same treatment (**Table AS 70.5.1**). These parameters were influenced by higher number of shoots/ha since very beginning and maintained upto 180 DAP. Lowest NMC, cane yield, sucrose % and CCS yield (t/ha) were recorded in conventional planting (flat planting without trash mulching). Highest cane yield (83.8 t/ha) was recorded in 1.0 IW/CPE irrigation treatment which was significantly higher over either 0.8 or 0.6 IW/CPE. Higher cane yield in this treatment was the result of high NMC. However, sucrose % and CCS yield were non-significant in all the three irrigation treatments. Germination % was also not influenced by irrigation treatments (**Table AS 70.5.2**).

Summary: On the basis of present study it was observed that cane yield and NMC were significantly higher in the treatment of paired row planting (30: 120) + trash mulching and at 1.0 IW/CPE ratio. Sucrose (%) was not influenced due to planting method or trash management and irrigation methods, though the CCS yield was highest in the treatment of paired row planting + mulch and was significantly higher over rest of the treatments. Cane yield was statistically similar in treatment 0.8 or 1.0 IW/CPE but were significantly higher over 0.6 IW/CPE.

Table AS 70.5.1: Effect of planting methods with or without mulch under different irrigation regimes on growth, yield and juice quality of spring planted Sugarcane at Pantnagar

Treatment	Germination (40 DAP)	No of shoots (000/ha)			Millable canes (000/ha)	Cane yield (t/ha)	Sucrose (%)	CCS (t/ha)
		120 DAP	150 DAP	180 DAP				
Planting method								
Flat planting with mulch	27.8	128.1	135.9	143.4	81.9	78.2	17.4	12.1
Flat planting without mulch	25.9	126.6	130.9	132.1	76.8	77.9	16.8	12.7
Paired row with mulch	32.5	129.7	143.9	148.1	88.4	86.7	17.7	14.9
Paired row without mulch	29.4	129.1	137.3	145.3	85.8	85.8	17.6	13.8
SEM±	0.2	0.5	0.4	0.4	0.1	0.1	0.02	0.01
CD at 5%	2.1	NS	4.2	4.5	1.1	1.2	0.3	0.5
Irrigation level								
0.6 IW/CPE	28.2	126.8	135.9	141.3	82.4	80.8	17.3	12.4
0.8 IW/CPE	28.8	127.6	137.3	142.2	83.4	81.7	17.4	13.7
1.0 IW/CPE	29.7	130.7	137.8	143.2	83.8	83.9	17.5	14.1
S.Em ±	0.2	0.1	0.3	0.2	0.02	0.1	0.01	0.05
CD at 5%	NS	1.8	NS	NS	0.4	1.8	NS	0.7

Table AS 70.5.2: Effect of treatments on water productivity at Pantnagar

Method of planting	Irrigation water applied (mm)	Total rainfall (mm)	Total water applied (mm)	Water productivity (q/ha/cm)
Planting method				
Flat planting with mulch	250	1185.6	1435.6	5.4
Flat planting without mulch	250	1185.6	1435.6	5.3
Paired row with mulch	250	1185.6	1435.6	5.9
Paired row without mulch	250	1185.6	1435.6	5.8
Irrigation level				
0.6 IW/CPE	150	1185.6	1335.6	6.1
0.8 IW/CPE	225	1185.6	1410.6	5.7
1.0 IW/CPE	300	1185.6	1485.6	5.6

6. SHAHJAHANPUR

The experimental results showed that germination percent was significantly higher in paired row trench planting than conventional flat planting. Conventional flat planting (75 cm row spacing) with organic mulch @ 6 t/ha gave significantly higher number of shoots (173580/ha) than that of paired row trench planting (120: 30 cm row spacing) whereas, significantly higher number of millable canes (126450/ha) and cane yield (88.77 t/ha) were obtained in paired row trench planting (120: 30 cm row spacing) with organic mulching @ 6 t/ha than that of other treatments of planting methods and mulch practices. Maximum water use efficiency (1138.08 Kg/ha-cm) was recorded in paired row trench planting (120: 30 cm row spacing) with organic mulching @ 6 t/ha followed by paired row trench planting (30:120 cm row spacing) without mulching with water use efficiency of 1143.90 Kg/ha-cm (**Table AS 70.6.1**).

Irrigation scheduling at 1.00 IW/CPE ratio (I3) produced significantly higher number of shoots (155250/ha), millable canes (1,19420/ha) and cane yield (89.57 t/ha) than those of other irrigation schedule while, maximum water use efficiency (1806.89 Kg/ha-cm) was obtained at 0.60 IW/CPE ratio (I1) followed by 0.80 IW/CPE ratio (I2) with water use efficiency of 1396.17 Kg/ha-cm. CCS percent was not affected significantly due to various planting methods and irrigation schedules.

Summary: Paired row trench planting (120: 30 cm row spacing) with organic mulch @ 6 t/ha produced higher cane yield (88.77 t/ha) and maximum water use efficiency (1138.08 Kg/ha-cm) than those of other planting methods and mulch practices. Irrigation schedule at 1.00 IW/CPE ratio (I3) resulted in significantly higher cane yield (89.57 t/ha) than that of rest irrigation schedule while, maximum water use efficiency (1806.89 Kg/ha-cm) was obtained at 0.60 IW/CPE ratio (I1) followed by 0.80 IW/CPE ratio (I2) with water use efficiency of 1396.17 Kg/ha-cm.

Table AS 70.6.1: Effect of planting methods and irrigation regimes on sugarcane at Shahajahanpur

Treatment	Germination (%)	Shoots (000/ha)	Millable canes (000/ha)	Plant height (m)	Cane yield (t/ha)	CCS (%)	Water use efficiency (K_g/ha-cm)
A							
P_1	41.70	173.58	109.52	2.44	83.32	11.74	936.18
P_2	41.50	167.33	103.51	2.36	81.84	11.54	951.63
P_3	52.40	132.26	126.45	2.50	88.77	11.52	1138.08
P_4	52.10	128.40	123.18	2.39	85.60	11.74	1043.90
SE±	**0.49**	**0.89**	**1.59**	**0.03**	**0.42**	**0.17**	**-**
CD at 5%	**1.07**	**1.93**	**3.46**	**0.07**	**0.91**	**NS**	**-**
B							
I_1	47.90	146.32	111.99	2.36	81.31	11.64	1806.89
I_2	46.40	149.60	115.58	2.43	83.77	11.61	1396.17
I_3	46.50	155.25	119.42	2.48	89.57	11.74	1194.27
SE±	**0.48**	**0.90**	**1.57**	**0.04**	**0.45**	**0.16**	**-**
CD at 5%	**1.05**	**1.95**	**3.44**	**0.09**	**0.99**	**NS**	**-**

7. UCHANI

This experiment was conducted on mid maturing variety CoH 167 during spring season. Sugarcane was planted on March 6, 2016 as per treatments. Conventional sugarcane furrow opener was used to open the furrows at 75 cm in conventional planting whereas, paired row trench making machine was used to open the trench at 30: 120 cm.Significant differences were observed among different method of planting in terms of germination, tillers, NMC, cane yield and sugar yield. Significantly higher germination, tillers, NMC, cane weight, cane yield and sugar yield were recorded in paired row trench planting (30:120 cm) as compared to conventional planting at 75 cm row spacing. Trash mulching resulted in significantly higher cane and sugar yield as compared to without mulching treatments. CCS percent was not affected due to different planting methods (**Table AS 70.7.1**).

Germination was not affected due to irrigation schedule as the irrigation schedule was followed after complete germination. Significant differences were observed among irrigation schedules in all the parameters except germination and CCS per cent. Irrigation schedule of 1.0 produced significantly higher number of tillers, NMC, cane weight, cane yield and sugar yield as compared to irrigation schedule of 0.8 and 0.6 IW/ CPE. Lowest value of all the sugarcane parameters was recorded in irrigation schedule of 0.6 IW/CPE. Interaction between method of planting and irrigation levels was found non-significant.

Total irrigation water applied during pre-monsoon season of 45, 60 and 75 cm in conventional planting and 30, 39 and 48 cm in paired row trench planting method was calculated at 0.6, 0.8 and 1.0 IW/CPE schedule, respectively. During post monsoon, 60 and 50 cm irrigation water was applied in conventional and trench planting, respectively. Total (pre+ post monsoon) irrigation water of 105,120 and 135

cm in conventional planting and 80, 89 and 98 cm in paired row trench planting was applied at 0.6, 0.8 and 1.0 IW/CPE irrigation schedule, respectively. Total (Irrigation+ rainfall) water was calculated as 177.1, 192.1 and 207.1 cm in conventional and 152.1, 161.1 and 170.1 in paired row trench planting at 0.6, 0.8 and 1.0 IW/CPE irrigation schedule, respectively. Highest yield of cane produced/1000 litres of irrigation water applied was recorded in trench planting at 0.8 IW/CPE irrigation schedule (**Table AS 70.7.2**).

Summary: Significantly higher germination, tillers, NMC, cane weight, cane yield and sugar yield were recorded in paired row trench planting (30:120 cm) as compared to conventional planting at 75 cm row spacing. Trash mulching resulted in significantly higher cane and sugar yield as compared to without mulching treatments. CCS percent was not affected due to different planting methods and irrigation levels. Interaction between method of planting and irrigation levels was found non-significant. Total (Irrigation+ rainfall) water was calculated as 177.1, 192.1 and 207.1 cm in conventional and 152.1, 161.1 and 170.1 in paired row trench planting at 0.6, 0.8 and 1.0 IW/CPE irrigation schedule, respectively. Highest yield of cane produced/1000 litres of irrigation (11.23 kg) water was recorded in trench planting at 0.8 IW/CPE irrigation schedule.

Table AS 70.7.1: Effect of planting methods and irrigation regimes on sugarcane at Uchani

Treatment	Germination (%)	Tillers (000/ha)		NMC (000/ha)	Cane wt. (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
		90 DAP	120 DAP					
Planting methods								
Conventional planting with trash mulching	43.7	99.0	117.7	107.4	811	83.9	12.43	10.43
Conventional planting without trash mulching	43.0	94.5	111.7	103.3	781	77.8	12.44	9.67
Paired row trench with trash mulching	48.2	111.4	131.6	120.8	843	97.9	12.45	12.20
Paired row trench without trash mulching	48.4	106.7	126.2	116.1	832	92.9	12.44	11.56
CD at 5%	3.2	4.2	6.3	6.1	43	4.7	NS	0.60
Irrigation schedule (IW/CPE)								
0.6	46.1	92.4	109.3	101.2	772	75.2	12.42	9.35
0.8	45.6	104.5	123.5	113.4	837	91.1	12.45	11.34
1.0	45.9	111.8	132.2	121.1	843	98.0	12.46	12.21
CD at 5%	NS	6.9	8.1	7.5	39	3.3	NS	0.40

Table AS 70.7.2: Irrigation water applied and rainfall received during the crop season at Uchani

Planting method	IW/CPE	Total irrigation including first irrigation (cm)	Post monsoon irrigation (cm)	Total irrigation (cm)	Total rainfall (cm)	Total water (Irrigation + rainfall) (cm)	Cane yield (t/ha)	Cane produced per 1000 litres of irrigation water (kg)
Conventional planting with trash mulching	0.6	45	60	105	72.1	177.1	70.4	6.71
Conventional planting with trash mulching	0.8	60	60	120	72.1	192.1	86.7	7.23
Conventional planting with trash mulching	1.0	75	60	135	72.1	207.1	94.6	7.00
Conventional planting without trash mulching	0.6	45	60	105	72.1	177.1	63.3	6.03
Conventional planting without trash mulching	0.8	60	60	120	72.1	192.1	81.3	6.78
Conventional planting without trash mulching	1.0	75	60	135	72.1	207.1	88.7	6.57
Paired row trench with trash mulching	0.6	30	50	80	72.1	152.1	88.0	11.00
Paired row trench with trash mulching	0.8	39	50	89	72.1	161.1	99.9	11.23
Paired row trench with trash mulching	1.0	48	50	98	72.1	170.1	105.9	10.80
Paired row trench without trash mulching	0.6	30	50	80	72.1	152.1	79.2	9.90
Paired row trench without trash mulching	0.8	39	50	89	72.1	161.1	96.4	10.83
Paired row trench without trash mulching	1.0	45	50	98	72.1	170.1	103.1	10.52

PENINSULAR ZONE

8. PADEGAON

The data revealed that furrow planting (120 cm row spacing) with green manure (sun hemp) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP (P2) recorded significantly the highest tillering ratio (1.35 and 2.59) at 120 DAP and 180 DAP and millable height (221.89cm and 310.89cm) at 180 DAP and harvest, respectively, however it was found at par with furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing –up + green manure/brown mulching (P4). Significantly the highest number of millable cane (88799) and girth (10.39cm) was observed with furrow planting (120 cm row spacing) with green manure (sun hemp) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP (P2) and it was found at par with furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing –up + green manure/brown mulching (P4).The germination, tillering ratio at 90 DAP, millable height at 90 and 120 DAP, average cane weight (kg) were found to be non-significant. Data presented in Table 1 revealed that the furrow planting (120 cm row spacing) with green manure (sun hemp) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP. P2 recorded the highest cane yield (125.98 t/ha) followed by P4 and CCS yield was found to be non-significant (**Table AS 70.8.1**).

Significantly the highest tillering ratio (1.32 and 2.53) was recorded with irrigation schedule (I3:1.00) at 120 DAP and 180 DAP, respectively and it was found at par with irrigation schedule (I3:0.80 at 180 DAP only. Significantly the higher number of millable cane (86850) and girth (10.27cm) was recorded with irrigation schedule (I3:1.00), however it was found at par with irrigation schedule (I2:0.80). The Irrigation schedule did not express its significant effect on CCS yield. While, significantly the highest cane yield (121.15 t ha-1) was recorded with Irrigation schedule (I3), however, it was found at par with Irrigation schedule (I2).

The interaction between planting method (P2) and irrigation schedule (I3) recorded significantly the highest cane yield (127.68 t/ha) however, it was found at par with interaction between I2 P2, I1 P2 and I3 P1.Among the planting methods treatment P4 recorded higher water use efficiency (1294.51 kg/ha-cm) followed by treatment P3 and P2 while in irrigation scheduling 0.60 IW/CPE (I1) recorded higher water use efficiency followed by 0.80 IW/CPE ratio (I2) (**Table AS 70.8.2**).

Summary: The furrow planting (120 cm row spacing) with green manure (sun hemp) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP (P2) and irrigation schedule with 1.00 IW/CPE was found significantly superior for cane yields. While CCS yield was not affected by different planting methods and irrigation schedules. The higher water use efficiency was recorded in Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing –up with green manure/brown mulching and irrigation schedule with 0.60 IW/CPE. All quality parameters were found to be non-significant.

Table AS 70.8.1: Effect of planting method and irrigation scheduling on sugarcane at Padegaon

Treatment	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Main: Planting Method		
P_1: Furrow planting (120 cm row spacing) without mulching	114.44	14.04
P_2: Furrow planting (120 cm row spacing) with green manure (dhaincha/sunnhemp/cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP.	125.98	15.24
P_3: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation * after earthing –up without mulching.	113.92	13.92
P_4: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation* after earthing –up + green manure/brown mulching.	116.71	14.07
SE±	**1.97**	**0.30**
C.D. at 5%	**6.82**	**NS**
B) Sub: Irrigation schedule (IW/CPE)		
I_1 : 0.60	114.46	14.07
I_2 : 0.80	117.67	14.38
I_3 : 1.00	121.15	14.50
SE±	**0.96**	**0.21**
C.D. at 5%	**3.76**	**NS**
C) Interactions		
SE±	**2.51**	**0.48**
C.D. at 5%	**6.84**	**NS**
General Mean	**117.76**	**14.32**

Table AS 70.8.2: Effect of interaction between planting method and irrigation regimes on cane yield at Padegaon

Planting Method / Irrigation schedule	P_1	P_2	P_3	P_4
I_1	105.46	123.68	112.00	116.71
I_2	112.40	126.58	115.34	116.37
I_3	125.46	127.68	114.44	117.04
SE±	**2.51**			
C.D. at 5%	**6.84**			

9. POWARKHEDA

The germination percentage did not differ significantly due to methods of planting and irrigation schedules. However, germination percentage ranged from 67.89 to 68.08 percent for methods of planting and 67.55 to 68.13 percent for irrigation

schedules.Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP recorded higher numbers of tillers (105.14 '000/ha) than that with furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (97.86 '000/ha). Among irrigation schedules significantly higher number of tillers were obtained with I3 (IW/CPE 1.0) (103.57 '000/ha) as compared to number of tillers recorded with I1 (97.53) but the number of tillers remained at par between I3 (103.57) and I2 (100.46) and between I2 (100.46) and I1 0.60 (97.53).

Number of Millable Canes (NMC '000'/ha): Among Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP recorded higher numbers of NMC (101.69) than Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (94.34), but the Number of NMC recorded at par in between P4 (96.50), P1 (95.96) and P3 (94.34). Application of irrigation schedules Significantly higher number of NMC obtained at I3 1.00 (100.09) as compared to number of NMC recorded with I1 0.60 (94.04) but the Number of NMC recorded at par in between I3 1.00 (100.09) and I2 0.80 (97.24) and I2 0.80 (97.24) and I1 0.60 (94.04) irrigation schedules.

Cane yield (t/ha): The cane yield was influenced significantly due to different planting methods. However, among Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP recorded higher cane yield of (105.83) than Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (98.45), but the cane yield recorded at par in between P4 (100.64), P1 (99.61) and P3 (98.45). Application of irrigation schedules Significantly higher cane yield obtained at I3 1.00 (103.50) as compared to cane yield recorded with I1 0.60 (98.24) but the cane yield recorded at par in between I3 1.00 (103.50) and I2 0.80 (101.36) and I2 0.80 (101.36) and I1 0.60 (98.24) irrigation schedules (**Table AS 70.9.1**).

Total water productivity (Kg/m^3): The total water productivity was influenced significantly due to different planting methods. However, among Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP recorded higher total water productivity of (1.070) than Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (0.995), but the total water productivity recorded at par in between P4 (1.017), P1 (1.007) and P3 (0.995). Application of irrigation schedules Significantly higher total water productivity obtained at I3 1.00 (0.929) as compared to total water productivity recorded with I1 0.60 (1.111) and I2 0.80 (1.045) (**Table AS 70.9.2**).

Summary: Results revealed that the cane yield was influenced significantly due to different planting methods. Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP

recorded higher cane yield of (105.83 t/ha) than furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (98.45), but the cane yield recorded at par in between P4 (100.64), P1 (99.61) and P3 (98.45). Among irrigation schedules significantly higher cane yield was obtained at I3 1.00 (103.50) as compared to cane yield recorded with I1 0.60 (98.24) but the cane yield recorded at par in between I3 1.00 (103.50) and I2 0.80 (101.36) and I2 0.80 (101.36) and I1 0.60 (98.24) irrigation schedules.

Table AS 70.9.1: Effect of treatments on sugarcane at Powarkheda

Treatments	Germination (%)	Tillers (000'/ha)	Plant Height (cm)	NMC (000'/ha)	Brix (%)	Cane Yield (t/ha)
Planting method						
P1: Furrow planting (120 cm row spacing) without mulching	68.08	99.17	251	95.96	21.20	99.61
P2: Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP.	68.20	105.14	274	101.69	21.24	105.83
P3: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching.	67.92	97.86	242	94.34	21.13	98.45
P4: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up + brown mulching	67.89	99.89	251	96.50	21.21	100.64
S Em +	2.48	1.73	5.34	1.75	0.08	1.96
CD at 5%	NS	5.03	15.5	5.08	NS	5.19
Irrigation schedule						
I1: 0.60	68.40	97.53	240	94.04	21.13	98.24
I2: 0.80	67.55	100.46	256	97.24	21.23	101.36
I3: 1.00	68.13	103.57	267	100.09	21.23	103.50
S Em +	2.48	1.73	5.34	1.75	0.8	1.96
CD at 5%	NS	5.03	15.5	5.08	NS	5.19

Table AS 70.9.2: Effect of treatments on water productivity at Powarkheda

Treatment	Irrigation water applied (cm)	Effective rainfall (cm)	Profile water use	Total water expense (cm)	Total water productivity (kg/m3)
Planting method					
P1: Furrow planting (120 cm row spacing) without mulching	137.2	151.91	7.5	296.61	1.007
P2: Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP.	137.2	151.91	7.5	296.61	1.070
P3: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing-up without mulching.	137.2	151.91	7.5	296.61	0.995
P4: Furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing-up + brown mulching	137.2	151.91	7.5	296.61	1.017.
S Em +	-	-	-	-	0.010
CD at 5%	-	-	-	-	0.027
Irrigation schedule					
I1: 0.60	105.0	151.91	8.2	265.11	1.111
I2: 0.80	131.5	151.91	7.5	290.91	1.045
I3: 1.00	175.0	151.91	6.7	333.61	0.929
S Em +	-	-	-	-	0.010
CD at 5%	-	-	-	-	0.027

10. MANDYA

Among the planting methods, 120 cm row spaced furrow planting with *dhaincha* green manure sowing at 30 DAP and mulching at 75 DAP recorded significantly higher cane yield (80.39 t/ha) as compared to others. However, it was at par with 120 cm row spaced furrow planting with alternate skip furrow irrigation after earthing up + *dhaincha* green manure mulching (77.48 t/ha). While, the lower cane yield was noticed in 120 cm row spaced furrow planting with alternate skip furrow irrigation without mulching (72.87 t/ha). Among the irrigation schedules, IW/CPE ratio of 1.0 recorded significantly higher yield (82.21 t/ha) as compared to IW/CPE ratio of 0.60 (69.97 t/ha). While, it was at par with IW/CPE ratio of 0.80 (77.33 t/ha). Among the interactions, significantly higher cane yield was observed in P2I3 (82.80 t/ha). However, it was on par with P2I2, P1I3, P2I2, P3I3, P4I2 and P4I3 (**Table AS 70.10.1**).

The total water used was significantly lower in 120 cm spaced furrow planting with alternate skip furrow irrigation after earthing up + green manure mulching (1868 mm) and it saved 17.6% of irrigation water. However, it was at par with 120 cm spaced furrow planting with alternate skip furrow irrigation after earthing up without mulching (1982 mm). While, higher total water used was observed with 120 cm spaced furrow planting without mulching (2266 mm). Scheduling of irrigation at IW/CPE ratio of 0.6 consumed lowest amount of total water and saved 19.5% of water. While, the highest amount of total water was consumed by IW/CPE ratio of 1.0 (2310 mm).

Summary: 120 cm row spaced furrow planting with alternate skip furrow irrigation after earthing up + *dhaincha* green manure mulching found to enhance the water use efficiency and gave at par yield as that of 120 cm row spaced furrow planting with *dhaincha* green manure with irrigation at IW/CPE ratio 1.0.

Table AS 70.10.1: Effect of treatments on sugarcane at Mandya

Treatment	Single cane weight (kg)	Cane length (m)	Internodal length (cm)	No. of internodes	Millable cane ('000/ha)	Cane yield (t/ha)	Sucrose %	CCS %	CCS (t/ha)	Water used (mm)
P1	0.95	1.93	8.12	18.68	77.52	75.26	18.54	12.80	9.64	2266
P2	1.00	2.04	8.97	19.74	79.26	80.39	18.40	12.85	10.33	2188
P3	0.98	1.87	7.65	17.73	76.33	72.87	18.67	12.81	9.32	1982
P4	1.02	1.98	8.11	18.40	78.45	77.48	18.89	12.77	9.87	1868
S.Em.±	0.05	0.03	0.19	0.65	0.93	1.19	0.14	0.25	0.23	10.6
CD @ 5%	0.17	0.12	0.66	2.24	3.22	4.12	0.48	0.88	0.80	36.7
I1	0.97	1.79	7.08	16.08	74.73	69.97	18.63	12.97	9.07	1860
I2	0.99	1.98	8.22	18.51	78.41	77.33	18.73	12.92	9.99	2058
I3	1.01	2.10	9.33	21.33	80.53	82.21	18.51	12.54	10.31	2310
S.Em.±	0.07	0.03	0.08	0.58	0.73	1.63	0.12	0.05	0.18	12.0
CD @ 5%	0.28	0.10	0.31	2.29	2.88	6.39	0.48	0.21	0.70	47.2
P1I1	0.92	1.76	7.16	15.94	73.52	69.64	18.80	12.61	8.77	1999
P1I2	0.94	1.92	8.08	18.84	78.68	74.82	18.50	13.14	9.83	2278
P1I3	1.00	2.11	9.13	21.26	80.34	81.32	18.32	12.66	10.31	2521
P2I1	0.99	1.85	7.45	16.63	74.96	73.25	18.15	12.79	9.36	1963
P2I2	1.00	2.07	8.94	19.03	80.01	81.58	18.72	13.17	10.76	2171
P2I3	1.02	2.21	10.52	23.57	82.80	86.33	18.32	12.58	10.87	2430
P3I1	0.99	1.73	6.63	15.57	74.36	67.65	18.74	13.18	8.92	1785
P3I2	0.97	1.90	7.73	17.88	76.42	73.10	18.63	12.81	9.36	1974
P3I3	0.97	1.98	8.59	19.76	78.20	77.87	18.65	12.43	9.66	2186
P4I1	0.97	1.82	7.10	16.17	76.07	69.34	18.84	13.29	9.21	1693
P4I2	1.06	2.02	8.13	18.30	78.51	79.79	19.09	12.55	10.01	1810
P4I3	1.04	2.10	9.09	20.73	80.76	83.32	18.75	12.47	10.38	2101
S.Em.±	**0.07**	**0.04**	**0.28**	**0.78**	**2.01**	**2.37**	**0.31**	**0.27**	**0.41**	**30.5**
CD @ 5%	**0.22**	**0.14**	**0.88**	**2.41**	**6.20**	**7.29**	**0.97**	**0.83**	**1.27**	**94.1**

11. NAVSARI

Germination % at 30 DAP were recorded significantly highest with planting method P3 (Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing up without mulching) over other planting method and remained at par

with treatment P4 (Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing up + green manure/brown mulching). Irrigation levels failed to show significant effect on germination %.Interaction effect of planting methods and irrigation levels was found non-significant.Tiller population was significantly influenced due to different planting methods at 90, 120 and 180 DAP. At all the stages, significantly highest numbers of tillers were recorded with planting methods P4 and P2 and remained at par with each other over other methods. Irrigation levels did not show significant effect at 90 DAP however, significantly highest tillers population was observed with irrigation level I3 (1.00 IW/CPE ratio) and remained at par with I2 over I1 at 120 and 180 DAP.Significantly highest plant height was noticed with planting method P4 and P2 and found equally effective over other methods at all the growth stages. Irrigation level I3 recorded significantly highest plant height (151.45, 167.46, 183.50 cm) at 90, 120 and 180 DAP respectively over I1 and remained at par with I2.

NMC (106.71 '000/ha) was significantly recorded higher with planting method P4 (Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing up + green manure/brown mulching) and remained at par with P2. Significantly highest and lowest NMC were recorded withirrigation levels I3 and I1 respectively. Cane length did not show any significant effect due to planting method and irrigation levels. Cane diameter was significantly highest with planting methods P4 and P2 over others methods while it failed to show levels of significance due to irrigation levels. Planting methods did not show significant effect on single cane weight while irrigation level I3 recorded significantly highest single cane weight (1.30 kg) over I1 and I2 (**Table AS 70.11.1**).

Significantly highest cane (117.26 t/ha) and CCS (16.28 t/ha) yield was noticed with planting method P4 but remained at par with P2 over other methods. Significantly highest cane (122.12 t/ha) and CCS (16.68 t/ha) yield was observed with irrigation level I3 over I1 and I2.Among various quality parameters only CCS % and pol % cane were significantly influenced due to planting methods. Significantly highest CCS % and pol % cane were observed with planting method P4 and remained at par with P2 and P3 over P1. Quality parameters were not significantly influenced due to irrigation levels.Field water use efficiency was recorded highest (129.15 kg ha-1 mm-1) with irrigation level I1 followed by I2 (105.81 kg ha-1 mm-1) and I3 (101.77 kg ha-1 mm-1)

Interaction effect between planting methods and irrigation levels was found non-significant for all the growth, yield, quality and soil parameters.

Table AS 70.11.1: Effect of different treatments on sugarcane at Navsari

Treatment	NMC at harvest (000 ha^{-1})	Cane length at harvest (cm)	Cane diameter at harvest (cm)	Single cane weight (kg)	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
Planting method						
P_1	99.42	275.56	2.41	1.06	105.07	14.00
P_2	103.40	283.56	2.51	1.09	111.62	15.31
P_3	92.15	264.22	2.43	1.07	95.57	13.15
P_4	106.71	292.11	2.61	1.11	117.26	16.28
S.EM.±	2.85	8.14	0.04	0.04	2.51	0.31
C.D. at 5%	9.86	NS	0.14	NS	8.69	1.06
C.V.%	8.51	8.76	5.03	9.82	7.01	6.26
Irrigation level						
I_1	95.44	271.75	2.39	0.96	96.86	13.27
I_2	97.75	278.92	2.52	0.99	103.16	14.10
I_3	108.08	285.92	2.56	1.30	122.12	16.69
S. EM.±	2.52	6.57	0.06	0.03	2.46	0.39
C.D. at 5%	9.90	NS	NS	0.11	9.65	1.54
C.V.%	8.70	8.16	9.02	9.26	7.93	9.27
Interaction						
S.EM.±	5.77	13.51	0.08	0.05	5.74	0.91
C.D. at 5%	NS	NS	NS	NS	NS	NS

12. THIRUVALLA

The experiment with the objective of enhancing crop and water productivity in sugarcane was planted on 15.01.2016 and harvested on 10.01.2017. There were no effect on germination % and tiller count due to various planting methods and irrigation schedule.The treatment variation due to planting methods, green manure and mulch practices as well as irrigation schedule were significant for growth and yield parameters (**Table AS 70.12.1**).

The growth and yield attributes recorded in P4(furrow planting at 120 cm spacing with alternate skip furrow irrigation after earthing up+ green manure/brown mulching was significantly superior to other planting methods and mulch practices tried. The maximum cane length (251.44 cm), cane girth (10.00 cm), single cane weight (1.60 kg), MCC (85000/ha), cane yield (105.42 t/ha),and sugar yield(11.59t/ha) were recorded by P4. With regard to irrigation schedule, the highest value for cane length(253.15 cm), cane girth (10.10 cm), MCC (8702/ha), cane yield (108.50t/ha),and sugar yield(11.94t/ha) were recorded by I3 (IW/CPE ratio -1.00).

The interaction effect was significant for cane length, MCC, cane yield and sugar yield and the maximum values were recorded by the treatment combination P4I3 (256.96 cm, 88250, 110.21t/ha and 12.12 t/ha, respectively).There was slight 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 the treatment combination P4I3

Table AS 70.12.1: Effect of different treatments on sugarcane at Thiruvalla

Treatment	Germination (%)		Cane length (cm)	MCC ('000/ha)	CCS (%)	Cane yield (t/ha)	Sugar yield (t/ha)	BC ratio
	30 DAP	45 DAP						
P_1	51.58	54.65	244.30	76.83	10.0	96.19	9.62	-
P_2	49.34	52.71	240.65	72.47	9.8	90.50	8.88	-
P_3	53.18	57.60	247.92	81.24	10.5	100.78	10.58	-
P_4	55.75	61.03	251.44	85.00	11.0	105.42	11.59	-
CD	**NS**	**NS**	**2.40**	**3.15**	**NS**	**4.70**	**0.45**	**-**
I_1	52.33	56.66	248.91	78.71	9.9	95.65	9.47	-
I_2	55.40	58.55	250.74	82.33	10.2	102.10	10.41	-
I_3	57.64	62.87	253.15	87.02	11.0	108.50	11.94	-
CD	**NS**	**NS**	**1.35**	**2.70**	**NS**	**4.08**	**0.33**	**-**
P_1I_1	54.60	57.75	245.90	73.64	9.3	92.14	8.57	1.22
P_1I_2	55.12	58.10	246.84	74.80	9.3	93.75	8.72	1.24
P_1I_3	55.14	58.82	247.75	76.15	9.5	95.08	9.03	1.25
P_2I_1	50.18	53.25	241.34	72.50	8.9	88.25	7.85	1.18
P_2I_2	51.25	54.19	243.10	73.10	9.0	90.47	8.14	1.18
P_2I_3	52.31	55.10	244.31	73.50	9.1	91.02	8.28	1.20
$P3I_1$	57.22	61.96	248.83	76.90	9.7	95.81	9.29	1.26
P_3I_2	57.50	62.23	249.94	78.94	9.8	98.65	9.67	1.28
P_3I_3	57.70	62.51	250.87	80.75	10.0	100.73	10.07	1.30
P_4I_1	57.96	62.84	251.60	82.56	10.2	103.50	10.55	1.33
P_4I_2	58.24	63.01	253.75	85.40	10.5	106.34	11.16	1.35
P_4I_3	58.73	63.24	256.96	88.25	11.0	110.21	12.12	1.38
PxI(CD)	NS	NS	4.14	5.03	NS	6.13	1.03	NS

EAST COAST ZONE

13. ANAKAPALLE

Significant differences in germination were not observed due to different treatments. However, scheduling irrigations at 1.0 IW/CPE (I3) recordedhighest germination of 86.7 %. All mulching treatments with furrow or alternate furrow irrigation methods recorded more or less similar germination from 83.2 to 85.4%. At 180 days, significant variations were observed in tiller population among different irrigation and mulching treatments. Scheduling irrigations at 1.0 IW/CPE (I3) recordedsignificantly more number of tillers (88136/ha) as compared to (I1)(83488/ha)but was found on par with I2 i.e. scheduling irrigation at 0.8 IW/CPE (86439/ha). Significant variations were not observed in tiller population at 150 DAP due to different mulching treatments. However furrow irrigation with sun hemp mulch recorded more number of tillers (87423/ha) at 150 DAP.

Significant differences were observed in number of millable canes at harvest due to irrigation and mulching treatments. Scheduling irrigations at frequent intervals (1.0 IW/CPE) (I3) recorded significantly more number of millable canes (65997/ha) at harvest as compared to less number of irrigations at longer intervals i.e. I2 (60292/ha) and I1 (58433/ha) treatments. Furrow irrigation with sun hemp mulch recorded significantly more number of millable canes (63029/ha) as compared to alternate furrow irrigation without mulch (60152/ha) and with mulch (61144 /ha) but found on par with furrow irrigation without mulching (61970/ha).

Significantly higher cane yield (87.7 t/ha) was recorded in scheduling irrigations at frequent intervals at 1.0 IW/CPE (I3) as compared to scheduling irrigations at longer intervals at 0.6 IW/CPE (78.1 t/ha) and 0.8 IW/CPE (81.3 t/ha) treatments. Significant differences in cane yield were not observed due to different mulching treatments. However furrow irrigation with mulching recorded higher cane yield of 84.8 t/ha.Per cent juice sucrose values did not vary significantly due to irrigation schedules or mulching treatments (**Table AS 70.13.1**).

Scheduling irrigations to sugarcane at 1.0 IW/CPE with 15 irrigations, received 112.5 ha-cm irrigation water and recorded lowest water productivity of 0.78t/ha-cm whereas, scheduling irrigations at 0.6 IW/CPE which received 60.0 ha-cm irrigation water with 8 irrigations recorded highest water productivity of 1.38 t/ha-cm (**Table AS 70.13.2**).

Summary: Significantly higher cane yield (87.7 t/ha) was recorded in scheduling more number of irrigations at 1.0 IW/CPE (I3) as compared to scheduling irrigations at I1 (78.1 t/ha) and I2 (81.3 t/ha) treatments. Significant differences in cane yield were not observed due to different mulching treatments. However furrow irrigation with mulching recorded higher cane yield of 84.80t/ha. Scheduling irrigations at 0.6 IW/CPE registered highest water productivity of 1.38.

Table AS 70.13.1: Effect of treatments on sugarcane at Anakapalle

Treatment	Germination (%)	Tiller population /ha at 150 DAP	LMC (cm)	NMC/ ha	Cane yield (t/ha)	Juice sucrose (%)	CCS (%)	Sugar Yield (t/ha)
Irrigation (IW/CPE)								
I_1- 0.6	82.30	83488	306.5	58433	78.1	19.06	13.7	10.7
I_2-0.8	84.20	86439	309.0	60292	81.3	19.09	13.8	11.2
I_3-1.0	86.70	88136	319.3	65997	87.7	18.80	13.0	11.4
SEm ±	-	668.0	3.3	630.0	1.30	0.17	0.30	-
C.D (0.05)	NS	2622.0	9.72	2470.0	4.0	NS	NS	-
Mulching								
T1-Furrow irrigation without mulching	83.5	86712	310.9	61970	81.80	19.3	13.7	11.2
T2-Furrow irrigation with mulching	83.2	87423	316.6	63029	84.80	18.9	13.7	11.6
T3-Alternate Furrow irrigation without mulching	85.4	86525	304.8	60152	80.90	19.06	13.5	10.9
T3-Alternate Furrow irrigation with mulching	84.8	86368	307.3	61144	81.90	18.70	13.1	10.7
SEm ±	-	459.0	4.0	465.0	1.4	0.20	0.17	
C.D (0.05)	NS	NS	NS	1381.0	NS	NS	NS	
Interaction		NS	NS	NS	NS	NS	NS	

Table AS 70.13.2: Effect of Irrigation treatments on water use and WUE

Irrigation (IW/CPE)	No.of Irrigations	Quantity of water applied (ha-cm)	Cane yield (t/ha)	Water Productivity (t/ha-cm)
I_1- 0.6	8	60.0	78.1	1.30
I_2-0.8	11	82.5	81.3	1.00
I_3-1.0	15	112.5	87.7	0.78

14. CUDDALORE

This experiment was laid out on 22.05.2016 with the objective to enhance the crop and water productivity of sugarcane in Strip Plot Design with three replications.

Among the methods of planting, furrow planting of sugarcane setts at 120 cm spacing with alternate skip furrow irrigation after earthing up with green manure/brown mulch recorded the maximum WUE of 2069.41 kg/ha-cm and it was on par with furrow planting (120cm row spacing) with alternate skip furrow irrigation after earthing up with green manure/brown mulching, which recorded WUE of 2038.69 kg/ha-cm. By adopting the IW/CPE ratio of 1.0 recorded the maximum WUE of 1831.87 kg/ha-cm.

Among the methods of planting, the furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing up without mulching recorded the maximum millable cane population of 132560/ha and it was on par with furrow planting (120cm row spacing) with alternate skip furrow irrigation after earthing up with green manure/brown mulching, which recorded 134560/ha and adopting the IW/CPE ratio of 1.0 recorded significantly the maximum millable cane population of 128460/ha. The result on individual cane length, cane diameter and cane weight revealed that, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded the maximum cane length (282.32 cm), cane diameter (2.84 cm) and cane weight (1.72 kg), it was on par with furrow planting (120cm row spacing) with alternate skip furrow irrigation after earthing up with green manure/brown mulching, which recorded 275.32cm, 2.74 cm and 1.65 kg of cane length, cane diameter and cane weight respectively. Adopting the IW/CPE ratio of 1.0 recorded the maximum cane length of 264.35cm, cane diameter of 2.93 cm and cane weight of 1.76 kg respectively (**Table AS 70.14.1**).

Among the methods of planting, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded significantly the highest cane yield (139.65 t/ha) and sugar yield (17.72 t/ha). Adopting the IW/CPE ratio of 1.0 recorded significantly the highest cane yield (131.87 t/ha), sugar yield (16.43 t/ha). The result on quality parameters revealed that, non-significant result among the treatment on quality parameters of cane. Among the methods of planting, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded the maximum commercial cane per cent of 12.69, it was on par with furrow planting (120cm row spacing) with alternate skip furrow irrigation after earthing up with green manure/brown mulching, which recorded 12.42 per cent. Adopting the IW/CPE ratio of 1.0 recorded the maximum12.65 per cent of CCS.

Regarding the result on economics, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded the maximum B:C ratio of 3.78, it was on par with furrow planting (120cm row spacing) with alternate skip furrow irrigation after earthing up with green manure/brown mulching, which recorded 3.55 (**Table AS 70.14.2**).

Summary: Among the methods of planting, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded significantly the maximum cane yield (139.65 t/ha), sugar yield (17.72 t/ha) and B:C ratio of 3.78 and adopting the IW/CPE ratio of 1.0 recorded significantly the maximum cane yield (131.87 t/ha), sugar yield (16.43 t/ha) and B:C ratio 3.58.

Table AS 70.14.1: Effect of different treatments on sugarcane at Cuddalore

Treatment	Cane Diameter (cm)	Cane weight (kg)	Brix (%)	Pole (%)	Purity (%)	CCS (%)	Cane yield (t/ha)	Sugar yield (t/ha)	B:C ratio
Planting method and mulch practice									
P_1	1.92	1.24	20.12	12.12	87.26	12.45	123.45	15.37	3.35
P_2	2.84	1.72	20.87	12.96	89.56	12.69	139.65	17.72	3.78
P_3	2.12	1.32	20.02	12.96	87.12	12.36	120.25	14.86	3.26
P_4	2.74	1.65	20.06	12.87	88.65	12.42	130.89	16.26	3.55
CD P=0.05	0.16	0.28	0.98	NS	NS	NS	8.45	1.38	
Irrigation schedule (IW/CPE) with depth of irrigation 7.5 cm									
I_1	1.88	1.20	19.92	12.29	85.30	12.34	123.64	15.41	3.40
I_2	2.41	1.48	20.35	12.69	88.02	12.51	127.84	16.11	3.47
I_3	2.93	1.76	20.74	13.06	90.62	12.65	131.87	16.43	3.58
CD P=0.05	0.13	0.22	NS	NS	NS	NS	7.07	0.88	

Table AS 70.14.2: Effect on water use efficiency at Cuddalore

Treatment	Soil Moisture (%)				Irrigation water applied (ha-cm)	WUE Kg/ha-cm
	70th day	80th day	90th day	100th day		
Planting method and mulch practice						
P_1	51.6	48.5	45.3	42.2	90.00	1371.67
P_2	62.5	58.7	59.3	56.4	68.50	2038.69
P_3	36.5	36.3	38.6	36.5	60.50	1987.60
P_4	58.6	45.4	57.3	55.3	63.25	2069.41
CD (p=0.05)	3.99	1.98	3.79	1.86		
Irrigation schedule (IW/CPE) with depth of irrigation 7.5 cm						
I_1	48.5	46.9	46.1	44.2	68.23	1766.04
I_2	50.2	47.9	47.8	45.0	70.59	1800.04
I_3	51.9	48.7	49.4	45.8	72.86	1831.87
CD (p=0.05)	NS	NS	2.64	NS		

15. NAYAGARH

The experiment was laid out in strip plot design with three replications. Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up + brown mulching method produced significantly higher NMC (92930/ha) and cane yield (103.93t/ha) which is closely followed by furrow planting (120 cm row spacing) with brown mulching (NMC and cane yield 92.68 '000/ha and 103.36 t/ha, respectively) (**Table AS 70.15.1**). Irrigating the crop at IW/CPE ratio of 1.0 produced highest NMC and sugarcane yield of 96.22 '000/ha and 106.17 t/ha, respectively which is significantly different from irrigating the crop at IW/CPE ratio of 0.6 (NMC and cane

yield 82.62'000/ha and 98.94 t/ha, respectively). Planting method x irrigation schedule interaction was found not significant. However maximum water use efficiency was recorded with IW/CPE of 0.6 (819.7 kg/ha-cm) followed by IW/CPE ratio of 0.8 (764.3 kg/ha-cm). Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up + brown mulching treatment recorded higher water use efficiency (819.6 kg/ha-cm) than other planting methods (**Table AS 70.15.2**).

Table AS 70.15.1: Effect of different treatments on sugarcane at Nayagarh

Treatment	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)
Planting methods and mulch practices									
P_1	52.26	76.97	87.68	88.48	101.93	21.59	17.95	12.04	11.14
P_2	53.83	90.08	90.75	92.68	103.36	20.69	17.56	11.90	11.63
P_3	51.66	83.83	85.94	86.83	102.05	20.25	17.23	11.69	11.39
P_4	50.92	88.41	88.46	92.92	103.93	19.45	16.85	11.54	12.12
SEm ±	5.48	3.400	2.82	2.54	2.24	1.05	0.45	0.29	0.25
CD at 5 %	NS	6.97	5.68	6.92	NS	NS	NS	NS	NS
Irrigation schedule									
I_1	52.86	82.34	79.82	83.62	98.94	20.82	17.54	11.84	11.33
I_2	51.96	85.72	82.26	87.75	103.34	21.44	17.84	11.97	11.88
I_3	50.24	92.29	90.68	96.22	106.17	19.75	17.25	11.86	12.46
SEm ±	4.52	2.74	2.74	2.68	1.94	1.22	0.41	0.24	0.255
CD at 5 %	NS	7.636	8.63	6.41	5.69	NS	NS	NS	0.68

Table AS 70.15.2: Effect of different treatments on water se efficiency at Nayagarh

Treatment	Cane yield (t/ha)	Quantity of water applied (ha-cm)	Water use efficiency (Kg/ha-cm)
Planting method			
P_1	101.93	142.6	714.8
P_2	103.36	133.8	772.5
P_3	102.05	130.7	780.8
P_4	103.93	126.8	819.6
Irrigation schedule			
I_1	98.94	120.7	819.7
I_2	103.34	135.2	764.3
I_3	106.17	150.4	705.9

NORTH CENTRLA ZONE

16. PUSA

The experimental findings reveal that except germination and single cane weight, all other growth, yield attributes and cane yield varied significantly with planting method. Paired row trench planting (30: 120 row spacing) with trash mulching @ 6 t/ha (P3) being at par with paired row trench planting (30: 120 row spacing)

without trash mulching (P4) produced significantly higher plant population (193800/ha), cane length (330 cm), cane diameter (2.48 cm), millable canes (143100/ha) and cane yield (106.4 t/ha) compared with other planting methods. Similar to cane yield maximum irrigation water use efficiency (3.62 t/ha-cm), pol (17.57%) and purity percent (89.3%) juice was obtained with paired row trench planting (30: 120 row spacing) with trash mulching @ 6 t/ha (P3), while the minimum with conventional flat planting (75 cm row spacing) without mulching (P2).

The number of irrigations was 5, 4 and 3 at IW: CPE ratios 1.00, 0.80 and 0.60 respectively. The total water applied on the basis of depth (7.5 cm) and number of irrigations was 37.5, 30.0 and 22.5 cm at IW: CPE ratios of 1.00, 0.80 and 0.60 respectively. Among the levels of irrigation, irrigation scheduled through IW: CPE ratio 1.00 recorded the significantly higher plant population (195200/ha), cane diameter (2.46 cm), millable canes (1, 44, 200/ha) and cane yield (107.1 t/ha) over lower levels. Irrigation water use efficiency decreased with successive rise in the level of irrigation. The quality viz., brix, pol and purity percent juice did not differ significantly due to different irrigation levels (**Table AS 70.16.1**).

Summary: Based on the one year study, it may be concluded that paired row trench planting (30: 120 cm row spacing) with or without trash mulching is more productive and efficient water user compared to conventional flat planting (75 cm row spacing) with or without trash mulching. Application of irrigation water at 1.00 IW: CPE ratio is most effective for realizing higher productivity from sugarcane cultivation in Bihar.

Table AS 70.16.1: Effect of treatments on sugarcane at Pusa

Treatment		Germination (%) at 45 DAP	Plant population ($\times 10^3$/ha) at 120 DAP	Plant height (cm) at 240 DAP	Cane length (cm) at harvest	Cane diameter (cm)	Millable canes ($\times 10^3$/ha)	Single cane weight (g)	Cane yield (t/ha)	Total volume of irrigation water applied (ha-cm)	Irrigation water use efficiency (t/ha-cm)
Planting method with and without mulch											
P_1	Conventional flat planting (75 cm row spacing) with trash mulching @ 6 t/ha	33.6	161.0	304	276	2.22	121.2	765	90.9	30.0	3.09
P_2	Conventional flat planting (75 cm row spacing) without mulching	34.3	146.2	299	273	2.16	112.0	762	85.1	30.0	2.89
P_3	Paired row trench planting (30: 120 cm row spacing) with trash mulching @ 6 t/ha	38.3	193.8	364	330	2.48	143.1	775	106.4	30.0	3.62
P_4	Paired row trench planting (30: 120 cm row spacing) without trash mulching	37.0	189.9	347	317	2.44	136.5	768	102.3	30.0	3.48
	SEm (±)	3.21	4.87	3.3	4.7	0.035	3.63	8.1	2.74	-	-
	CD (P=0.05)	NS	16.9	11.4	16	0.14	12.6	28	9.5	-	-
	CV (%)	12.2	8.6	9.0	5.0	6.3	8.5	7	8.6	-	-
Irrigation schedule (IW/CPE)											
I_1	0.60	35.3	143.0	305	279	2.18	109.8	759	81.4	22.5	3.65
I_2	0.80	37.0	173.9	334	305	2.34	130.6	771	98.0	30.0	3.29
I_3	1.00	36.6	195.2	346	313	2.46	144.2	773	107.1	37.5	2.87
	SEm (±)	0.46	2.26	5.5	3.8	0.022	1.68	12.5	1.29	-	-
	CD (P=0.05)	NS	8.9	21.5	16	0.07	6.6	NS	5.1	-	-
	CV (%)	7.5	6.0	10.5	8	5.6	5.1	15	6.2	-	-

17. SEORAHI

Sugarcane crop was planted on 27 February 2016 and harvested on 10 March-2017. Paired row trench planting (120:30 cm row spacing) with organic mulch @ 6t/ha treatment recorded significantly higher shoot population (141.34 thousand/ha), NMC (137.35 thousand/ha) and cane yield (113.94 t/ha) as compared to remaining treatments but at par with paired row trench planting (120:30 cm row spacing) without mulch treatment. Germination per cent was not affected significantly with different treatments of planting methods but maximum value (49.11 per cent) obtained in paired row trench planting (120:30 cm row spacing) with organic mulch @ 6t/ha treatment. Irrigation at IW/CPE ratio 1.0 recorded significantly higher germination (50.72 per cent), Shoot population (140.42 thousand/ha), NMC (136.45 thousand/ha) and cane yield (110.14 t/ha) over remaining treatments. Sucrose per cent was not affected significantly due to different treatments of irrigation schedules and planting methods (**Table AS70.17.1**).

Summary: Among planting methods, Paired row trench planting (120:30 cm row spacing) with organic mulch @6t/ha(P3) treatment produced significantly higher shoot population, NMC and cane yield over Conventional flat planting (75 cm row spacing) with organic mulch @6t/ha(P1) and Conventional flat planting (75 cm row spacing) without mulch (P2) treatments but among the irrigation scheduling, IW/CPE 1.0 ratio was best. Cane yield increased with increase the IW/CPE ratio.

Table As 70.17.1: Effect of different treatments on sugarcane at Seorahi

Treatment	Germination %	Shoot (000/ha)	NMC (000/ha)	Cane Yield(t/ha)	Sucrose %
planting methods					
P1	43.79	123.77	119.89	92.32	17.77
P2	43.25	121.98	118.80	76.97	17.81
P3	49.11	141.34	137.35	113.94	17.96
P4	46.57	140.92	136.90	108.33	17.96
SEm±	2.16	5.29	5.24	5.22	0.21
CD(P=0.05)	NS	15.52	15.38	15.31	NS
Fertility levels					
I1	39.41	118.15	114.39	89.98	17.91
I2	46.90	137.43	133.86	93.55	17.69
I3	50.72	140.42	136.45	110.14	18.03
SEm±	1.87	4.58	4.54	4.52	0.18
CD(P=0.05)	5.49	13.49	13.31	13.26	NS

NORTH EASTERN ZONE

18. BURALIKSON

The crop was planted on 18th April, 2016 and harvested on 7th March, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.75 %) and

low in available P (17.6 kg P2O5/ ha) and medium in available K (234 Kg K2O/ ha) with pH 5.14.

Data revealed that no significant difference was observed among the irrigation schedule on yield and quality of sugarcane (Table AS 70.18.1). However, the highest cane yield was recorded by paired row trench planting (30:120 cm row spacing) with organic mulching @ 6 t/ha (53.72 t/ha) which is statistically at par with paired row trench planting (30:120 cm row spacing without mulch (50.22 t/ha) but superior over other two planting methods. Moreover, no significant differences were recorded in case of quality of sugarcane (**Table AS 70.18.1**).

Treatment	**Germination (%)**	**Tiller population 120DAP (000/ha)**	**NMC (000/ha)**	**Cane length (cm)**	**Cane yield (t/ha)**	**Sucrose (%)**	**CCS (%)**
Planting methods							
A_1	44.10	74.00	75.35	216	47.66	18.07	12.90
A_2	44.02	68.31	71.95	212	44.88	18.11	13.09
A_3	47.09	83.54	80.52	229	53.72	18.09	13.08
A_4	46.21	76.24	77.68	214	50.22	18.13	13.15
CD 5 %	NS	5.21	4.81	NS	5.56	NS	NS
Irrigation regimes							
I_1	44.57	73.78	75.57	218	48.68	18.03	13.02
I_2	46.14	73.09	76.96	219	49.48	18.06	13.05
I_3	45.36	76.44	78.11	217	49.21	18.13	13.09
CD 5 %	NS	NS	NS	NS	NS	NS	NS

Table AS 70.18.1: Effect of treatments on sugarcane at Buraliksaon

PROJECT NO.: AS 71

Project Title: Carbon sequestration assessment in sugarcane based cropping system

Objective : To improve the total soil organic carbon build-up and sustain crop yields

Year of start : 2016 – 2017
Locations : All centers
Duration : One cycle of 3 years crop rotation

Treatments (Cropping system) : **North West and North Central Zones**

T_1 : Rice - Wheat – Rice – Wheat (residue retention without *Trichoderma*)
T_2 : Rice - Wheat – Rice – Wheat (residue retention with *Trichoderma*)
T_3 : Sugarcane – Ratoon (trash mulching without *Trichoderma*) - Wheat
T_4 : Sugarcane – Ratoon (trash removal without *Trichoderma*) - Wheat
T_5 : Sugarcane – Ratoon (trash mulching with *Trichoderma*) - Wheat
T_6 : Sugarcane – Ratoon - Wheat (trash incorporation through rotavator and*Trichoderma* incorporation before sowing of wheat)
T_7 : Sugarcane – Ratoon- Wheat (Zero tilled) without *Trichoderma*
T_8 : Sugarcane – Ratoon-Wheat (Zero tilled) with *Trichoderma*

Peninsular and East Coast Zones

T_1 : Soybean-wheat/maize/*toria*
T_2 : Sugarcane-Ratoon-cowpea/urd bean/moong bean
T_3-T_8 : Will be same as in North West and North Central Zones except wheat to be substituted by maize/*toria*/cowpea

Treatments : 8
Design : RBD
Replication : 3
Plot size : 6 rows of 6 meter length

Observations to be recorded : **Soil parameters**

1. Initial and final soil fertility status (0-30, 30-60 and 60-90 cm soil depths) as well as physical parameters (bulk density, infiltration rate, WHC)
2. Total soil organic carbon before start of the experiment and after harvest of every crop

Rice – Wheat/ Maize/*Toria*:

1. Germination count
2. No. of tillers at 30, 60 & 90 DAS
3. Days to maturity
4. Straw and grain yield

Sugarcane:

1. Germination at 35 & 45 DAP
2. Periodic tiller population 90, 120, 180 DAP/DAR
3. Plant height at 90, 120, 180 DAP/DAR
4. Growth parameters i.e., NMC, cane length, diameter and cane wt.
5. Juice quality (Brix, pol % and purity %)
6. Cane and sugar yields (t/ha)

Note:

All other trash management treatments will be same for both the regions.
Trichodermaviride solid based culture (10^7 cfu/g)
The experiment will be conducted in permanent field layout.
Planting season: February – March

CURRENT YEAR (2016-17) REPORT

NORTH WEST ZONE

1. FARIDKOT

Sugarcane: CoJ 88

Date of Planting: 22.03.2016 Date of harvesting: 16.03.2017

Rice: PR 124

Date of Transplanting: 24.06.2016 Date of harvesting: 19.10.2016

Wheat: PBW 725

Date of sowing: 11.11.2016 Date of harvesting: 22.04.2017

Initial Soil Status: pH: 8.6, EC: 0.30 dsm-1, OC= 0.30%, P =13.0 kg/ha, K= 750 kg/ha

The experiment was started with planting of sugarcane during 2016 and the effect of various treatments has been applied and their effect will be studied in ratoon crops. The yield of rice and wheat was at par in both the treatments. Sugarcane yield from plant crop was also at par in all treatments.

Yield of crops in rotation (t/ha)

T1- Rice(7.8) – wheat (5.6)
T2- Rice (7.9) - wheat (5.7)
Sugarcane: 94.6

2. KOTA

A field experiment was planted on 8th March, 2016 to improve the total soil organic carbon build-up and sustain crop yields. Sugarcane variety CoPb 09181 was planted at 75 cm row distance, keeping 3 budded 4 setts per meter row length. Uniform application of RDF was applied and cultural operations were followed as per recommendation as and when desired. The highest sugarcane – equivalent yield (62.40 t/ha) was recorded with the Soybean-wheat -moongbean (residue retention with Trichoderma) treatment than T1. The soybean – equivalent yield (52.89 q/ha), mean crop grain yield in kharif, rabi and summer season were also recorded in the same cropping system. Higher germination percent in kharif and rabi and tillers/plant in rabi were observed in Soybean-wheat -moongbean (residue retention without Trichoderma), while number of branches /plant in kharif and summer was recorded in soybean-wheat -moongbean (residue retention with Trichoderma) treatment (**Table AS 72.2.1**).

Significant increase in soil organic carbon (0.523 %) was recorded under soybean-wheat -moongbean (residue retention with Trichoderma) treatment over T3 and T4 treatment and at par with rest. The highest infiltration rate (4.62 mm/hr) was recorded under soybean-wheat -moongbean (residue retention with Trichoderma) treatment over all the treatment except T1.

Summary: Based on the one year study of soil properties, it can be concluded that soybean-wheat -moongbean (residue retention with Trichoderma) treatment was found better with respect to significant enhancement in OC, infiltration rate, bulk density, WHC and nutrient status of soil over T3 and T4 treatments. Cane yield (93.33 t/ha) was recorded with the Sugarcane – Ratoon - Moong bean system.

Table AS 71.2.1: Performance of crops in rotation at Kota

Cropping system	**Mean crop grain yield (q/ha)**			**Mean crop straw yield (q/ha)**			**Soybean-equivalent (q/ha /year)**
	Kharif	**Rabi**	**Sum.**	**Kharif**	**Rabi**	**Sum.**	
T_1**:**Soybean-Wheat-Mungbean (Residue retention without Trichoderma)	17.2	40.2	8.8	29.5	63.0	19.8	51.71
T_2**:**Soybean-Wheat–Mungbean (Residue retention with Trichoderma)	17.5	40.8	9.2	30.4	62.2	20.5	52.89

3. KAPURTHALA

Sugarcane Variety: CoJ 88

Date of Planting: 19.03.2016 Date of harvesting: 03.03.2017

Rice

Variety: PR 121

Date of Transplanting: 04.07.2016 Date of harvesting: 21.10.2016

Wheat

Variety: PBW 725

Date of sowing: 07.11.2016 Date of harvesting: 27.04.2017

Initial Soil Status: pH: 8.2, EC: 0.27 dsm-1, OC= 0.25%, P =13.5 kg/ha, K= 135 kg/ha

The experiment was started with planting of sugarcane during 2016 and the effect of various treatments has been applied and their effect will be studied in ratoon crops. The yield of rice and wheat was at par in both the treatments. Sugarcane yield from plant crop was also at par in all treatments.

T1	Rice: 6.3 t/ha Wheat: 5.0 t/ha
T2	Rice: 6.4 t/ha Wheat: 4.8 t/ha

Average Sugarcane yield: 80.1 t/ha over the cropping systems

4. LUCKNOW

The experiment was laid out in randomized block design with three replications. Sugarcane genotype CoPk 05191 was planted in the experiment by 18th Feb 2016.The experimental soil was silt loam with pH 7.42 and organic carbon 0.42%, low in available nitrogen (270 kg/ha), medium in available phosphorus (36 kg/ha) and medium in available potassium (310 kg/ha). The water holding capacity (%) ,bulk density , infiltration rate, SOC (%) , EC and available nutrients of N P K , were recorded at various soil depths (0-30, 30-60 and 60-90 cm).

Soil analysis of experimental field revealed that Rice-Wheat cropping system recorded mean organic carbon 0.36% as compared to sugarcane based cropping system (0.43%) in 0-30 cm depth of soil. It subsequently decreased in 30-60 cm depth and found 0.24 and 0.29 % SOC, respectively (**Table AS 71.4.1**).Mean available nutrient status of N and P_2O_5 after harvesting of sugarcane crop (T3-T8) and rice-wheat system (T1-T2) in soil decreased as compared to initial status of Treatments T3 to T8 showed mean higher status of available N (203.7 kg/ha),P_2O_5 (31.08 Kg/ha) and K_2O (340.2 Kg/ha) as compared to rice-wheat system(T1-T2). Residue retention with Trichoderma in wheat improved the wheat yield by 7%.

Rice-wheat cropping system recorded grain yield of rice 4.22 t and wheat 4.57 t/ha. However sugarcane plant crop yielded to the tune of 107 to 119 t/ha in different sugarcane based cropping system (T3-T8).

Table AS 71.4.1: Effect of residue retention and Trichoderma inoculation on soil properties at Lucknow

Cropping System	**pH**		**EC**		**% OC**		**N (kg/ha)**		**P_2O_5 (kg/ha)**		**K_2O (kg/ha)**	
	0-30	30-60	0-30	30-60	0-30	30-60	0-30	30-60	0-30	30-60	0-30	30-60
	After wheat (after one year – Rice-Wheat)											
T_1.Rice-Wheat-Rice Residue retention without Trichoderma	7.54	7.89	0.17	0.17	0.35	0.21	184.1	157.87	37.11	14.73	348.5	243.9
T_2.Rice-Wheat-Rice Residue retention with Trichoderma	7.6	7.49	0.17	0.13	0.37	0.27	171.0	118.40	25.34	17.34	327.4	229.2
	After Sugarcane											
T_3.Sugarcane-Ratoon (Trash mulching without Trichoderma)-Wheat	8.15	8.33	0.08	0.09	0.57	0.42	275.9	210.6	35.15	20.88	355.5	295.7
T_4- Sugarcane-Ratoon (Trash removel without Trichoderma)-Wheat	8.04	8.22	0.06	0.12	0.33	0.26	183.9	157.69	28.44	22.13	414.7	269.3

T_5 - Sugarcane-Ratoon (Trash mulching with Trichoderma)-Wheat	8.05	8.51	0.08	0.08	0.4	0.23	170.8	118.27	30.46	25.35	269.3	285.1
T_6 - Sugarcane-Ratoon (Trash incorporation through rotavator and Trichoderma incorporation before sowing of wheat)	8.13	8.39	0.07	0.06	0.45	0.18	183.9	105.1	30.46	21.39	317.8	343.2
T_7 - Sugarcane-Ratoon-wheat (Zero tilled) without Trichoderma	8.00	8.65	0.10	0.14	0.49	0.34	197.1	118.27	29.21	23.86	360.8	311.5
T_8 - Sugarcane-Ratoon-wheat (Zero tilled) with Trichoderma	8.02	8.51	0.10	0.1	0.35	0.31	210.2	170.83	32.8	22.89	323.2	306.2
Initial	7.42	7.34	0.23	0.22	0.42	0.16	269.6	194.43	35.86	28.45	310.2	310.2

5. PANTNAGAR

Sugarcane (Co Pant 5224) was planted on 22.2.2016 by flatbed method at 75 cm apart row to row. Soil of the experimental plot was silty clay loam, neutral in pH (7.2), rich in organic carbon (1.05%), low in available N, and medium in Potassium and high in available Phosphorus. Recommended dose of NPK (120: 60: 40 Kg/ha) was applied. Recommended package and practices were adopted to raise the crops (sugarcane, rice and wheat). Sugarcane was harvested on 15.3.2017. Observations were recorded as per technical programme.

(i) Sugarcane: Sugarcane crop produced almost similar shoot population, NMC and cane yield in different treatments which were found non-significant to each other. Sucrose% and CCS yield were also found non-significant.

ii) Rice : Rice crop variety HKR-47 was raised matured in 104 days after planting and produced 47.0 q/ha straw and 54.8 q/ha grain yield.

iii) Wheat :Wheat variety HD 2967 produced 48.6 q/ha grain yield and 46.2 q/ha straw, matured in 145 days.

Summary: Sugarcane crop produced almost similar cane yield and NMC in all the treatments and found non-significant. Sucrose% and CCS yield were also found non-significant. Rice variety HKR-47 produced 54.8 q/ha grain and 47.0 q/ha straw yield. Rice variety HD 2967 produced 48.6 q/ha grain and 46.2 q/ha straw yield. Initial values for N, P and K and organic carbon were also taken before planting of these crop and shown in Table at different depths (0-30, 30-60 and 60-90 cm).

PENINSULAR ZONE

6. PADEGAON

The data revealed that mean sugarcane yield was observed to the tune of 106.8 t/ha to 108.5 t/ha. The soybean yield recorded in treatment T1 was 15.60 5 q/haand T2 14.80 q/ha while wheat yield recorded in T1 was 26.85 q/ha and T2 31.71 q/ha.

7. POWARKHEDA

Soybean crop failed due to poor germination, and heavy rainfall. Wheat crop mean germination percent (77.67%), mean number of tillers at 30 DAS 2223.5 (000'/ha), mean number of tillers at 60 DAS 2736.2 (000'/ha), mean number of tillers at 90 DAS 2643.2 (000'/ha), days of maturity 140, mean straw yield 5.28 t/ha and mean grain yield 3.90 t/ha. The cane yield did not differ significantly due to various treatments. The cane yield was between 109.88 to 111.32 t/ha.

8. NAVSARI

Cane yield (124.61 t/ha) was recorded. Rice grain and straw (85.89 and 148.18 q/ha) and maize grain and straw (54.37 and 388.62 q/ha) yield were recorded with treatment T1.

After Rice crop, soil properties viz., pH, BD and available nitrogen were not significantly influenced due to cropping system. EC at 60-90 cm depth was recorded lowest under rice crop (T1) and at par with T3 however at other depth it did not show any significant effect. OC% was recorded highest with T3 and at par with almost all the treatment except T1, T5 and T7 while at other depth there was no significant difference observed due to cropping system. WHC % was recorded significantly highest under rice crop (T1) at 30-60cm and 60 -90 cm depth over sugarcane crop however it was not show any significant effect at 0-30 cm depth. Available P_2O_5 at 0-30 cm depthrecorded highest with T3 and remained at par with almost all the treatment except T1; at 30-60 cm, sugarcane planted plot recorded highest P2O5 over T1 and at par with T2 and T3, at 60-90 cm depth also sugarcane planted crop recorded significantly highest available P_2O_5 over T1 (rice crop) and remained at par with almost all the treatment. Available K_2O at 60 -90 cm depth noticed highest with sugarcane plot (T8) over T1 and at par with T2, T3 and T6. It was not influenced at remaining depth (**Table AS 71.8.1**).

After Maize crop, there was no significant difference observed due to cropping system on soil pH, OC%, BD, available nitrogen, available phosphorus. Soil EC at 0-30 and 60-90 cm depth was affected; it was recorded significantly lowest under rice crop (T1) and remained at par with T3 and T4 while at 30-60 cm depth it was not affected due to different system. Significantly highest and lowest WHC % was recorded under

rice crop (T1) and Sugarcane crop (T4) at 0- 30 cm depth respectively, while 30-60cm depth, it also obtained highest with rice crop an and lowest with sugarcane crop (T2). It was not significantly influenced at 60-90 cm depth. Available K_2O at 0-30 cm depth was recorded highest under rice crop plot (T1) over T5 and remained at par with the entire sugarcane crop. However at 30-60 and 60-90 cm depth, there was no significant difference observed due to various cropping system.

Table AS 71.8.1: Performance of rice and maize in cropping system at Navsari

Crop	Tillers (m^2)		Grain Yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Maturity days
	60 DAP	90 DAP			
Rice	133	192	8589.05	14818.18	115-120
Maize	3	5	5437.50	10712.50	110-115

9. MANDYA

A field experiment was conducted to improve the total organic carbon buildup and sustain the crop yield in sugarcane based cropping system. In this experiment the generally followed cropping system in the region (Soybean-Maize) is evaluated against the different sugarcane based cropping system. In first year, sugarcane was raised in T2 to T7 treatment and soybean-maize was grown in T1 treatment. All the sugarcane treatments recorded on par yield and yield attributing parameters; and in soybean-maize treatment, soybean yield was 18.23 q/ha and maize yield was 88.0 q/ha. The different treatments will be imposed in next year.

10. THIRUVALLA

The plant crop has been taken up during 2016-17 and subsequently treatment schedule for the ratoon crop as specified in the technical programme has been undertaken during 2017-18. Hence the results are awaited.

EAST COAST ZONE

11. ANAKAPALLE

First year experimentation results indicated that there was no significant variations in yield and quality of sugarcane plant crop in T2 to T8 treatments. After harvesting the cane soil samples were collected in every treatment replication wise and kept ready for soil analysis. Soyabean crop was sown during first week of June, 2016 and harvested during second week of September, 2016. After harvesting the soyabean crop soil samples were collected depth wise. Due to the continuous rainfall sowing of maize crop after harvesting of soyabean was delayed and maize crop was sown during third week of October, 2016. Soyabean crop establishment was poor due to continuous rainfall (186.4 mm) in the month of June, 2016 and recorded grain yield of 520 Kg/ha. Maize sown after soyabean performed better and gave green cob yield of 20,500/ha.

12. CUDDALORE

The pre plant soil samples were collected and analyzed for the estimation of physic chemical properties. The result showed that, the pH of 7.84, EC of 0.47 dS/m,

organic carbon content of 0.35 per cent, CEC of 29.84 c mol p (+)/Kg, available nitrogen content of 240.33 Kg/ha, available phosphorus content of 39.67 Kg/ha and available potassium content of 123.7 Kg/ha were found to be in the surface soil.This experiment was laid out on 24.02.2016.

In cropping sequence the soybean crop recorded germination (65.36 per cent), plant height (42.32 cm), LAI (2.81), number of pod per plant (42.21), number of seed per plant (35.69), seed weight (2.23 g/seed) and grain yield (16.23 q/ha).The maize crop recorded the germination (85.26 per cent), plant height (64.23 cm), LAI (3.27), number of cob per plant (1.96), number of seed per cob (438.65) and grain yield (23.86 q/ha).

The result revealed that among the treatment non-significant result was recorded with respect to cane yield and sugar yield. Even though, the highest cane yield (137.6 t/ha) and sugar yield (16.66 t/ha) was recorded.

13. NAYAGARH

Sugarcane (CoOr 10346) was planted. Initial soil organic carbon was calculated by taking observations of Organic carbon % and bulk density of different depths. In the first treatment cowpea (1.7 q/ha) and sesame (5.42 q/ha)were grown to compare with sugarcane based cropping system. The observations on growth parameters and yield and yield attributes were analysed but there were no significant differences among the treatments.

NORTH CENTRAL ZONE

14. PUSA

The data on growth, yield attributes, yield and organic carbon content on post-harvest soil and quality of sugarcane as affected by different treatments have been recorded.Data revealed that comparatively higher grain (3.98 and 4.22 t/ha) and straw (5.17 and 5.74 t/ha) of rice and wheat, respectively was obtained with rice- wheat-rice-wheat (residue retention with Trichoderma) cropping system (T2). However, sugarcane (88.5 t/ha) and sugar (10.73 t/ha) yield was obtained in other treatments.

PROJECT NO.: AS 72

Project Title: Agronomic performance of elite sugarcane genotypes

Objective : To assess the performanceof promising sugarcane genotypes of Advanced Varietal Trial (AVT)

Year of start : 2016-2017

Duration : One year

Locations : All centres where post of Agronomist has been provided as well as any voluntary center.

Planting time : North West, North Central & North East Zones: February-March

Peninsular & East Coast Zones: Ist fortnight of January

Treatments :

1. **Genotypes :** Please see varieties and checks of the Centre's zone (listed below)
2. **Agronomy :** **Spacing :** Wider spacing for all the entries
    1. 120 cm for North West, North Central, North East and East Coast Zones.
    2. 150 cm for the Peninsular Zone.

    Fertilizer levels:

    125% of the recommended dose of NPK for the zone

Design : RBD

Replication : 2 or 3

Plot size : North West, North Central, North East and East Coast Zones:
5 rows of 6 m length.
Peninsular Zone: 4 rows of 6 m length.

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

2. Separate trials to be laid out for early and mid-late maturity groups along with zonal checks.

Observations to recorded : i) Initial soil fertility status for available NPK, soil be texture, physico-chemical properties of the soil.

ii) Data on germination, no. of millable canes, cane yield, Pol (%), CCS(t/ha).

List of varieties (zone-wise) for the Experiment AS 72 during 2016-17

I. North West Zone (AVT II Plant)

Early maturing varieties (4): CoH 11262, CoLk 11201, CoLk 11202 and CoLk 11203

Zonal Check (2): CoJ 64 and Co 0238

Midlate maturing varieties (6): Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214 and CoS 11232

Zonal Check (3): CoS 767, CoS 8436 and CoPant 97222

II. North Central & North East Zones (AVT II Plant)

Early maturing varieties (4): CoP 11436, CoP 11437, CoP 11438 and CoSe 11451

Zonal Check (2): BO 130 and CoSe 95422

Midlate maturing varieties (4): BO 155, CoSe 11453, CoSe 11454 and CoSe 11455

Zonal Check (3): BO 91, CoP 9301 and CoSe 92423

III. Peninsular Zone (AVT II Plant)

Early maturing varieties (8): Co 10004, Co 10005, Co 10006, Co 10024, Co 10026, Co 10027, CoT 10366 and CoT 10367

Zonal Check (3): Co 85004, Co 94008 and CoC 671

Midlate maturing varieties (11) : Co 09009,Co 10015, Co 10017, Co 10031, Co 10033, CoM 10083, CoT 10368, CoT 10369, CoVC 10061, PI 10131 and PI 10132

Zonal Check (2): Co 86032 and Co 99004

IV. East Coast Zone (AVT II Plant)

Early maturing varieties (5): CoA 12321, CoA 12322, CoA 12323, CoOr 12346 and CoV 12356

Zonal Check (3): Co 6907, CoC 01061 and CoA 92081

Midlate maturing varieties: Will be conducted in 2017-18.

Note: Varieties other than listed above should not be included or substituted.

CURRENT YEAR (2016-17) REPORT

NORTH WESTERN ZONE

1. FARIDKOT

Early

The experiment was conducted by planting six genotypes at 120 cm spacing and by applying 125% of recommended N. Initial soil fertility status was pH 8.1, EC 0.43 ds/m, OC 0.51%, P 26.2 kg/ha, K 550 kg/ha. The highest cane yield was obtained for CoH 11262 (83.6 t/ha) which was at par with other genotypes except CoLk 11201 and CoLk 11202. Same was the case in sugar yield.**CoH 11262** was found promising in cane and sugar yield (**Table AS 72.1.1**).

Mid-late

The experiment was conducted by planting nine genotypes at 120 cm spacing and by applying 125% of recommended N. Initial soil analysis revealed pH 8.1, EC 0.43 dS/m, OC 0.51%, P 26.2 kg/ha, K 550 kg/ha. The highest cane yield was of CoPant 97222 (116.1 t/ha) which was significantly superior to all other genotypes. Amongst test entries the highest cane yield was of CoPb 11214 (98.3 t/ha) which was at par with CoLk 11206 (91.7 t/ha). Sugar yield was higher in CoLk 11206 but was at par with CoPb 11214. **CoPb 11214 and CoLk 11206** were found promising in cane and sugar yield (**Table AS 72.1.2**).

Genotypes	Germination %	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Cane yield (t/ha)	Sucrose (%)	CCS%	CCS (t/ha)

Table AS 72.1.1: Performance of early maturing genotypes at Faridkot

CoH 11262	35.0	114.1	79.3	229	3.08	83.6	16.15	11.44	9.54	
CoLk 11201	51.8	96.3	58.3	196	3.09	54.2	17.04	12.06	6.53	
CoLk 11202	46.5	85.7	67.6	241	3.03	71.7	16.72	11.73	8.41	
CoLk 11203	45.2	93.1	84.8	234	2.87	68.9	17.21	11.89	9.37	
Co 11027	26.8	80.5	63.9	220	2.63	1279	72.8	15.48	10.66	7.8
CoJ 64	47.8	108.9	88.9	233	2.69	78.6	16.52	11.73	9.21	
CoH 11263	24.9	111.9	80.2	174	2.96	1164	76.4	15.53	10.87	8.3
Co 0238	49.8	166.7	59.4	212	3.16	80.6	16.47	11.53	9.29	
CoLk 11204	30.3	91.1	76.1	190	2.75	1061	65.3	16.99	12.1	7.9
CD (5%)	7.2	13.3	10.6	26	0.21	8.4	NS	NS	0.77	
CoLK 11206	27.3	85.9	63.9	234	2.77	1423	91.7	15.82	11.07	10.2
CoPb 11214	26.3	135.1	98.3	205	2.60	1050	98.3	13.45	9.27	9.1
CoS 11232	26.9	92.4	95.6	222	2.43	1046	79.2	14.7	10.45	8.3
CoS 767	28.8	129.4	95.4	243	2.68	1391	105.6	15.02	10.39	10.9
CoS 8436	30.5	97.9	84.1	162	3.1	996	78.1	15.43	10.42	8.1
CoPant 97222	32.9	140.7	98.1	218	3.01	1615	116.1	15.21	10.68	12.4
CD (5%)	NS	34.2	18.9	32	0.26	375	9.7	1.22	1.01	1.6

Table AS 72.1.2: Performance of mid-late maturing genotypes at Faridkot

2. KOTA

Early

The data showed that soil of experimental trial was clay loam in texture, alkaline in reaction with bulk density 1.42 Mg/m^3). The soil was medium in available phosphorus and high in available nitrogen and potassium. The experiments crop was planted in spring on 12.3.2016 and harvested in 15.03.2017.The experiment consisted of 6 genotypes (CoH 11262, CoLK 11201, CoLK 11202 and CoLK 11203)compared with zonal checks CoJ 64 and Co 0238 were planted at 120 cm row spacing with 125% of the recommended dose of NPK (250:75:50 Kg/ha)).

Among genotypes, CoH 11262 recorded significantly higher germination (48.20 %), tiller count (139000/ha), number of millable cane (86800 thousand/ha) and cane yield (85.63 t/ha) over CoJ 64 and Co 0238 and at par with CoLK 11201, CoL11202 and CoLK 11203. Similarly CoH 11262 recorded significantly higher CCS yield (11.13 t/ha) over CoLK 11201, CoLK11202 and CoJ 64 and on par with rest of the genotypes. Whereas brix (21.53 %), sucrose (19.03 %) and CCS (13.14 %) were recorded

significantly higher in genotype CoLK 11203 over CoLK 11201, and CoJ 64 and on par with rest of the genotypes (**Table AS 72.2.1**).

Mid-late

The experiment crop was laid in spring on 15.3.2016 and harvested on 16.03.2017.The 9 genotypes (Co 11027, CoH 11263, CoLk 11204, CoLk 11206, CoPb 11214 and CoS 11232; zonal check, CoS 767, CoS 8436 and CoPant 97222) were planted at 120 cm row spacing with 125% of the recommended dose of NPK (250:75:50 kg/ha)).Among genotypes CoLK 11206 recorded significantly higher germination (47.25 %), tiller count (141500/ha), number of millable cane (94800 thousand / ha), and single cane weight (1170 g) over Co 11027, CoLK 11204, CoPb 11214, CoS 11232 and CoS 767 and at par with CoH 11263, CoS 8436 and CoPant 97222. Cane yield (88.15 t/ha) was recorded significantly higher in genotype CoLK 11206 over CoPb 11214, CoS 11232 and CoS 767 and at par with rest of genotypes. Similarly CoLK 11206 recorded significantly the highest CCS yield (11.41 t/ha) over CoLK 11204, CoS 11232 and CoS 767 and at par with rest of genotypes. Whereas brix (21.40 %), sucrose (18.90 %) and CCS (13.06 %) recorded significantly higher in genotype CoPB 11214 over CoLK 11204, CoS 11232 and CoS 767 and on par with rest of the genotypes (**Table AS 72.2.2**).

Table AS 72.2.1: Performance of early genotypes of sugarcane at Kota

Treatment	Germination 45 DAP (%)	Tillers 180 DAP (000/ha)	Cane length (cm)	Millable cane (000/ ha)	Single cane weight (g)	Cane yield (t/ha)	Sucrose (%)	CCS (%)	CCS yield (t/ha)
Varieties									
CoH 11262	48.20	139.00	223.37	86.80	1296.67	85.63	18.79	12.99	11.13
CoLK 11201	45.20	134.30	216.73	82.10	858.00	79.17	16.80	11.52	9.13
CoLK 11202	45.47	135.07	224.03	82.87	883.33	80.70	17.90	12.33	9.93
CoLK 11203	45.20	133.37	225.20	81.17	815.00	76.53	19.03	13.17	10.07
CoJ 64 (zc)	41.13	128.67	214.60	76.47	876.67	72.00	16.90	11.59	8.35
Co 0238 (zc)	43.80	137.73	231.53	85.53	996.67	85.13	17.80	12.25	10.42
SEm ±	1.14	1.98	9.74	1.98	33.64	2.82	0.48	0.35	0.36
CD (P=0.05)	3.61	6.24	NS	6.24	106.08	8.90	1.50	1.11	1.14
CV	4.42	2.55	7.58	4.16	6.11	6.12	4.62	4.95	6.37

Table AS 72.2.2: Performance of mid-late genotypes at Kota

Treatment	Germination 45 DAP (%)	Tillers (000/ha)	Cane length (cm)	Millable cane (000/ ha)	Cane yield (t/ha)	Brix (%)	Sucrose (%)	CCS (%)	CCS yield (t/ha)
Varieties									
Co 11027	48.00	135.25	205.00	88.55	83.20	20.75	18.23	12.57	10.47
CoH 11263	46.30	138.00	205.00	91.30	87.35	20.95	18.43	12.72	11.11
CoLK 11204	45.70	135.10	213.00	88.40	86.00	19.25	16.68	11.43	9.77
CoLK 11206	47.25	141.50	225.00	94.80	88.15	21.25	18.74	12.95	11.41
CoPb 11214	40.20	131.00	210.00	84.30	69.35	21.40	18.90	13.06	9.06
CoS 11232	42.60	131.20	210.00	84.50	72.60	20.05	17.51	12.04	8.74
CoS 767 (zc)	40.60	131.00	192.50	84.30	73.30	19.50	16.94	11.62	8.51
CoS 8436 (zc)	41.60	136.00	220.00	89.30	78.80	21.10	18.59	12.84	10.11
CoPant 97222(zc)	43.10	137.00	222.50	90.30	84.40	20.70	18.18	12.53	10.58
SEm ±	1.37	1.87	12.91	1.87	3.67	0.39	0.40	0.30	0.47
CD (P=0.05)	4.47	6.11	NS	6.11	11.96	1.27	1.31	0.97	1.52
CV	4.41	1.96	8.63	3.00	6.45	2.68	3.15	3.37	6.63

3. KAPURTHALA

Early

The experiment was conducted by planting six genotypes at 120 cm spacing and by applying 125% of recommended N in a soil having pH 8.2, EC 0.27 dS/m, OC=0.25%, P 13.5 Kg/ha and K 135 Kg/ha. The highest cane yield was of Co 0238 (84.6 t/ha) which was at par with CoLk 11203 (82.9t/ha) & CoLk 11202 (81.9 t/ha) and was significantly higher than other genotypes. Similarly Co 0238, CoLk 11202 and CoLk 11203 were also significantly better than other three genotypes in case of CCS (t/ha). **CoLk 11202 & CoLk 11203** were found promising in cane and sugar yield (**Table AS 72.3.1**).

Mid-late

The experiment was conducted by planting nine genotypes at 120 cm spacing and by applying 125% of recommended N. The highest cane yield was of CoS 11232 (85.2 t/ha) which was at par with CoPb 11214 & CoLk 11206 and significantly superior to all other genotypes. Sugar yield was highest in CoPb 11214 which was at par with CoS 11232 & CoLk 11206 (**Table AS 72.3.2**).

Table AS 72.3.1: Performance of early maturing genotypes at Kapurthala

Genotype	Germination %	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane girth (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)	CCS %	CCS t/ha
CoH 11262	45.8	101.2	83.3	249	2.51	1265	76.9	16.85	11.74	9.03
CoLk 11201	49.6	92.5	78.8	216	2.59	1180	71.2	17.34	12.06	8.59
CoLk 11202	48.2	99.4	77.6	231	2.61	1352	81.9	17.73	12.23	10.01
CoLk 11203	44.9	103.5	84.6	239	2.07	1251	82.9	17.95	12.39	10.27
CoJ 64	45.9	104.7	92.9	213	2.19	1006	72.6	18.02	12.33	8.95
Co 0238	49.2	97.9	79.4	242	2.89	1505	84.6	17.17	11.93	10.09
CD (5%)	NS	5.3	4.6	21	0.26	155	4.9	0.55	0.27	0.57

Table AS 72.3.2: Performance of mid-late maturing genotypes at Kapurthala

Genotype	Germination %	No. of Shoots 000/ha	NMC 000/ ha	Cane length (cm)	Cane girth (cm)	Single cane wt. (g)	Cane yield (t/ha)	Sucrose (%)	CCS %	CCS t/ha
Co 11027	38.7	90.6	70.9	225	2.61	1359	70.8	17.38	11.60	8.21

CoH 11263	39.9	91.9	81.4	192	2.66	1268	72.4	17.83	11.89	8.61
CoLk 11204	43.3	111.1	90.1	210	2.45	1171	77.2	17.49	11.99	9.26
CoLK 11206	47.3	115.4	93.9	214	2.37	1125	81.7	17.22	11.37	9.29
CoPb 11214	46.3	115.1	96.5	215	2.40	1050	80.3	17.65	12.07	9.69
CoS 11232	39.5	92.7	95.5	229	2.13	1036	85.2	16.35	11.28	9.61
CoS 767	42.8	99.4	93.4	233	2.28	1095	75.6	17.02	11.39	8.61
CoS 8436	45.5	92.9	81.1	188	2.33	956	71.1	16.83	11.12	7.91
CoPant 97222	42.9	100.7	90.1	218	2.48	1135	72.1	18.21	12.38	8.93
CD (5%)	NS	9.2	10.9	26	0.18	170	6.7	0.28	0.31	0.60

4. LUCKNOW

Early

A field experiment was conducted to evaluate the agronomic performance of different elite genotypes of sugarcane (early) at higher fertility level (25 % higher over recommended doses of NPK/ha) and at wider spacing (120 cm row to row). Experimental soil contained pH8.15, OC 0.41 %, available N 232 Kg/ha, available P_2O_5 32 Kg/ ha and available K_2O 213 kg/ha.

Germination (%) recorded at 45 DAP revealed that the genotype CoLk 11203 being at par with genotypes CoJ 64 was significantly higher than therest of the genotypes. The result also showed that highest tillers at 120 and 150 DAP, and NMC was registered with genotype CoLk11203 and lowest with CoH11262. However, highest stalk length (2.40 meter), single cane weight (1.34 kg), cane (76.81 t/ha) and sugar (10.17 t/ha) yieldwas recorded with Co 0238-a check variety for the trial. Similarly, highest sugar yield in Co 0238 was due to higher brix (21.26), and sucrose percentage (19.04) at maturity stage. Among CoLk series of genotypes, CoLk 11203 was superior over CoLk 11201 and CoLk 11202 in respect to all the parameters. The performance of genotype CoH11262 was significantly inferior over rest of the genotypes and gave lowest cane yield (18.84 t/ha), which is far below than the national productivity of

sugarcane. Highest brix, sucrose and purity % measured at 10-month stage was recorded with Co 0238, which was at par with CoLk 11203. While genotype CoLk 11201 showed the lowest value of all these parameters at the same growth stage (**Table AS 72.4.1**).

Mid-late

Germination (%) was significantly higher in genotype CoLk 11206 over CoH11263, Co Pant 97222, CoLk 11204 and Co 11027. Tillering at 120 DAP revealed that genotype CoPb 11214 gave significantly higher no of tillers over all the genotypes except CoLk 11206 and CoS 767. The genotype CoPb 11214 also maintained its superiority in no of tillers at 150 days stage from all the genotype tested except genotype CoLk 11204.

The data on NMC/ha showed significantly higher values in genotype CoLk 11204 over rest of the genotypes except CoPb 11214. But cane length and per cane weight was recorded significantly higher in CoLk 11206 among all the genotypes tested. Higher cane girth (2.53 cm) was reported in genotype CoPant 97222 but was at par with most of the genotypes except CoPb11214, CoLk 11204 and Co 11027 which were having lower cane girth. With the yield level of 80.76 t/ ha, the genotype CoLK 11206 proved to be the highest yielder but was at par with genotypes CoPb 11214 and CoLk 11204. The genotype CoLk 11206 gave highest sugar yield at both the stages (viz. 10 and 12 months stage) but was significantly at par with genotypes Co Pb 11214 and CoLk11204.

Quality parameters revealed that genotype Co11027 was significantly better in all the quality parameters viz. Brix, sucrose % and purity % at both 10 and 12 month stages of the crop. But other genotypes viz CoH11263 , Co Pant 97222, CoS8436 were also significantly at par with Co11027 (in brix), Co Pant 97222, Co S8436 (in sucrose), Co Pant 97222 (in purity) at 10 month stage and Co H 11263, Co Pant 97222 in purity at 12 month stage (**Table AS 72.4.2**).

Table AS 72.4.1: Performance of early genotypes at Lucknow

Treatment	Germination % at 45DAP	Tillers (,000/ha) at 120 DAP	Tillers (,000/ha) at 150 DAP	Stalk length (m)	Stalk diameter (cm)	Single cane weight (Kg/ha)	NMC (000/ ha)	Cane yield (t/ha)	CCS yield (t/ha) at 10 months
CoLk 11201	19.39	190.5	158.1	2.14	2.76	1.09	52.10	53.2	6.86
CoLk 11202	19.37	139.5	153.4	2.34	2.41	1.02	54.93	57.5	7.23
CoLk 11203	25.87	280.2	221.4	2.09	2.12	0.85	71.59	64.1	8.39
CoH 11262	10.98	54.4	83.2	1.75	2.55	0.95	21.21	18.8	2.41
CoJ 64	25.34	237.4	156.4	1.92	2.47	0.99	61.81	60.4	8.03
Co 0238	19.50	143.7	125.0	2.40	2.43	1.34	57.38	76.8	10.17
C.D.	1.88	48.4	33.6	0.20	0.16	0.16	4.82	6.94	0.78
SE(m)	0.58	15.2	10.5	0.06	0.05	0.05	1.51	2.17	0.25
SE(d)	0.83	21.4	14.9	0.09	0.07	0.07	2.13	3.07	0.35
C.V.	5.07	15.1	12.2	5.19	3.41	8.31	4.92	6.82	5.90

Table AS 72.4.2: Performance of mid-late genotypes at Lucknow

Genotype	NMC	Cane length (cm)	Per cane wt(g)	Cane girth (cm)	Cane yield (t/ha)	Sugar yield t/ ha (at 10 months)	Sugar yield t/ ha (at 12 months)
CoH11263	58333	125	538	2.39	31.30	3.86	3.98
CoPb 11214	100540	200	800	2.18	79.77	9.53	9.36
Co Pant 97222	64660	183	943	2.53	62.78	7.85	8.17
CoLk 11204	105632	183	677	2.17	73.12	8.66	8.83
CoS 8436	76311	120	623	2.49	46.96	5.87	5.92
Co Lk 11206	73950	229	1109	2.34	80.76	9.58	9.72
Co 11027	63055	186	890	2.29	55.14	7.17	7.59
Co S 767	82021	202	760	2.30	63.60	6.83	7.07
C.D. at 5%	15800	21.89	158.23	0.23	8.86	1.12	1.23

5. PANTNAGAR

Early

Among all the genotypes (6), cane yield was highest (102.9 t/ha) of the genotype CoH 11261, which was significantly higher over rest of the genotypes (**Table AS 72.5.1**). The cane yield was significantly higher over national checks i.e. CoJ 64 (77.4 t/ha) and Co Pant 3220 (87.8 t/ha). Co 0238 could not be planted due to non-availability of seed from the breeder. Heavier cane with higher shoot population at different stages of crop growth were also recorded in the genotype Co H 11262 over rest of the genotypes. However, NMC were higher in national check (Co J 64) but there was no significant difference in between Co J 64 and CoH 11262. Higher sucrose (17.9%) was also higher in genotype CoH11262 which were significantly higher over rest except Co Pant 3220. CCS yield was recorded highest (15.2 t/ha) in genotype Co H 11262 which was significantly higher over rest of the genotypes. Germination % was almost the same in Co H 11262, CoJ 64 and Co Pant 3220 which was significantly higher over rest of the genotypes i.e. CoLK 110201, CoLK 110202, CoLK 110203.

Summary: As per observations recorded genotype CoH 11262 performed better among all the genotypes tested with regard to cane yield, NMC, germination %, individual cane weight, sucrose % and commercial cane yield. Sucrose % was on par to Co Pant 3220.

Treatment	Germi-nation %	Millable cane (000/ha)	Cane yield (t/ha)	Sucrose % in Nov.	Sucrose % at Harvest	CCS (t/ha)
	45 DAP					
T_1- CoLK 110201	8.7	40.7	46.3	17.3	17.1	6.8
T_2- CoLK 110202	6.7	49.3	64.6	16.9	17.2	9.6
T_3- CoLK 110203	15.2	47.3	43.0	17.3	17.4	6.3
T_4- CoH 11261	14.5	70.1	102.9	17.6	17.9	15.2
T_5- CoJ 64	15.5	72.0	77.4	15.6	15.9	11.0
T_6- Co Pant 3220	15.2	68.7	87.8	17.3	17.6	10.7

Table AS 72.5.1: Performance of early maturing genotypes at Pantnagar

SEm±	1.4	2.8	2.2	0.2	0.09	0.30
CD at 5 %	4.4	8.8	6.8	0.6	0.30	0.96

6. SHAHJAHANPUR

Early

The soils of experimental field was low in organic carbon (0.37%), medium in phosphorus (20.60 Kg/ha) and potash (161.0 Kg/ha) with pH 6. 7. Experimental plant crop of early genotypes was planted on 21.02.2016 and mid-late genotypes on 22.02.16. Crop of early genotypes was harvested on 02.03.2017 and mid- late genotypes on 06.03.17.

Experimental results of early genotypes revealed that genotype CoLk 11202 produced significantly higher cane yield (105.50 t/ha) than those of standards Co 0238 (103.10 t/ha) and CoJ 64 (87.60 t/ha). Regarding spacing significantly higher cane yield (99.30 t/ha) was recorded with 90 cm spacing than that of 120 cm (90.40 t/ha). CCS % in cane was more or less similar under various genotypes and spacing treatments (**Table AS 72.6.1**).

Mid-late

Experimental results of mid- late genotypes showed that genotype CoLk 11206 produced significantly higher number of millable cane (127030/ha) and cane yield (97.60 t/ha) than that of all three standards and other entries. Regarding spacing, significantly higher number of shoots (162760/ha), millable canes (119530/ha) and cane yield (91.52 t/ha) were recorded with 90 cm row spacing than those of 120 cm row spacing. CCS percent was not affected significantly due to various genotypes and spacing treatments (**Table AS 72.6.2**).

Summary: In early genotypes CoLk 11202 and mid–late genotype CoLk 11206 produced significantly higher cane yield than standards and other entries with cane yield of 105.50 t/ha and 97.60 t/ha , respectively. Row spacing of 90 cm was found superior to 120 cm spacing in cane yield under both early and mid – late genotypes with cane yield of 99.30/ha and 91.52 t/ha, respectively. CCS percent was not affected significantly due to various genotypes and spacing treatments.

Table AS 72.6.1: Performance of early maturing genotypes at Shahjahanpur

Treatment	Germination (%)	Shoots (000/ha)	Millable canes (000/ha)	Cane yield (t/ha)	CCS (%)
(A)Genotypes					
Entries					
CoLk 11201	46.04	138.59	106.14	94.30	13.01

CoLk 11202	41.62	149.98	113.01	105.50	12.97
CoLk 11203	44.47	131.60	109.85	89.60	13.43
Co H 11262	43.65	151.40	110.35	88.70	12.63
Standards					
Co 0238	43.96	144.36	102.54	103.10	13.00
CoJ 64	47.50	158.83	107.93	87.60	12.90
SE±	**0.64**	**1.33**	**0.40**	**3.80**	**0.16**
CD at 5%	**1.31**	**2.71**	**0.82**	**7.72**	**0.33**
(B) Spacing					
S_1- 90 cm	46.01	164.35	113.98	99.30	13.08
S_2 -120cm	44.74	127.23	102.79	90.40	12.91
SE±	**0.30**	**0.63**	**0.86**	**1.79**	**0.08**
CD at 5%	**NS**	**1.27**	**1.75**	**3.64**	**0.15**

Table AS 72.6.2: Performance of mid-late genotypes at Shahjahanpur

Treatment		**Germination (%)**	**Shoots (000/ha)**	**Millable canes (000/ha)**	**Cane yield (t/ha)**	**CCS (%)**
(A) Genotypes						
Entries						
V_1-	Co 11027	24.54	117.57	80.71	70.20	13.12
V_2-	CoH 11263	35.90	136.73	110.13	93.50	12.07
V_3-	CoLk 11204	43.30	168.38	115.15	96.30	12.05
V_4-	CoLK11206	43.90	155.71	127.03	97.60	12.32
V_5-	CoPb 11214	44.35	160.36	124.54	94.50	12.33
V_6-	CoS 11232	17.85	83.91	62.19	57.10	12.02
Standards						
V_7-	CoS 767	37.95	158.29	124.07	88.40	12.56
V_8-	CoS 8436	39.15	161.21	121.86	81.30	12.71
V_9-	CoPant 97222	39.10	151.52	110.00	89.50	12.23
SE±		**1.79**	**0.49**	**1.01**	**1.79**	**0.16**
CD at 5%		**NS**	**1.022**	**2.09**	**3.64**	**0.32**

(B)Spacing					
S_1- 90 cm	36.52	162.76	119.53	91.52	12.23
S_2 -120cm	35.83	110.90	96.62	77.90	12.56
SE±	**1.035**	**0.28**	**0.58**	**3.80**	**0.09**
CD at 5%	**NS**	**0.59**	**1.21**	**7.73**	**0.19**

7. UCHANI

All the genotypes were planted at 120 cm with 125 % of recommended dose of NPK i.e. 187.5+ 62.5+62.5 NPK kg/ha during spring season on March 4, 2016. Recommended dose of fertilizers for Haryana state are 150-50-50 NPK kg/ha. The soil of the experimental field was sandy loam in texture with pH 7.5, EC 0.4 dS/m, organic carbon 0.38%, available P 11.8 Kg/ha and available K 194 Kg/ha. The crop was harvested on March 3, 2017.

Early

Genotypes did not differ significantly in terms of germination per cent recorded at 40 days after planting. CoLk 11203 and CoJ 64 being at par produced significantly higher number of tillers and NMC as compared to rest of the entries whereas; CoJ 64, CoLk 11201, CoLk 11202 and Co 0238 were found at par with each other. CoH 11262, CoLk 11202 and Co 0238 being at par recorded significantly highest cane weight, cane yield and sugar yield as compared to CoLk 11201, CoLk 11203 and CoJ 64. Varieties CoLk 11201 and CoJ 64 being at par recorded lowest cane weight and cane yield. CCS per cent was not significantly affected by different entries.CoLk 11201 produced significantly lowest sugar yield among all the varieties (**Table AS 72.7.1**).

Mid-late

There was no difference in terms of germination per cent recorded at 40 days after planting. CoH 11263, CoLk 11204, CoLk 11206, Co Pb 11214, CoS 11232, CoS 767 and CoPant 97222 being at par recorded significantly higher number of tillers as compared to Co 11027 and CoS 8436, the latter two being at par with each other. Similar trend was observed in terms of millable canes recorded at harvest. Significantly highest cane weight was recorded in variety CoH 11263 and lowest in CoS767. Varieties CoH 11263, CoLk 11206 and CoPb 11214 being at par produced significantly higher cane yield as compared to checks and rest of the varieties. Varieties CoS 767, CoS 8436, Co 11027 and CoPant 97222 being at par recorded significantly lowest cane yield among all the varieties. Varieties did not differ significantly for CCS % at harvest. Varieties CoH 11263 and CoLk 11206 being at par produced significantly highest sugar yield among all the varieties (**Table AS 72.7.2**).

Summary: In early group, varieties CoH 11262, CoLk 11202 and Co 0238 being at par recorded significantly highest cane weight (986, 952, 978 g), cane yield (101.2, 103.1, 107.5 t/ha) and sugar yield (12.63, 12.85, 13.59 t/ha) as compared to CoLk 11201, CoLk 11203 and CoJ 64. In mid late group, Varieties CoH 11263 (102.9 t/ha), CoLk 11206 (100.3 t/ha) and CoPb 11214 (97.1 t/ha) being at par produced significantly higher cane yield as compared to checks and rest of the varieties. Varieties

CoS 767, CoS 8436, Co 11027 and CoPant 97222 being at par recorded significantly lowest cane yield among all the varieties. Varieties did not differ significantly for CCS % at harvest. Varieties CoH 11263 (12.99 t/ha) and CoLk 11206 (12.35 t/ha) being at par produced significantly highest sugar yield among all the varieties.

Table AS 72.7.1: Performance of early maturing genotypes at Uchani

Varieties	Germination (%)	Tillers (000/ha)	NMC (0000/ha)	Cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
CoH 11262	58.7	128.4	108.2	986	101.2	12.48	12.63
CoLk11201	57.8	136.0	114.3	740	79.8	12.58	9.99
CoLk11202	61.0	136.3	115.0	952	103.1	12.46	12.85
CoLk11203	62.5	153.4	126.8	768	91.8	12.57	11.53
Co 0238 (Check)	60.3	131.5	112.8	978	107.5	12.64	13.59
CoJ 64 (Check)	61.0	145.9	120.9	776	88.5	12.66	11.21
CD at 5%	NS	12.8	9.4	74	8.8	NS	1.14

Table AS 72.7.2: Performance of mid-late maturing genotypes at Uchani

Varieties	Germination (%)	Tillers (000/ha)	NMC (0000/ha)	Cane weight (g)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
Co 11027	46.8	120.2	103.0	882	85.5	12.24	10.45
CoH 11263	49.6	135.4	112.5	942	102.9	12.62	12.99
CoLk 11204	50.1	145.8	120.2	780	91.8	12.05	11.06
CoLk 11206	48.4	144.0	119.6	865	100.3	12.31	12.35
CoPb 11214	47.3	136.7	113.6	880	97.1	12.00	11.66
CoS 11232	47.6	135.0	112.2	844	92.2	12.50	11.52
CoS 767 (c)	45.9	138.5	115.2	745	83.4	12.00	10.03
CoS 8436(c)	46.4	119.8	99.7	881	85.2	12.40	10.56
CoPant 97222 (c)	46.0	131.0	109.0	828	87.7	12.60	11.07
CD at 5%	NS	12.8	11.1	35.1	7.1	NS	1.30

PENINSULAR ZONE

8. PADEGAON

Early

The data revealed that genotype CoT 10367 recorded significantly the highest germination (37.03% and 60.40%) at 30 DAP and 60 DAP, respectively and it was found at par with Co 10026, Co 10027, CoT 10366, Co 85004 and Co 10005 at 30 DAP and Co 10026, Co 10027, Co 85004 and Co 94008 at 60 DAP. Significantly the highest tillering ratio (1.60) was observed in genotype Co10006, while it was found at par with CoC 671. Significantly higher girth (10.14cm) was observed in genotype CoC 671, however it was found at par with all the genotypes except genotype Co 10024 and Co 85004.Co 10006 recorded significantly the highest number of millable cane (101111). However, it was found at par with Co 10005, Co 10026, Co 10027 and CoT 10366. Co 10006 recorded the highest cane and CCS yield (119.81 t/ha and 17.12 t/ha) and it was at par with Co 10026 in respect of CCS yield (**Table AS 72.8.1**).

Genotype Co 10027 recorded significantly the highest sucrose (21.51%), CCS (15.48%) and purity (95.99%) and it was found at par with CoT 10367, Co 85004, Co

10024 and Co 10026. Significantly the highest brix (22.61) was recorded in genotype CoT 10367 which was found at par with all the genotypes except Co 10004.

Mid-late

Genotype Co 10083 recorded significantly highest germination (35.42% and 68.31%) at 30 DAP and 60 DAP, respectively and it was found at par with Co 10033, Co 10017, Co 09009, PI 10131, Co 86032, CoT 10369 and CoVC 10061 at 30 DAP and Co 10033, Co 10017, Co 09009 and PI 10131 at 60 DAP. The genotype CoT 10369 and Co 09009 recorded significantly highest number of millable cane (100370). However, it was found at par with all the treatments except PI 10131. Genotype CoT 10369 recorded the highest cane and CCS yield (117.22 t/ha and 16.99 t/ha).While it was found at par with Co 10015 and Co 10031.

PI 10132 recorded significantly highest brix (22.44) sucrose (20.86%) and CCS (14.76%) and it was found at par with CoT 10368, Co 10083 and Co 10015 with respect to brix, CoVC 10061, CoT 10369, Co 10083, Co 86032, CoT 10368 and Co 10015 in respect of sucrose and CoVC 10061, CoT 10369, Co 10083, Co 86032, CoT 10368 and Co 10033 in respect of CCS per cent (**Table AS 72.8.2**).

Summary : The genotype Co 10006 was found significantly superior for cane and CCS yields than the other genotypes. Genotype Co 10027 recorded significantly highest sucrose %, CCS and purity as compared to the other early maturing genotypes. For mid-late groupgenotypes CoT 10369 was found significantly superior for cane and CCS yields than the other genotypes. Genotype PI 10132 recorded significantly the highest brix (c), sucrose % and CCS% as compared to the other genotypes.

Table AS 72.8.1: Performance of early maturity genotypes at Padegaon

Treatment	Cane Yield (t ha^{-1})	CCS Yield (t ha^{-1})	Germination (%)		No of Mill. Cane	Height (cm)	Sucrose (%)	CCS (%)
			30 DAP	60 DAP				
T_1: Co 10004	70.93	9.96	29.90	46.92	78889	229.00	19.59	14.05
T_2 : Co 10005	103.06	14.34	31.51	52.90	98704	232.67	19.93	13.91
T_3 : Co 10006	119.81	17.12	28.29	48.30	101111	201.33	20.26	14.30
T_4 : Co 10024	78.52	11.63	26.45	48.99	89722	179.67	20.90	14.80
T_5 : Co 10026	107.22	15.81	34.73	59.34	98148	233.00	20.79	14.75
T_6 : Co 10027	90.74	14.04	33.81	58.65	95556	173.67	21.51	15.48
T_7 : CoT 10366	102.69	14.60	32.43	50.14	95000	183.33	20.34	14.23
T_8 : CoT 10367	101.30	15.26	37.03	64.40	92407	210.00	21.24	15.10
T_9 : Co 85004	101.67	15.25	32.43	58.65	90000	198.67	21.10	15.00
T_{10} : Co 94008	85.56	12.34	29.21	54.05	93611	199.33	20.32	14.41

T_{11} : CoC 671	94.17	14.24	24.15	53.20	87222	215.33	21.06	15.12
CD at 5 %	**11.13**	**1.59**	**5.61**	**11.19**	**7360.10**	**44.56**	**0.81**	**0.80**

Table AS 72.8.2: Performance of mid-late maturity genotypes at Padegaon

Treatment	Cane Yield (t ha^{-1})	CCS Yield (t ha^{-1})	Germination (%)		No of Mill. Cane	Mill. Height (cm)	Sucrose (%)	CCS (%)
			30 DAP	60 DAP				
T_1: Co 09009	100.37	12.93	32.43	66.01	100370	181	18.33	12.86
T_2: Co 10015	112.59	15.86	26.45	43.47	99907	205	19.91	14.08
T_3: Co 10017	102.59	14.13	33.58	63.48	91944	216	19.57	13.78
T_4: Co 10031	115.00	15.93	29.44	48.30	94167	222	19.57	13.84
T_5: Co 10033	105.83	14.91	34.96	66.70	90926	270	19.56	14.07
T_6: Co 10083	91.02	12.97	35.42	68.31	87037	188	20.07	14.25
T_7: CoT 10368	101.57	14.28	29.44	51.29	91574	247	19.91	14.09
T_8: CoT 10369	117.22	16.99	31.28	57.96	100370	214	20.55	14.50
T_9: CoVC 10061	93.33	13.71	31.05	55.20	87315	181	20.69	14.69
T_{10}: PI 10131	88.61	12.35	32.43	61.87	82593	172	19.47	13.93
T_{11}: PI 10132	93.24	13.76	25.53	43.70	84630	240	20.86	14.76
T_{12}: Co 86032	103.52	14.73	32.43	56.35	94259	206	20.00	14.23
T_{13}: Co 99004	89.54	12.39	29.44	47.38	86574	232	19.48	13.84
CD at 5 %	**10.54**	**1.59**	**5.16**	**10.20**	**15914.14**	**43.22**	**0.98**	**0.82**

9. POWARKHEDA

Early

The initial soil properties were recorded as pH 7.46, EC 0.39 dS/m, OC 0.61%, available N 237 Kg/ha, P_2O_5 16.63 Kg/ha and K_2O 475 Kg/ha. Among genotypes evaluated germination percentage did not differ significantly. Co 10004 showed significantly higher number of tillers (96390) than Co 85004 (90370), Co 94008 (90650) and CoC 671 (89070). The NMC differed significantly due to varieties. Among varieties the NMC recorded was significantly higher with Co 10004 (91390) as compared to Co 85004 (85560), Co 94008 (85560) and CoC 671 (85000).The brix values ranged from 21.05 to 23.23 per cent for varieties. Co 85004 recorded significantly higher brix (23.23) than other varieties, but the brix values were at par for Co 85004 (23.23) Co 94008 (22.67) and CoC 671 (22.67) (**Table AS 72.9.1**).

Among varieties, Co 10004 recorded significantly higher cane yield (99.17 t/ha) than Co 85004 (93.43 t/ha) Co 94008 (93.15 t/ha) and Co C 671 (93.15 t/ha).

Mid-late

Germination did not differ significantly. Co 10031 showed significantly higher number of tillers (107.59 '000/ha) than Co 86032 (100.83) and Co 99004 (98.33). NMC population was recorded significantly higher with Co 10031 (102.22 '000/ha) as compared to Co 86032 (95.46), and Co 99004 (92.78). Co 10031 showed higher plant height (265 cm) as compared to Co 86032 (254) and Co 99004 (246). The brix values ranged from 21.05 to 21.25 for varieties. However, brix values did not differ significantly (**Table AS 72.9.2**). The cane yield was influenced significantly due to different varieties. Co10031 recorded significantly higher cane yield of (106.48 t/ha) than Co 86032 (100.00 t/ha) and Co 99004 (97.87 t/ha). The cane yield obtained at par in between Co 86032 (100.00 t/ha), PI 10131 (98.80 t/ha), Co 09009 (98.43 t/ha), CoT 10369 (98.33 t/ha), Co 99004 (97.87 t/ha), Co 10015 (97.22 t/ha) and PI 10132 (96.85 t/ha).

Summary: Results revealed that among the early genotypes Co 10004 recorded significantly higher cane yield (99.17 t/ha) than Co 85004 (93.43 t/ha) Co 94008 (93.15 t/ha) and Co C 671 (93.15 t/ha) but the cane yield obtained at par in between Co 85004 (93.43 t/ha) Co 94008 (93.15 t/ha), Co C 671 (93.15 t/ha) and CoT 10367 (93.06 t/ha). Among mid-late genotypes Co10031 recorded significantly higher cane yield (106.48 t/ha) than Co 86032 (100.00 t/ha) and Co 99004 (97.87 t/ha).

Table AS 72.9.1: Performance of early maturity genotypes at Powarkheda

S.No.	Treatments	Germi-nation (%)	Tillers (000'/ha)	NMC (000'/ha)	Height (cm)	Brix (%)	Yield (t/ha)
1	**Co 10004**	62.00	96.39	91.39	242	21.13	99.17
2	**Co 10005**	60.50	80.74	75.46	210	21.24	83.33
3	**Co 10006**	62.83	80.83	76.57	173	21.24	85.19
4	**Co 10024**	58.33	81.48	77.22	196	21.24	85.65
5	**Co 10026**	60.50	81.67	77.78	217	21.25	86.11
6	**Co 10027**	56.50	82.22	78.33	186	21.24	87.41
7	**CoT 10366**	52.17	81.85	77.87	171	21.05	87.22
8	**CoT 10367**	58.33	89.81	85.65	202	21.24	93.06
9	**Co 85004**	56.33	90.37	85.56	231	23.23	93.43
10	**Co 94008**	57.17	90.65	85.56	228	22.67	93.15
11	**Co C 671**	57.33	89.07	85.00	233	22.62	93.15
	S Em ±	**2.06**	**1.90**	**1.92**	**2.41**	**0.46**	**2.07**

	CD at 5%	**NS**	**5.54**	**5.60**	**7.01**	**1.34**	**5.61**

Table As 72.9.2: Performance of mid-late maturing genotypes at Powarkheda

S.No.	Treatments	Germi -nation (%)	Tillers (000'/ha)	NMC (000'/ha)	Height (cm)	Brix (%)	Yield (t/ha)
1	**Co 09009**	67.17	99.81	94.26	252	21.22	98.43
2	**Co 10015**	65.67	98.70	93.06	243	21.24	97.22
3	**Co 10017**	67.83	91.94	86.48	246	21.24	90.65
4	**Co 10031**	63.67	107.59	102.22	265	21.24	106.48
5	**Co 10033**	65.83	92.78	87.41	217	21.25	90.93
6	**CoM 10083**	63.50	94.26	88.70	186	21.24	92.96
7	**CoT 10368**	57.50	92.96	88.06	228	21.05	92.41
8	**CoT 10369**	63.67	100.56	94.91	222	21.24	98.33
9	**CoVC 10061**	62.00	88.98	83.89	244	21.24	88.24
10	**PI 10131**	61.83	100.46	94.72	246	21.25	98.80
11	**PI 10132**	61.50	98.24	92.69	231	21.25	96.85
12	**Co 86032**	62.33	100.83	95.46	254	21.22	100.00
13	**Co 99004**	62.67	98.33	92.78	246	21.22	97.87
	S Em ±	**2.02**	**2.09**	**2.13**	**2.67**	**0.05**	**2.07**
	CD at 5%	**NS**	**6.08**	**6.19**	**8.16**	**NS**	**6.03**

10. PUNE

The highest cane yield in early group of genotypes (119.81 t/ha) was obtained in genotype Co 10004 and mid-late genotype Co 10033 with134.41 t/ha which was more than the check variety, CoC 671 and Co 86032, respectively. Sugar yield (t/ha) was also significantly higher (20.18 t/ha) obtained in mid-late genotype Co 10033 followed by (19.29 t/ha) in Co 86032.Whereas, Co 10004 early genotype yielded 16.47 t/ha (**Table AS 72.10.1**). Benefit cost ratio was affected due to various genotypes, it was highest (2.68) in mid-late genotype Co 10033 and early genotype Co 10004 (2.22).

In early group, highest germination (70.20 %), tillering at 120DAP (0.74 lac/ha),number of millable canes (0.60 lac/ha),single cane weight (2.22 kg), cane girth (11.08 cm),number of internodes (24.66) and millable plant height (288 cm) were obtained in genotype Co 10004.While in mid-late group, highest tillering at 120DAP (1.14lac/ha),number of millable canes (0.86 lac/ha), and number of internodes (23.83) were obtained in genotype Co 10033.

The juice quality parameters measured in terms of Brix, Sucrose (%) and CCS (%) differed significantly due to different genotypes. In early group, highest Brix (20.68),

CCS (14.895) and Sucrose (20.145) was noticed in genotype Co 10004, but those were less than the check variety CoC 671. Whereas, mid-late genotype Co 10033 recorded maximum Brix (20.84), CCS (15.06) and Sucrose (20.61) (**Table AS 72.10.2**).

Summary: The results indicated that, the early genotype Co 10004 found better with maximum germination (70.20 %), tillering (0.74 lac/ha),single cane weight (2.22 kg), cane girth (11.08 cm), cane yield (119.81 t/ha), CCS yield (16.47 t/ha) and B:C ratio (1:2.22), but inferior in juice quality than check variety CoC 671.The mid-late genotype Co 10033 was found better with tillering (1.14 lac/ha), NMC (0.86 lac/ha), cane yield (134.41 t/ha), CCS yield (20.18t/ha), B:C ratio (2.68) and juice quality than the check variety Co 86032.

Table AS 72.10.1: Performance of genotypes at Pune

Ver No	Treatment Details	Ger % 45 DAP	Tillering (lac/ha) 120 DAP	NMC (lac/ ha)	Cane Yield (t/ha)	B:C Ratio	CCS T/ha	cane weight (kg/cane)
V1	Co 10004	**70.20**	**0.74**	**0.60**	**119.81**	2.22	**16.47**	**2.22**
V2	CoT 10366	46.56	0.63	0.54	75.61	1.40	12.87	1.26
V3	Co 10005	42.08	0.73	0.58	78.88	1.46	11.59	1.36
V4	Co 10033	60.58	**1.14**	**0.86**	**134.41**	**2.68**	**20.18**	1.67
V5	PI 10132	**60.83**	0.79	0.68	115.73	2.43	17.18	**2.10**
V6	Co 10015	48.95	0.86	0.70	68.86	1.70	13.89	1.30
V7	CoC 671.	64.37	0.73	0.65	79.16	1.80	12.85	1.44
V8	Co 86032	62.91	0.93	0.78	127.41	2.52	19.29	1.63
S.E.		1.99	0.07	0.05	14.41	-	1.42	0.01
C.D.at 5 %		6.05	0.23	0.17	43.74	-	4.37	0.03
CV		9.83	13.32	17.48	27.75	-	17.83	1.31

Table AS 72.10.2: Performance of genotypes at Pune

Ver No	Treatment	Intern -odes/ cane	Total height (cm)	Millable height (cm)	Cane Girth (cm)	Brix %	Pol %	CCS%
V1	Co 10004	**24.66**	324	**288**	**11.08**	**20.68**	**20.14**	**14.89**
V2	CoT 10366	24.00	**271**	231	10.63	19.56	19.97	14.39
V3	Co 10005	22.63	258	209	9.74	20.62	19.06	14.25
V4	Co 10033	**23.83**	313	276	10.49	**20.84**	**20.61**	**15.06**
V5	PI 10132	23.15	**335**	**300**	**11.33**	20.52	19.72	14.75
V6	Co 10015	21.16	267	234	9.58	19.77	20.23	14.44
V7	CoC 671.	21.83	228	185	10.99	21.36	21.38	15.14
V8	Co 86032	22.82	292	254	10.91	19.54	18.93	14.56
A- .E.		0.62	15.5	9.40	0.19	0.11	0.07	0.25
B- .D.at 5 %		1.89	47.07	28.54	0.59	0.33	0.21	0.78
C-		5.27	10.55	7.43	3.62	1.06	0.68	3.43

11. MANDYA

Early

A field experiment was conducted to assess the performance of promising early sugarcane genotypes of advanced Varietal Trial under optimum agronomic management practices and wide row spacing of 150 cm. Among the genotypes, Co 10005 recorded significantly higher cane yield (104.3 t/ha) as compared to others. This increased cane yield was mainly attributed to increased yield attributes viz., single cane weight (1.17 Kg), cane length (1.47 m), cane girth (2.18 cm), number of internodes (18.75) and number of millable cane (92.54 thousand/ha). While, the quality parameters viz., sucrose % and CCS % were not influenced significantly among the genotypes. But, CC sugar was significantly higher in Co 10005 (14.64 t/ha). This genotype recorded 20-30% higher cane yield over check varieties Co 671, Co 94008 and Co 85004 (**Table AS 72.11.1**).

Mid-late

Among the genotypes, Co 10033 was found superior with respect to cane yield (113.7 t/ha) as compared to others. But, was on par with PI 10131 (106.3 t/ha), PI 10132 (110.0 t/ha), CoVC 10061 (113.4 t/ha), CoT 10369 (103.4 t/ha) and Co 09009 (103.8 t/ha). This increased cane yield was due to enhanced yield parameters viz., single cane weight, cane length, cane girth, inter-nodal length, number of internodes and number of millable cane (**Table AS 72.11.2**). While, quality parameters viz., sucrose % and CCS% did not vary significantly among the genotypes, commercial cane sugar yield was significantly higher in CoVC 10061 (16.19 t/ha).

Summary: Among early genotypes, Co 10005 recorded significantly higher cane yield (104.3 t/ha). For mid-late genotypes, Co 10033 was found superior with respect to cane yield (113.7 t/ha).But, was on par with PI 10131 (106.3 t/ha), PI 10132 (110.0 t/ha), CoVC 10061 (113.4 t/ha), CoT 10369 (103.4 t/ha) and Co 09009 (103.8 t/ha).

Table AS 72.11.1: Performance of early genotypes at Mandya

Treatment	Single cane weight (kg)	Cane length (m)	Cane girth (cm)	Internodal length (cm)	Millable cane ('000/ha)	Cane yield (t/ha)	Sucrose %	CCS %	CCS (t/ha)
Co10004	1.28	1.43	2.79	8.41	52.13	67.7	18.36	13.01	8.81
Co10005	1.17	1.47	2.18	7.95	92.54	104.3	19.72	14.03	14.64
Co10006	0.86	0.83	2.43	8.26	76.67	66.3	18.16	12.83	8.50
Co10024	1.02	1.04	2.53	7.98	85.58	86.2	18.42	13.04	11.25
Co10026	0.96	1.15	2.56	8.83	86.22	84.1	19.66	13.91	11.71
Co10027	1.01	0.97	2.68	6.55	82.00	84.2	19.24	13.62	11.48
CoT 10366	1.01	1.11	2.50	6.64	81.45	83.4	18.67	13.21	11.01
CoT 10367	1.24	1.06	2.76	6.17	74.60	86.2	19.32	13.78	11.88
Co 85004	1.02	0.92	2.38	6.37	78.14	77.9	19.37	13.79	10.75
Co 94008	0.97	1.10	2.65	7.30	87.55	82.5	18.74	13.19	10.91
CoC 671	1.00	0.99	2.78	5.99	77.70	72.8	19.46	13.84	10.08

S.Em.±	**0.09**	**0.09**	**0.07**	**0.79**	**5.99**	**3.82**	**0.41**	**0.32**	**0.65**
CD (p=0.05)	**0.27**	**0.26**	**0.21**	**2.32**	**17.67**	**11.28**	**1.22**	**0.94**	**1.92**

Table AS 72.11.2: Performance of mid-late genotypes at Mandya

Treatment	Single cane weight (kg)	Cane length (m)	Cane girth (cm)	Internodal length (cm)	Millable cane ('000/ha)	Cane yield (t/ha)	Sucrose %	CCS %	CCS (t/ha)
Co10015	0.80	1.75	2.32	6.19	113.65	96.0	20.32	14.22	13.67
Co10017	1.14	2.02	2.46	4.65	96.28	95.3	19.69	13.81	13.16
Co10031	0.79	1.85	2.62	4.75	97.75	90.0	18.67	13.00	11.71
Co10033	0.78	2.20	2.47	7.87	136.20	113.7	18.89	12.71	14.43
CoM10083	0.94	1.62	2.24	5.12	104.00	97.0	18.91	13.17	12.77
PI 10131	1.11	1.59	3.15	7.71	121.31	106.3	19.36	13.69	14.55
PI 10132	0.94	1.94	2.71	7.87	130.75	110.0	19.85	13.63	15.00
CoVC10061	1.19	2.07	2.91	8.08	109.55	113.4	19.94	14.28	16.19
CoT10369	0.92	1.55	2.50	6.58	102.06	103.4	19.11	13.50	13.92
CoT10368	0.75	1.72	2.42	5.65	112.25	99.6	18.37	12.88	12.83
Co09009	0.88	1.37	2.52	5.48	112.83	103.8	18.85	12.77	13.55
Co 99004	0.92	1.47	2.57	4.98	99.44	84.3	20.00	14.18	11.95
Co 86032	0.92	1.47	2.40	5.75	97.89	93.5	18.62	13.12	12.27
S.Em.±	**0.15**	**0.12**	**0.20**	**0.61**	**9.49**	**5.20**	**0.60**	**0.77**	**1.30**
CD**(p=0.05)**	**0.46**	**0.38**	**0.60**	**1.89**	**29.24**	**16.02**	**1.86**	**2.36**	**4.00**

12. NAVSARI

Early

Germination (%) at 45 DAP was recorded significantly highest with V5 (Co 10026) over other genotypes and at par with V1 (Co 10004), V4 (Co 10024) and V6 (Co 10026) over checks. Number of tillers were significantly influenced due to different varieties at 120 and 180 DAP; significantly highest number of tiller (148.19 000 ha-1) was recorded with V11 (CoC 671) and at par with V1, V2, V4, V5 and V6 at 120 DAP while at 180 DAP it remained at par with V1, V4 and V5. Co 10004 recorded significantly highest NMC (104.44 000/ha) over checks and remained at par with V2, V3, V4, V5 and V6. Co 85004 recorded significantly highest single cane weight (1.34 Kg) and remained at par with almost all the varieties except V6 and checks V10 and V11.

Significantly highest cane yield (120.18 t/ha) was recorded with variety C0 10024 over checks and remained at par with all the varieties except V3. Co10024 recorded significantly highest CCS yield (16.49 t/ha) over checks and at par with V1, V2, V5 and V8. Among quality parameters, brix, pol % juice, purity %, pol % cane and CCS % were significantly influenced under different varieties. Significantly highest

brix and pol % juice were recorded with variety Co 10024 and at par with V3, V8 and V9. Purity % was recorded highest with checkV11 (CoC 671) and V2 (Co 10005) and remained at par with each other. Pol % cane and CCS % was recorded significantly highest with V8 (CoT 10367) and remained at par with V3, V4 and Checks V9 and V11 (**Table AS 72.12.1**).

Mid-late

Germination (%) at 30 DAP were recorded significantly highest with variety V8 (PI 10131) over V5, V7, V9 and V11. Significantly highest (173.41 & 139.27 000/ha) and lowest (127.58 & 93.58 000/ha) number of tillers were recorded with variety V4 (C0 10033) and check V11 (Co 99004), respectively at 120 and 180 DAP. Check V10 (Co 86032) recorded significantly highest NMC (125.70 000 ha-1) over other variety and remained at par with variety V2 and V6. Significantly highest cane length was noticed with variety V9 (PI 10132) over checks and remained at par variety V2, V3 and V6. Variety V2 (Co 10015) recorded significantly highest cane diameter over V1, V3 and V9 while other variety and check remained at par. Variety V2 (Co 10015) recorded significantly highest single cane weight (1.20 kg) over check Co 86032 (V10) and variety V1 and V3 while other varieties and check remained at par with V10.

Significantly highest cane yield (127.78 t/ha) was recorded with variety V2 (C0 10015) over checks and remained at par with the varieties V5, V6 and V8. CCS yield was not significantly influenced due to different varieties. Among various quality parameters, brix, pol % juice, pol % cane and CCS % were significantly influenced with different varieties. Significantly highest this parameters were recorded with variety V5 (CoT 10368) and check V11 (Co 99004) and found equally effective over other varieties further pol % juice and pol % cane remained also at par with V4 and CCS % with variety V4 and V6 (Table AS 72.12.2).

Summary: In early group significantly highest cane yield (120.18 t/ha) was recorded with variety C0 10024 over checks and remained at par with all the varieties except V3. Co10024 recorded significantly highest CCS yield (16.49 t/ha) over checks and at par with V1, V2, V5 and V8. Whereas, for mid-late genotypes significantly highest cane yield (127.78 t/ha) was recorded with variety V2 (C0 10015) over checks and remained at par with the varieties V5, V6 and V8. CCS yield was not significantly influenced due to different varieties.

Table AS 72.12.1: Performance of early maturing genotypes at Navsari

Variety	Germination (%) 45 DAP	No. of tillers at 180 DAP (000/ha)	NMC (000/ha)	Cane length (cm)	Cane girth (cm)	Single cane weight (kg)	Cane yield (t/ha)	CCS yield (t/ha)
V_1- Co 10004	49.56	115.30	104.44	262.00	2.53	1.25	119.78	15.95
V_2-Co 10005	42.06	106.69	99.72	224.66	2.38	1.24	110.17	14.72
V_3-Co 10006	46.53	103.19	93.06	255.40	2.46	1.22	102.19	14.01
V_4- Co 10024	54.63	108.94	102.78	270.26	2.63	1.33	120.18	16.49
V_5-Co 10026	55.33	110.00	92.78	271.91	2.74	1.24	109.59	14.42

V_6-Co 10027	49.55	107.49	91.39	275.86	2.66	1.17	105.74	13.99
V_7-CoT 10366	48.39	103.23	88.06	277.26	2.62	1.22	107.01	14.19
V_8- CoT 10367	48.77	104.96	87.22	257.68	2.67	1.27	106.14	14.56
V_9-Co 85004	44.13	96.74	83.33	282.87	2.71	1.34	94.36	12.95
V_{10}-Co94008	42.15	91.34	81.39	244.09	2.65	1.17	95.02	12.60
V_{11}-CoC 671	44.79	122.52	94.72	241.61	2.49	1.03	94.16	12.87
S. Em. ±	2.17	4.86	4.51	11.52	0.11	0.04	5.52	0.76
C.D. at 5%	6.41	14.34	13.31	33.98	NS	0.13	16.29	2.24
C.V. %	7.87	7.91	8.44	7.66	7.01	6.02	9.04	9.22

Table AS 72.12.2: Performance of mid-late maturing genotypes at Navsari

Variety	Germination % at 30 DAP	No. of tillers at 120 DAP (000/ha)	NMC (000/ha)	Cane length (cm)	Cane girth (cm)	Single cane weight (kg)	Cane yield (t/ha)	CCS yield (t/ha)
V_1-Co 09009	45.38	138.54	108.12	261.33	2.45	1.05	111.75	15.18
V_2-Co 10015	47.14	149.23	122.62	295.00	2.59	1.20	127.78	17.12
V_3-Co 10031	45.92	144.31	108.98	272.00	2.43	1.02	110.41	15.24
V_4-Co 10033	45.26	173.41	109.62	256.67	2.56	1.11	108.06	15.40
V_5-CoT 10368	41.75	146.14	105.05	246.67	2.62	1.07	114.93	16.60
V_6-CoT 10369	49.55	145.54	117.49	273.67	2.65	1.06	122.50	17.02
V_7-Co VC 10061	41.90	140.15	109.99	196.67	2.71	1.17	111.75	15.42
V_8-PI 10131	50.33	142.47	109.05	265.67	2.59	1.12	116.63	15.08
V_9-PI 10132	44.13	137.01	104.71	309.00	2.54	1.16	108.59	14.64
V_{10}-Co 86032	45.21	146.94	125.70	245.67	2.57	0.95	109.33	14.67
V_{11}-Co 99004	42.35	127.58	99.46	262.33	2.57	1.07	95.44	13.29
S. Em. ±	1.85	6.99	5.11	13.23	0.05	0.05	5.41	0.84
C.D. at 5%	5.44	20.62	15.07	39.02	0.15	0.14	15.95	NS
C.V. %	7.05	8.37	7.97	8.74	3.45	7.43	8.33	9.47

13. KOLHAPUR

Early

The data in respect of growth parameters revealed that the genotype Co 10004 recorded significantly highest germination (49.42%), stalk length (199.67 cm) and single cane weight (1.17 Kg) over standard checks,howeverat par with other genotypes CoT 10367 (46.47%), CoT 10366 (42.77%) and Co 10024 (42.48%).Single cane weight of the genotype Co 10004 (1.17 Kg) was found on par with Co10024 (1.09 Kg), CoT 10367 (1.05 Kg), CoT 10366 (1 Kg). None of the genotypeswas found significantly superior in respect of number of tillers at 120 DAP and number of millable cane over standard check Co 85004 (99350/ha and 93300/ha). However, the genotypes Co 10027 (93890 and 88950/ha), Co 10004 (90740 and 85890/ha), Co10026 (90190 and 85130/ha) and Co 10024 (89810 and 84510/ha) were found at par with variety Co 85004 in respect of tiller population and number of millable canes.

Co10027 recorded significantly highest cane and CCS yield (95.34 and 14.05 t/ha) over standard checks, however, it was found at par with the genotype Co 10004 (92.97 and 13.03 t/ha) followed by Co10026 (89.36 and 12.66 t/ha).As regards, quality

parameters at 10 month crop age none of the genotype found superior over standard check CoC 671 for brix0 (21.26), sucrose (19.84%) and CCS (14.07%). At 12 month, the genotype Co 10005 recorded significantly highest brix (22.30), sucrose (21.15%) and CCS (15.11%) over standard check and it was found at par with other genotypes CoT 10367, Co 10027, Co10024 and Co10026 (**Table AS 72.13.1**).

Mid-late

Genotype, PI 10132 recorded significantly highest germination (51.91%) over standard checks and was found at par with genotypes Co 09009 (46.18%), CoT 10369 (45.66%), CoM10083 (44.62%) and Co 10017(43.40%). The genotype CoT 10369 recorded significantly highest tillers at 120 DAP (100560/ha) over standard check and was at par with genotypes PI 10132 (92640/ha), Co 10033 (90280/ha) and CoM 10083 (88060/ha). Number of millable cane was recorded significantly highest by the genotype Co 10033 (87410/ha) and was found at par with genotypes CoT 10369 (85330/ha), Co 09009 (79050/ha), Co 10015 (79000/ha) and PI 10132 (76250/ha). The data on yield revealed that the genotype CoT10369 recorded significantly highest cane and CCS yield (t/ha) (88.07 and 12.75) over check varieties and was at par with genotypes CoM 10083 (85.35 and 11.95) and PI 10131 (84.08 and 11.46) (**Table AS 72.13.2**).

The juice quality parameters viz., brix, sucrose (%) and CCS (%) were not recorded significantly higher by any genotype than check variety Co 99004 at 10th month. At 12th month the genotype Co 10015 and CoT 10368 recorded significantly superior brix (22.44) over standard check. In respect of sucrose and CCS (%),Co10015 recorded significantly higher sucrose and CCS (21.44 % and 15.35%) over check varieties and was found at par with CoT 10368 (21.11% and 15.02%), Co 10031 (21.06% and 15.04%).

Summary: In early group Co10027 recorded significantly highest cane and CCS yield (95.34 and 14.05 t/ha) over standard checks, however, it was found at par with the genotype Co 10004 (92.97 and 13.03 t/ha) followed by Co10026 (89.36 and 12.66 t/ha). For mid-late group CoT10369 recorded significantly highest cane and CCS yield (t/ha) (88.07 and 12.75) over check varieties and was at par with genotypes CoM 10083 (85.35 and 11.95) and PI 10131 (84.08 and 11.46).

Table AS 72.13.1: Performance of early genotypes at Kolhapur

Genotype	Germination (%) 30 DAP	Tillers at 120 DAP ('000'/ha)	NMC at 12th months ('000/ha)	Single cane weight (kg)	Cane yield (t/ha)	CCS yield (t/ha)
Co 10004	49.42	90.74	85.89	1.17	92.97	13.03
Co 10005	37.85	88.43	82.91	0.91	75.56	11.42
Co 10006	31.54	60.19	59.62	0.83	48.72	6.51
Co 10024	42.48	89.81	84.51	1.09	87.01	12.85
Co 10026	38.19	90.19	85.13	0.93	89.36	12.66
Co 10027	42.01	93.89	88.95	0.90	95.34	14.05
CoT 10366	42.77	76.57	69.64	1.00	68.49	9.07
CoT 10367	46.47	68.89	61.66	1.05	65.74	9.89
Stds						
CoC 671	39.81	85.19	80.99	1.02	86.14	12.76
Co 94008	45.14	87.69	83.07	1.09	90.80	12.62
Co 85004	42.01	99.35	93.30	0.73	74.68	10.57
SE±	2.28	5.05	4.88	0.06	5.09	0.77
CD @ 5%	6.89	15.27	14.78	0.18	15.39	2.34
CV %	9.48	10.33	10.63	10.71	11.08	11.75

Table AS 72.13.2: Performance of mid-late genotypes at Kolhapur

Genotypes	Germination (%) 30 DAP	Tiller population at 120 DAP ('000'/ha)	NMC at 12th months ('000/ha)	Stalk diameter (cm)	Cane yield (t/ha)	CCS yield (t/ha)
Co 09009	46.18	81.81	79.05	2.47	72.64	10.30
Co 10015	35.42	82.22	79.00	2.13	70.73	10.86
Co 10017	43.40	61.25	54.89	2.07	20.81	2.62
Co 10031	32.99	75.97	67.93	2.64	69.44	10.44
Co 10033	42.01	90.28	87.41	2.21	75.35	10.18
CoM 10083	44.62	88.06	75.36	2.58	85.35	11.95
CoT 10368	32.64	70.97	66.94	2.25	50.70	7.62
CoT 10369	45.66	100.56	85.33	2.27	88.07	12.75
CoVC 10061	40.63	80.28	72.92	2.20	60.74	8.23
PI 10131	40.97	75.14	72.50	2.56	84.08	11.46
PI 10132	51.91	92.64	76.25	2.38	66.95	9.04
Stds.						
Co 86032	39.06	99.03	85.77	2.52	83.65	11.93
Co 99004	31.08	71.81	59.86	2.17	54.24	8.17
SE±	2.74	5.40	4.64	0.12	4.74	0.77
CD @ 5%	8.30	16.35	14.05	0.35	14.35	2.32
CV %	9.58	9.28	8.86	6.98	9.88	11.23

14. SANKESHWAR

Early

All the sugarcane varieties tested were found significant differ among them for germination number of tillers per plot, cane height and number of internodes per cane.Significantly higher germination count was recorded in V7-CoT 10366 (28.58%) and lowest count was recorded in V11 –CoC 671 (15.67).Significantly higher tiller number was recorded in V9 Co 85004 (73.25) and was on par with V5 Co 10026 (64.58). The lowest tiller count was recorded in V3 Co 10006 (39.08).The cane height was significantly higher in V5 Co 10026 (2.6 m) and lowest was recorded in V3 Co 10006 (1.77m). Number of internode was significantly higher in V8 CoT 10367 (23.33)

and was on par with all other varieties except V2 Co 10005, V3 Co 10006, and V6 Co 10027 (**Table AS 72.14.1**). The lowest number of was recorded in V4 Co 10024.Single cane weight was significantly higher in CoT 10367 (1.83 Kg) and was on par with Co 10026 (1.78), Co 94008 (1.70) and CoC 671 (1.58). The lowest single cane weight was recorded in V3 Co 10006 (1.07 kg).

Number of millable canes were significantly higher in Co 85004 (60.50 '000/ha) and was on par with CoT 10366 (58.17 '000/ha) and V1 Co 10004 (57.67 '000/ha). Lowest number of millable canes were recorded in V2 Co 10005 (43.43 '000/ha).Significantly higher cane yield was recorded in Co 94008 (68.20 t/ha) and was on par with Co 85004 (64.96 t/ha). The lowest cane yield was recorded in CoC 671 (49.95 t/ha).The POL was significantly higher in Co 10005 (22.02) and was on par with Co 10004 (20.20), Co 10006 (19.37), Co 10026 (20.36), CoT 10367 (21.71), Co 85004 (21.83) and CoC 671 (19.92). The lowest POL was recorded in V7 CoT 10366 (17.4).The higher CCS percent was recorded in Co 10005 (15.47) and the lowest was recorded in CoT 10366 (11.97). CCS yield was significantly higher in Co 85004 (9.99 t/ha) and was on par with Co 10005 (8.84), CoT 10367 (8.67) and Co 94008 (9.11). The lowest CCS yield was recorded in V4 Co 10024 (6.71 t/ha).

Mid-late

The germination was significantly higher in Co 10031 (24.33) and was on par with Co 09009 (21.25, Co 10017 (21.42), Co 10033 (21.17), CoT 10369 (21.75), PI 10131 (20.75) and Co 86032 (22.33). The lowest germination was recorded in Co 10015 (8.33). The number of tillers were significantly higher in CoVc 10061 (70.50 '000/ha) and was on par with Co 10017 (67.17 '000/ha), Co 10031 (63.25 '000/ha) and CoT 10369 (70.08 '000/ha). The lowest tillers were found in Co 10015 (18.50 '000/ha)).

Significantly higher number of millable canes (NMC) was recorded in PI 10131 (62.50 '000/ha) and was on par with Co 09009 (56.75 '000/ha), Co 10033 (56.58 '000/ha), CoM 10083 (57.08 '000/ha), PI 10132 (55.08 '000/ha) and Co 86032 (56.58 '000/ha). The lowest NMC was recorded in Co 10031 (48.42 '000/ha).Significantly higher cane yield was recorded in Co 86032 (61.53 t/ha) and all other varieties were on par except CoT 10369 and Co 99004 (49.11 t/ha) which recorded lowest cane yield (**Table AS 72.14.2**).

Sucrose percent was significantly higher in CoT 10369 (20.23) and was on par with all other varieties except Co 99004 (17.84) and CoT 10368 (17.16) which recorded lower sucrose percent.The CCS yield was significantly higher in PI 10131 (8.44 t/ha) and was on par with all other varieties except Co 99004 (6.03 t/ha) which recorded lowest CCS yield.

Summary: Among the early genotypes tested significantly higher cane yield was recorded in Co 94008 (68.20 t/ha) and was on par with Co 85004 (64.96 t/ha). The lowest cane yield was recorded in CoC 671 (49.95 t/ha). In mid-late group PI 10132 and Co 86032 performed better among the varieties tested for agronomic performance for most of the growth, yield and quality parameters.

Table AS 72.14.1: Performance of early genotypes at Sankeshwar

Varieties	Juice weight (kg)	Brix (%) 12M	Sucrose (%)	Purity (%)	CCS (%)	CCS Yield (t/ha)
V1-Co 10004	0.86	21.92	20.20	92.16	14.25	8.24
V2-Co 10005	0.65	24.10	22.02	91.39	15.47	8.84
V3-Co 10006	0.62	21.25	19.37	91.03	13.59	8.24
V4-Co 10024	0.75	20.75	17.81	85.81	12.14	6.71
V5-Co 10026	1.07	22.09	20.36	92.18	14.36	8.36
V6-Co 10027	0.73	19.82	17.44	87.34	12.04	6.93
V7-CoT 10366	0.75	19.92	17.40	87.37	11.97	6.73
V8-CoT 10367	0.99	23.43	21.71	92.67	15.34	8.67
V9-Co 85004 ©	0.62	23.76	21.83	91.88	15.37	9.99
V10-Co 94008 ©	0.98	19.11	18.50	96.52	13.33	9.11
V11-CoC 671 ©	0.88	20.65	19.92	96.16	14.33	7.11
MEAN	0.81	21.53	19.69	91.32	13.84	8.08
SEM ±	0.08	0.75	0.94	2.01	0.76	0.48
CV (%)	17.00	6.03	8.27	3.81	9.54	10.31
CD (5%)	0.23	2.21	2.77	5.93	2.25	1.42

Table AS 72.14.2: Performance of mid-late genotypes at Sankeshwar

Varieties	Germination count at 30 days	Cane yield (t/ha)	Sucrose (%)	CCS (%)	CCS Yield (t/ha)
V1-Co 09009	21.25	56.34	19.52	13.69	7.77
V2-Co 10015	8.33	59.03	19.60	13.63	8.08
V3-Co 10017	21.42	59.77	19.99	13.83	8.30
V4-Co 10031	24.33	61.35	19.52	13.70	8.42
V5-Co 10033	21.17	59.49	18.76	13.06	7.82
V6-CoM 10083	16.75	57.55	19.34	13.46	7.75
V7-CoT 10368	17.08	59.03	17.16	11.87	6.93
V8-CoT 10369	21.75	54.95	20.23	14.08	7.73
V9-CoVC 10061	17.33	58.84	19.87	13.81	8.14
V10-PI 10131	20.75	59.86	20.03	14.02	8.44
V11-PI 10132	15.75	57.18	18.99	13.30	7.59
V12-Co 86032 ©	22.33	61.53	18.41	12.70	7.80
V13-Co 99004 ©	10.92	49.11	17.84	12.32	6.03
MEAN	18.40	58.00	19.17	13.34	7.75
SEM ±	1.23	2.17	0.81	0.67	0.56
CV (%)	11.57	6.47	7.32	8.67	12.49
CD 5%	3.59	6.33	2.36	1.95	1.63

15. THIRUVALLA

In case of early varieties, the germination % and tiller count were influenced significantly by the various genotypes and the highest values for the said parameters were recorded by CoC 671 followed by Co 10005.

The treatment variation due to various genotypes were significant for cane length, cane girth, single cane weight, NMC, cane yield and sugar yield and COC 671 recorded the highest value for the said parameters (255.52 cm, 9.33cm, 1.62kg, 74750/ha, 85.21t/ha, 11.40 t/ha, respectively) followed by Co 10005 (244.70cm, 9.14 cm,1.53 Kg, 60750/ha, 72.0t/ha, respectively). The highest BC ratio of 1.33 was also recorded by CoC 671 (**Table AS 72.15.1**).

With regard to mid-late varieties, both the growth and yield parameters were influenced significantly by the genotypes and the highest values for cane length, cane girth, single cane weight, NMC, cane yield and sugar yield were recorded by Co10015 (250.90 cm, 9.75 cm, 1.59 Kg, 70120/ha, 87.64 t/ha and11.74 t/ha) followed by Co99004(248.61cm, 9.50 cm, 1.57 kg, 69350/ha, 62.25 t/ha and 9.97t/ha, respectively) The highest BC ratio of 1.35 was also recorded by Co10015 (**Table AS 72.15.2**).

Table AS 72.15.1: Performance of early genotypes at Thiruvalla

Treat-ment	Germination (%)	Tiller count (000/ ha)	Cane length (cm)	Cane girth (cm)	Single cane weight (Kg)	MCC (`000/ha)	CCS (%)	Cane yield (t/ha)	Sugar yield (t/ha)	B: C ratio
	45 DAP	150 DAP								
Co 10004	40.15	46.28	232.91	8.35	1.35	36.80	12.51	43.0	5.38	0.75
Co 10005	58.16	78.06	244.70	9.14	1.53	60.75	12.26	72.0	8.83	1.22
Co 10006	45.25	62.51	242.60	8.97	1.48	56.91	10.47	58.3	6.11	1.10
Co 10024	44.00	57.20	240.72	8.74	1.45	52.24	11.12	53.5	5.95	1.06
Co 10026	55.03	75.21	249.87	9.25	1.57	69.36	12.80	70.1	8.97	1.20
Co 10027	44.56	48.93	239.19	8.52	1.42	44.79	12.48	45.8	5.72	0.92
CoT 10366	42.20	51.78	236.05	8.60	1.40	47.66	11.42	48.5	5.54	0.96
CoT 10367	34.72	44.12	228.84	8.20	1.30	34.70	13.00	40.0	5.20	0.71
Co 85004	41.18	48.00	234.63	8.43	1.35	43.50	11.23	44.8	5.03	0.94
Co 94008	55.00	75.04	242.57	9.10	1.51	58.43	13.10	70.0	9.18	1.20
CoC 671	60.00	88.74	255.12	9.33	1.62	74.75	13.38	85.2	11.40	1.33
CD(0.05)	**4.18S**	**4.84**	**11.07***	**0.22**	**0.20**	**11.41***	**NS**	**10.1**	0.80	NS

Table AS 72.15.2: Performance of mid-late genotypes at Thiruvalla

Treatments	Germination (%)		Tiller count (000/ha)		Cane length (cm)	Cane girth (cm)	MCC (`000/ha)	CCS (%)	Cane yield (t/ha)	Sugar yield (t/ha)
	30 DAP	45 DAP	120 DAP	150 DAP						
Co 09009	51.50	55.74	75.90	72.05	242.55	9.16	65.344	13.41	68.75	9.22
Co 10015	58.75	62.15	93.71	90.84	250.90	9.75	70.12	12.75	87.64	11.74
Co 10017	30.68	35.22	49.08	45.21	227.00	8.30	42.24	12.84	41.12	5.28
Co 10031	41.10	44.19	54.12	50.74	227.18	8.45	45.75	12.86	47.64	6.13
Co 10033	50.09	53.00	68.75	65.66	238.70	9.10	60.03	12.15	62.37	7.58
CoM 10083	47.00	50.50	65.31	62.00	232.86	8.95	57.71	13.24	58.75	7.78
CoT 10368	46.21	49.64	62.80	59.72	230.57	8.90	56.00	12.29	56.25	6.91

CoT 10369	49.18	52.00	67.14	64.61	236.18	9.00	59.50	13.70	61.12	8.37
CoVC 10061	50.14	53.70	71.24	68.08	240.74	9.05	61.77	13.16	64.17	8.45
PI 10131	42.05	45.60	54.09	51.50	228.52	8.50	46.10	13.55	48.34	6.55
PI 10132	31.44	34.15	45.50	42.34	226.70	8.20	40.19	13.65	39.17	5.35
Co 86032	48.25	51.35	67.54	64.05	235.95	8.98	60.08	12.78	60.42	7.72
Co 99004	55.55	58.56	89.00	85.61	248.61	9.50	69.75	12.13	82.25	9.97
CD(0.05)	**3.65**	**4.25**	**5.10**	**4.92**	**10.34***	**0.18**	**9.00***	**NS**	**9.75***	**0.65**

EAST COAST ZONE

16. ANAKAPALLE

Initial soil analysis was done. The experimental soil was neutral in pH (7.46), normal in EC (0.18 dS/m), low in organic carbon (056%), low in available nitrogen (241 kg N/ha), high in available phosphorus (66.5 kg/ha) and high in available potassium (242 kg K_2O/ha).

Germination per cent was recorded at 35 days after planting. Among the five new genotypes Co Or 12346 recorded highest germination of 89.5 followed by Co A 12323 (82.2%). Lowest percent germination was recorded with the check variety Co C 01061.Tiller population at 180 DAP varied significantly. CoOr 12346 recorded significantly higher tiller population of 128093 but found on par with all other genotypes except Co A 12321 (119791/ha), Co A 12322 (105902/ha) and the check variety Co 6907 (121643/ha).

Number of millable canes at harvest varied significantly among different sugarcane genotypes. At harvest Co A 12322 recorded significantly higher number of millable canes of 76.6 thousands/ha as compared to the other zonal varieties Co or 12346, Co A 12321 and three check varieties Co C 01061, Co A 92081 and Co 6907 but found on par with Co A 12323, Co V 12356 (**Table AS 72.16.1**).**Co Or 12346 variety was severely infested with red rot disease in three replications and crop completely dried whereas Co A 92081 effected by smut.**

Cane yield early sugarcane genotypes under test varied significantly. CoA12322 (89.8 t/ha) followed by CoV 12356 (87.1 t/ha) and Co A 12323 (86.9 t/ha) recorded significantly higher cane yield as compared to other new sugarcane genotypes and also check varieties.

Summary :Among the five new early genotypes under test CoA12322 proved superior (89.8 t/ha) as compared to other genotypes but found on par with Co V 12356 (87.1 t/ha) and Co A 12323 (86.9 t/ha).

Table AS 72.16.1: Performance of early genotypes at Anakapalle

Treatment	Germination (%)	Shoot population at 180 DAP	NMC/ha	Cane yield (t/ha)	Juice sucrose (%)	CCS (%)	Sugar yield (t/ha)
Varieties:							

CoA12321 (2006 A 64)	79.8	119791	75000	85.8	16.3	10.13	8.7
CoA12322 (2006 A 102)	77.4	105902	76667	89.8	18.0	11.1	9.7
CoA12323 (2006 A 223)	82.2	86954	76112	86.9	18.4	11.67	10.4
Co or 12346	89.5	128093	70833	76.9	16.2	10.43	8.0
CoV12356	75.6	123031	75556	87.1	17.1	10.43	9.0
Co 6907	86.1	127546	74800	86.1	17.2	10.85	9.3
CoC01061	76.3	121643	73890	84.1	17.7	10.44	8.8
Co A92081	82.2	96065	70445	77.8	16.7	11.63	9.0
SEm ±	4.4	5658	544.0	0.95	0.60	-	-
C.D (0.05)	NS	17159	1650	2.9	NS	NS	-
C V(%)	9.5	8.6	5.6	5.0	5.7	7.0	-

17. CUDDALORE

The pre plant soil samples were collected and analyzed. The results indicated that, available N (256.36 kg/ha), available P (45.36 kg/ha), available K (202.15 kg/ha), OC (0.49 %), bulk density (1.35 g/cc), infiltration rate (1.28 cm/hr) was recorded.The experiment was laid out on 24.02.2016 with sugarcane genotypes viz., CoA 12321, CoA 12322, CoA 12323, CoOr 12346 and CoV 123456 along with the standards Co 6907, CoC 01061 and CoA 92081 in combination with application of 125 per cent of recommended dose of NPK (300:100:200 kg NPK/ha) in spring season.

The results revealed that the genotype CoA 12321 have recorded the maximum germination of 82.62 per cent and it was comparable with the standard CoC 01061and genotype CoA 13222, which recorded 87.96 and 81.89 per cent of germination.CoA 12321 have recorded the maximum tiller population of 194650/ha and it was comparable with the standard CoC 01061and genotype CoA 13222, which recorded 199860/ha tillers and 189680/ha respectively. The highest millable cane population of 136980/ha, cane weight (1.55 kg), cane length (294.3 cm) and cane diameter (2.87 cm) was reported for genotype CoA 12321.

CoA 12321 significantly recorded the highest cane yield (139.3 t/ha) and sugar yield (16.81 t/ha) and it was on par with the entries CoA 12323, CoC 01061 and CoOr 12346.The non-significant result was recorded on brix, pole, purity and commercial cane sugar percent. Even though, the new entry CoOr 12346 recorded numerically the maximum of 12.8 per cent CCS.The clone CoA 12321 recorded the maximum B:C ratio of 3.18 followed by CoOr 12346 which recorded 3.13 of B: C ratio (**Table AS 72.17.1**).

Summary:The genotype CoA 12321 significantly recorded higher cane yield (139.2 t/ha) and sugar yield (16.81 t/ha) resulted higher B: C ratio (3.18) with 125 % recommended dose of nitrogen per hectare.

Table AS 72.17.1: Performance of early genotypes at Cuddalore

Treatment	Germi-nation (%)	Millable canes '000 ha^{-1}	Cane wt. (kg)	Cane leth. (cm)	Cane Dia. (cm)	Cane yield t/ha	CCS (%)	Sugar yield t/ha	B:C ratio
CoA 12321	82.86	136.98	1.55	294.3	2.87	139.3	12.7	16.81	3.18
CoA 12322	81.69	132.54	1.39	293.3	2.92	136.6	12.6	15.39	3.10
CoA 12323	67.35	121.25	1.52	283.7	2.79	128.3	12.7	16.03	2.85
CoOr 12346	72.36	129.35	1.47	281.0	2.48	137.7	12.8	16.71	3.13
CoV 12356	79.62	121.20	1.43	270.7	2.76	122.3	12.6	14.29	2.67
Co 6907	72.65	124.32	1.19	263.7	2.58	112.4	11.9	13.66	2.37
CoC 01061	87.96	135.69	1.43	275.7	2.35	134.6	12.7	16.34	3.04
CoA 92081	67.89	121.25	1.49	261.7	2.73	122.3	12.5	14.12	2.67
CD (p=0.05)	4.98	7.16	0.08	9.96	0.15	7.19	0.70	0.86	

18. NAYAGARH

The experiment was laid out in randomized block design with five genotypes from AVT namely CoA 12321, CoA 12322, CoA 12323, CoOr 12346 and CoV 12356 along with three standard check i.e. Co 6907, CoC 01061 and CoA 92081on red laterite soil of the experimental farm. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dS/m. 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 (**Table AS 72.18.1**). Analysis of variance suggested that there is significant variations among the genotypes with respect to cane yield, sucrose %, CCS%, germination %, number of tillers at 120 days and number of millable canes ('000/ha). The genotype CoOr 12346 produced the highest average cane yield of 102.34 t/ha with application of 125 % RD of fertilizer and was closely followed by CoA 12322 (100.45 t/ha) and CoA 12323 (98.64 t/ha).

Table AS 72.18.1: Performance of early maturity genotypes at Nayagarh

Germination % at 45 DAP	No of tillers (000/ha) at 120 DAP	NMC (000/ha)	Cane yield (t/ha)	Juice Brix %	Juice Sucrose %	CCS %	CCS (t/ha)
CoA 12321	54.66	87.94	88.83	97.64	19.25	17.23	11.69
CoA 12322	53.83	88.68	89.45	100.45	20.69	17.56	11.90
CoA 12323	54.34	88.22	88.48	98.64	20.15	17.43	11.68
CoOr 12346	56.92	88.45	94.92	102.34	20.42	17.85	12.14
CoV 12356	50.48	83.43	86.7	95.78	18.22	16.65	11.24

Co 6907	54.34	82.45	85.6	93.45	18.82	16.87	11.12
CoC 01061	53.86	85.25	82.62	91.32	18.42	17.54	11.84
CoA 92081	54.96	86.85	87.75	94.68	19.44	17.84	11.97
SEm	1.22	2.68	2.24	2.75	1.78	1.16	0.54
CD (p=0.05)	NS	NS	5.46	6.64	NS	NS	NS
CV	4.67	3.75	4.35	5.62	6.32	3.64	3.12

NORTH CENTRAL ZONE

19. PUSA

Early

Growth, yield attributes, cane yield and sucrose content juice differed significantly among the genotypes. Genotype CoP 11436 noticed higher plant population (138000/ha) followed by BO 153 (124600/ha). The maximum number of millable canes (104800/ha) was also recorded with CoP 11436 which was significantly superior to CoP 11438 and CoSe 11451 and statistically similar to rest of the genotypes (**Table AS 72.19.1**). Similarly higher cane yield of 88.2 t/ha was recorded with CoP 11436 followed by CoSe 11451 (87.0 t/ha), BO 130 (81.1 t/ha), CoSe 95422 (78.0 t/ha), CoP 11437 (76.5 t/ha), BO 153 (74.1 t/ha) and lowest cane yield of 62.6 t/ha was recorded by CoP 11438. The maximum sucrose content (18.39%) was obtained with CoP 11438 which was significantly superior to CoSe 95422 and statistically comparable to rest of the genotypes.

Mid-late

Genotypes had significant impact on growth, yield attributes, cane yield and sucrose content juice. Genotype BO 155 recorded higher germination percentage (46.2%) plant population (152100/ha) and millable canes (107800/ha) followed by CoSe 95423. Genotype CoSe 11455 (103.4 t/ha), being on a par with BO 155 (91.4 t/ha) produced the highest cane yield and BO 91 (55.4 t/ha), the lowest. The higher sucrose content (18.71%) juice was noticed by the genotype CoP 9301 which was significantly superior to BO 155 (16.53%) and statistically comparable to rest of genotypes (**Table AS 72.19.2**).

Table AS 72.19.1: Performance of early genotypes at Pusa

Treatment	Germination (%)	Plant population ($\times 10^3$/ha)	NMC ($\times 10^3$/ha)	Cane yield (t/ha)	Sucrose (%) in juice
CoP 11436	46.5	138.0	104.8	88.2	18.14
CoP 11437	34.4	116.9	90.5	76.5	18.36
CoP 11438	22.0	64.0	53.3	62.6	18.39

CoSe 11451	34.2	102.1	79.2	87.0	18.25
BO 130	31.8	116.4	89.0	81.1	18.23
CoSe 95422	41.3	109.8	95.9	78.0	17.05
BO 153	47.7	124.6	89.1	74.1	18.37
SEm±	2.44	8.15	7.07	4.77	0.422
CD (P=0.05)	7.5	25.1	21.8	14.7	1.30
CV (%)	11.5	12.8	14.2	10.6	4.03

Table AS 72.19.2: Performance of mid-late genotypes at Pusa

Treatment	**Germi-nation (%)**	**Plant population ($\times 10^3$/ha)**	**NMC ($\times 10^3$/ha)**	**Cane yield (t/ha)**	**Sucrose (%) in juice**
BO 155	46.2	152.1	107.8	91.4	16.53
CoSe 11453	32.4	117.4	90.4	89.3	18.52
CoSe 11454	37.0	138.6	85.5	74.0	18.59
CoSe 11455	36.4	116.5	95.1	103.4	18.34
BO 91	31.3	97.2	74.8	55.4	18.26
CoP 9301	31.6	105.7	75.5	57.0	18.71
CoSe 92423	40.8	140.6	107.5	80.6	18.40
SEm±	2.80	10.93	5.39	4.07	0.156
CD (P=0.05)	8.6	33.7	16.6	12.5	0.48
CV (%)	13.3	15.3	10.3	9.0	1.49

20. SEORAHI

Early

The experimental field was medium in organic carbon (0.50 per cent), medium in available phosphorus (14.43 kg/ha) and low in potash (83.90 kg/ha) with pH 8.11. Sugarcane crop was planted on 26 Feb. -2016 and harvested on 23 Feb-2017.

In early group all test genotype produced significantly higher germination per cent, Shoot population, NMC and cane yield as compared to check varieties. CoP 11438 recorded significantly higher shoot population (185.28 thousand/ha), NMC (143.31

thousand/ha) and cane yield (111.24 t/ha) as compared with remaining test genotype and check varieties. Genotype CoSe 11451 and CoP 11437 obtained significantly higher sucrose per cent (18.17 and 18.11 per cent, respectively) over check variety CoSe 95422 (17.01per cent). Effect of fertility levels on shoot population, NMC and cane yield were resulted significantly higher in 125 per cent RDF treatment as compared to 100% RDF treatments. Effect of row spacing on Shoot population, NMC and cane yield were recorded significantly higher in 90 cm row spacing treatment. Effect of spacing and fertilizer level treatments were not affected significantly on germination and sucrose per cent but recorded maximum value of sucrose per cent in 125 per cent RDF and 120 cm row spacing treatments (**Table AS 72.20.1**).

Mid-late

All mid-late test genotype recorded significantly higher Germination, Shoot population, NMC and Cane yield over check varieties. Among mid-late test genotype, CoSe 11453 (16.74 per cent) produced maximum value of sucrose per cent. Cane yield was recorded significantly higher in CoSe 11455 genotype (98.09 t/ha) as compared with check varieties and remaining test genotypes. Effect of fertility levels on germination, NMC and cane yield were found significantly higher in 125 per cent recommended dose of fertilizer treatment as compared to 100% recommended dose of fertilizer treatments. Effect of row spacing on germination, shoot population, NMC and cane yield were recorded significantly lower, maximum sucrose per cent value (16.53) obtained in 120 cm row spacing treatment (**Table AS 72.20.2**).

Summary: Among test genotype, maximum sucrose per cent value produced in CoSe 11453 in mid-late and CoSe 11451 in early group genotype. CoSe 11455 in mid-late and CoP 11438 in early genotype recorded significantly higher cane yield over check varieties and remaining test genotypes. Cane yield increased up to 125 per cent recommended dose of fertilizer. 90 cm spacing treatment produced significantly higher yield as compared to 120 cm row spacing treatment. Sucrose per cent was not affected significantly with different treatments of fertility levels and spacing in mid-late and early genotype experiments.

Table AS 72.20.1: Performance of early genotypes at Seorahi

Treatments	Germination %	Shoot (000/ha)	NMC (000/ha)	Cane Yield(t/ha)	Sucrose (%)
Varieties					
V1	47.60	155.67	123.09	83.34	17.59
V2	52.19	165.62	128.31	87.31	18.11
V3	54.01	185.28	143.31	111.24	17.78
V4	52.35	173.86	128.90	94.68	18.17
Check					

V5	46.26	122.33	97.89	65.72	17.80
V6	46.37	135.94	106.67	70.92	17.01
SEm±	0.93	1.19	2.62	2.01	0.34
CD(P=0.05)	2.58	3.31	7.24	5.53	0.94
Fertility levels					
F1	49.50	148.50	116.38	83.46	17.70
F2	50.09	164.40	126.36	87.61	17.79
SEm±	0.54	0.69	1.51	1.15	0.19
CD(P=0.05)	NS	1.91	4.18	3.19	NS
Spacing					
S1	50.04	176.36	127.18	90.77	17.68
S2	49.55	136.54	115.56	80.30	17.81
SEm±	0.54	0.69	1.51	1.15	0.19
CD(P=0.05)	NS	1.91	4.18	3.19	NS

Table AS 72.20.2: Performance of mid-late genotypes at Seorahi

Treatment	Germination %	Shoot (000/ha)	NMC (000/ha)	Cane Yield(t/ha)	Sucrose (%)
Varieties					
V1	51.01	121.99	103.61	83.38	15.77
V2	51.65	122.50	106.00	82.85	16.74
V3	50.05	121.86	103.56	80.34	16.28
V4	51.92	124.94	106.44	98.09	15.49
check					
V5	41.16	109.33	88.65	67.68	15.99
V6	41.96	111.21	89.82	69.61	15.75
V7	43.83	112.94	91.30	70.39	16.79
SEm±	1.09	1.07	1.16	2.13	0.58
CD(P=0.05)	3.01	2.97	3.21	5.91	1.22
Fertility levels					
F1	46.07	117.15	97.61	74.73	16.15
F2	48.67	118.50	99.36	83.08	16.08
SEm±	0.58	0.57	0.62	1.14	0.31
CD(P=0.05)	1.61	NS	1.72	3.16	NS
Spacing					
S1	48.54	134.34	111.67	88.32	15.70
S2	46.19	101.31	85.29	69.49	16.53
SEm±	0.58	0.57	0.62	1.14	0.31
CD(P=0.05)	1.61	1.59	1.72	3.16	NS

NORTH EASTERN ZONE

21. BURALIKSON

Early

The trial was planted on 8th March, 2016 and harvested on 12th February, 2017. The experimental soil was clay loam in texture, medium in organic carbon (0.75 %) and low in available P (17.6 kg P_2O_5/ ha) and medium in available K (234 Kg K_2O/ ha) with pH 5.14.

The result revealed that all the genotypes were statistically at par in terms of cane yield and other growth parameters. None of genotypes was found superior than the

Varieties	Germination %	No of shoots (000/ha)	NMC (000/ha)	Cane length (cm)	Cane yield (t/ha)	Sucrose (%)	CCS (%)

check. However, significant difference was observed in case of quality of sugarcane (**Table AS 72.21.1**).

Mid-late

The trial was planted on 24th March, 2016 and harvested on 17th March, 2017. The result revealed that all the genotypes were statistically at par in terms of cane yield and other growth parameters. None of genotypes was found superior than the check. However, significant difference was observed in case of quality of sugarcane (**Table AS 72.21.2**).

NB: The low yield recorded by genotypes is might be due to high rainfall received throughout the growth period.

Table AS 72.21.1: Performance of early genotypes at Buralikson

Genotype	Germination %	No of shoots (000/ha)	NMC (000/ha)	Cane length (cm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
V_1: CoP11436	22.7	62.4	59.8	194.0	2.4	17.7	36.1	12.8
V_2: CoP 11437	31.5	64.9	62.0	213.0	2.3	18.1	36.5	13.1
V_3: CoP 11438	31.0	60.5	57.4	197.5	2.6	18.1	34.8	13.1
V_4: CoSe 11451	32.1	66.9	63.7	214.5	2.3	18.0	36.5	13.0
V_5: Bo 130	28.6	72.6	69.4	216.3	2.4	17.9	35.6	12.9
V_6: CoSe 95422	31.0	67.0	64.7	189.5	2.3	18.1	36.8	13.1
CD(0.05)	4.97	NS	NS	NS	NS	0.25	NS	0.19

Table AS 72.21.2: Performance of mid-late genotypes at Buralikson

V_1: BO155	36.33	52.00	50.06	200	29.01	17.17	12.40
V_2: CoSe 11453	38.00	52.64	50.37	211	32.04	17.42	12.58
V_3: CoSe 11454	33.49	50.00	47.91	202	30.45	18.08	13.08
V_4: CoSe 11455	37.30	51.40	47.31	205	29.40	17.32	12.51
V_5: BO91	36.89	52.04	47.66	204	29.71	17.95	12.97
V_6: CoP9301	38.79	48.09	46.48	200	30.63	17.48	12.76
V_7: CoSe 92423	34.92	50.28	48.45	201	30.02	17.19	12.41
CD(0.05)	NS	NS	NS	NS	NS	0.36	0.28

Important Observations:

Best performing genotypes across the centres located in different zones are listed herewith:

Sl. No.	Zone	Early genotypes	Mid-late genotypes
1	**North Western**	CoH 11262, CoLk 11202, CoLk 11203, CoLk 11201	CoLk 11206, CoPb 11214, CoH 11263, CoS 11232, CoLk 11204
2	**Peninsular**	Co 10006, Co 10004, Co 10005, Co 10024, Co 10027, CoT 10367, Co 10026	CoT 10369, Co 10031, Co 10033, PI 10131, Co 10015, CoM 10083, PI 10132, Co 09009
3	**East Coast**	CoA 12322, CoV 12356, CoA 12321, CoOr 12346	---
4	**North Central**	CoP 11436, CoSe 11451, CoP 11438	CoSe 11455, BO 155
5	**North Eastern**	All genotypes performed similar and below the performance of check varieties.	All genotypes performed similar and below the performance of check varieties.

SUMMARY OF THE ACHIEVEMENTS FOR THE YEAR 2016-17

In India sugarcane cultivation is facing continual challenges like escalating cost of cultivation, plateaued productivity of the crop, scarcity of labour, depleting soil fertility and productivity in major sugarcane producing regions.Climate change induced weather aberrations mainly rainfall deficit with erratic distributionalong with rising

minimum temperature have rendered farming of this crop further challenging. 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 2016-17six 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, efficacy of sub-surface drip method of irrigation in saving of water and raising of crop yield, integrated nutrient management schedule for sugarcane production system to ensure soil health and crop productivity, carbon sequestration potential of sugarcane based cropping systems impacting soil health, raising water productivity in sugarcane system through mulching and water application regimes and also to assess the effect of plant growth regulators on germination, growth and cane and sugar 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 2016-17 is given in Appendix I.

The experiment wise summary of the results are presented below:

AS 67: Optimization of fertigation schedule for sugarcane through micro-irrigation technique under different agro-climatic conditions

1. **FARIDKOT**

Surface drip irrigation applied at 80% IW/CPE the yielded at par with surface irrigation. 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 60% and 80% RDN in drip irrigated crop. Apparent water productivity and total water productivity with drip was higher than surface irrigation.Surface drip irrigation for paired row trench planted sugarcane (120:30 cm) resulted in saving of 48% irrigation water and 20 % of recommended N.

2. **LUCKNOW**

Sugarcane (fourth ratoon) yield was significantly influenced by irrigation and nitrogen treatments both. Highest ratoon yield of 94.43 t/ha was observed in drip fertigation treatment with irrigation water equal to 1.25 times pan evaporation and

nitrogen equal to 100 % of recommended dose. Drip fertigation influenced irrigation water use efficiency (IWUE) significantly. Highest IWUE of 2090.7 Kg/ha-cm was recorded when sugarcane was irrigated with irrigation water equal to 0.75 times pan evaporation and nitrogen equal to 75 % of recommended dose. However, surface irrigation resulted in the lowest IWUE (585.5 Kg/ha-cm) when sugarcane was irrigated with surface irrigation method and nitrogen was equal to 50 % of recommended dose.

3. CUDDALORE

Among the methods of irrigation at Cuddalore, the sub surface drip irrigation at 125 per cent Pan Evaporation, irrigation once in two days recorded the maximum sprouting (138200/ha), tiller population (176560/ha), millbale can population (176560/ha), root dry weight at 120 (132.50 Kg/ha) and 150 (134.26 Kg/ha) DAP in the second ratoon.

Important Observations: The trial stands concluded with the following major recommendations:

- Surface and sub-surface drip irrigation in sugarcane effectively saves water (up to 40%) and raises the crop productivity (up to 20%).
- Fertigation with drip resulted in 25% saving of nitrogen compared with surface irrigation. However, with the application of 100% RDN in drip irrigation cane productivity can further be raised.
- Drip irrigation system once installed can effectively be used for 5 years (up to fourth ratoon).

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, during the year 2016-17 only 21centres carried out the trial.

NORTH WEST ZONE

1. FARIDKOT

On the basis of one plant and two ratoon crops it can be concluded that application of FYM/ Compost (20 t/ha) + inorganic nutrient based on soil test (T6) is the best for getting higher mean cane yield followed by T5, T9 and T8. The Gross and net returns are also having same trend.

2. LUCKNOW

Significantly the highest rate of ratoon stubble sprouts (83.6%) was observed under 20 t FYM + STRC nutrient application followed by the treatment of only organic application. Highest number of tillers (217.3 thousand/ha at 150 days after initiation), shoot count (235.7 thousand/ha at 210 DAI), number of millable canes (156.8 thousand/ha), cane yield (89.4 t/ha) and sugar yield (9.87 t/ha) were recorded under the treatment where application of FYM @ 20 t/ha was done along with soil test (rating chart) based inorganic fertilizer recommendations.

3. PANTNAGAR

In Ratoon II highest cane yield (54.69 t/ha) was recorded in T6- FYM@20t/ha + inorganic fertilizer on soil test based. Millable cane, cane girth, cane length and weight of individual cane were also higher in T6. Commercial cane sugar was higher in T5 which was significantly higher over rest of the treatments.

4. UCHANI

Significantly highest number of tillers (137.9, 136.0 thousands/ha), NMC (114.9, 113.2 thousands/ha) and cane yield (93.6, 91.9 t/ha) and sugar yield were recorded under treatment of FYM @ 20 t/ha with soil test based fertilizer application or 100 % RDF. However these treatments were found at par with application of FYM @ 10 t/ha+ bio fertilizers along with fertilizers on soil test basis or 100 % RDF. So continuous application of FYM @ 10 t/ha + bio fertilizers in sugarcane plant-ratoon-I and ratoon-II will be equally effective in comparison to FYM @ 20 t/ha.

5. KAPURTHALA

On the basis of three year (one plant and two ratoons) data it can be concluded that the application of FYM/Compost @ 20 tonnes / ha + in-organic nutrient based on soil test (T6) is the best for getting higher cane yield followed by T9 and T5.

6. SHAHJAHANPUR

Application of FYM @ 10 tones/ha + bio-fertilizers (Azotobacter + PSB) + soil test basis NPK (T9) gave significantly higher second ratoon cane yield (82.16 t/ha) followed by application FYM @ 20 tones/ha + inorganic nutrient application based on soil test (T6). Maximum benefit cost ratio (1.64) was also obtained in T9 treatment.

7. SRIGANGANAGAR

The result indicated that number of tillers, NMC, single cane weight and cane yield were influenced significantly due to different nutrient treatments while, the effect on CCS % was non-significant. Cane yield (68.4 t/ha) was the highest with the application of FYM @ 20 t/ha + inorganic nutrient based on soil test (T6) which was significantly higher over other treatments except T5 – application of FYM @ 10 t/ha + bio fertilizers + soil test basis inorganic nutrients (64.3 t/ha).

8. KOTA

Among the nutrient management practices, application of 150:50:30 Kg N, P2O5, K2O/ha based on soil test through inorganic sources and enriched with FYM (10 t/ha) +12.5 + 12.5kg/ha (Azotobacter + PSB) was found best for increasing cane yield, CCS yield and net returns during three years. Whereas, application of 150:50:30 kg N, P2O5, K2O/ha through inorganic source enriched with FYM (20 t/ha) (T6) was found significantly superior and next best treatment in respect of cane quality and improving the status of soil during three years.

PENINSULAR ZONE

9. THIRUVALLA

In plant crop, among the various treatments, T8 (FYM/ compost @ 10 t/ha + bio fertilizer (Azotobacter/Acetobacter + PSB) + 100% RDF) recorded significantly higher values for cane length (255.61 cm), MCC (91000/ha) and resulted in highest yield (108.50 t/ha). Brix and sugar yield also followed the same trend with significantly higher values for sugar yield (12.42 t/ha) for the very same treatment. It was followed by T6 (FYM/ Compost @ 20 t/ha + inorganic nutrient application based on soil test (rating chart). With regard to ratoon crop also, the same trend was visible where T8 itself recorded the highest values for cane length (262.07 cm), MCC (93240/ha), cane yield (111.10 t/ha) and sugar yield (12.74 t/ha).

10. MANDYA

The data on cane and ratoon I and II yield indicated that, application of FYM (20 t/ha) + inorganic nutrient application based on soil test results recorded significantly higher cane, ratoon I and ratoon II yield (96.58, 90.33 and 74.84 t/ha, respectively) compared to all other treatments. However, it was on par with application of FYM (20 t/ha) + 100% RDF (93.12, 88.07 and 65.71 t/ha, respectively), application of FYM (10 t/ha) + bio fertilizer (Azotobacter + PSB) + 100% RDF (90.63, 85.50 and 67.54 t/ha, respectively) and application of FYM (10 t/ha) + bio fertilizer (Azotobacter + PSB) + soil test basis fertilizer application (88.73, 84.72 and 68.42 t/ha, respectively).

11. SANKESHWAR

The treatment differences did not exist due to severe drought for the last 3 years. Hence, most of the parameters recorded in the experiment did not show any variation due to moisture stress.

12. PADEGAON

The data in respect of yield and yield contributing parameters revealed that the treatment T6 receiving RDF as per soil test along with 20 t/ha FYM recorded significantly the higher number of millable canes and cane yield (92.76 '000/ha and 119.10 t/ha, respectively) and it was found at par with treatment T9, T5, T8 and T4 for cane yield. However, as far CCS yield the treatment T6 (15.35 t/ha) was found at par with the treatments T9, T5, T8, T4, T7 and T3. Significantly higher number of internodes (27), cane girth (7.31cm), millable height (230cm) was recorded in treatment T6 which was found at par with T9, T8, T5 and T4.

13. NAVSARI

Cane yield (117.59 t/ha) was recorded significantly higher with T9 over T1 and remained at par with T3, T6 and T8. CCS yield was significantly influenced due to various nutrient management treatments. Various quality parameters were not significantly influenced due to different nutrient management treatments except purity % at 10 month. Almost, all the treatment round equally effective over T5. While at 12 month, quality parameters were not significantly influenced due to different treatments. There was no significant difference observed due to various inorganic and organic treatments on soil pH, EC (1:2.5 dS/m), and available K_2O and BD.

14. COIMBATORE

In first ratoon sugarcane crop, 20 t FYM + 150 STCR based fertilizer application was found beneficial in improving cane yield over rest of the nutrient

management treatments. The treatment 20 t FYM + 150 STCR based fertilizer application recorded the highest NMC (119753 NMC/ha) and cane yield (137.74 t/ha) and was closely followed by the treatments 10 t FYM+ bio fertilizers + 150 STCR (127.27 t/ha). Sugarcane juice analysis done at 12 months revealed that Brix, Sucrose %, Purity % and CCS % were not influenced significantly by application of organics and inorganics.

15. PUNE

The treatment of soil test based fertilizer application without organic fertilizer was found numerically superior over 100 % RDF. All the treatments were found at par to each other. Compost application @ 20 t/ha and 10 t/ha with 100 % RDF, 50% RDF and soil test based fertilizer with bio fertilizer were at par to each other and superior over 100% RDF without organics. With respect to cane yield, application of 100% RDF with organic fertilizers was showed significant results over 50% RDF without organics.

EAST COAST ZONE

16. CUDDALORE

Application of FYM/Compost @ 10 tones/ha + bio fertilizers (Acetobacter + PSB) + soil test based NPK fertilizer recorded significantly the maximum cane yield (137.26 t/ha), CCS (12.26 %) and sugar yield (16.83) with B:C ratio of 3.40 and it was comparable with treatment (T8) application of FYM/Compost @ 10 tonnes ha-1 + bio fertilizer (Azotobacter + PSB) + 100 % RDF.

17. ANAKAPALLE

Studies on impact of integrated application of organics and in-organics in improving soil health and ratoon sugarcane productivity indicated that application of FYM (10 t/ha) + bio fertilizer + 100% RDF (89.9 t/ha) or application of FYM (10 t/ha) + bio fertilizer + inorganic nutrient application based on soil test (89.6 t/ha) registered significantly higher cane yield as compared to the other treatments. Application of trash at 10 t/ha + 50% RDF registered lowest cane yield of 76.4 t/ha.

18. NAYAGARH

The NMC and cane yield were 68.42 ‘000 & 75.03 t/ha in T8 and 69.85’000 & 75.93 t/ha in T9, respectively. This exhibits the positive effect of organic manures and bio fertilizers on cane yield. The soil physico-chemical parameters like BD, pH, EC, organic carbon content as well as available N, P and K content exhibited marked improvement upon application of organic source of plant nutrients.

NORTH CENTRAL ZONE

19. SEORAHI

Application of FYM (10 t/ha) + bio-fertilizer (Azotobacter + PSB) + soil test basis (NPK Application) produced significantly higher cane yield. Sucrose percent was recorded significantly higher in application of FYM (20 t/ha) + inorganic nutrient application based on soil test.

20. PUSA

Integrated application of nutrients was found effective in improving soil fertility and second ratoon cane yield. The application of fertilizers on soil test i.e. 170 kg N, 50 kg P_2O_5 and 80 kg K_2O along with organics (20 t/ha) was found suitable for boosting ratoon cane yield and maintaining soil fertility in calcareous soil of Bihar.

NORTH EASTERN ZONE

21. BURALIKSON

In the second year ratoon crop, application of FYM (10 t/ha) along with bio-fertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield (44.79 t/ha) which is statistically at par with application of FYM (10 t/ha) along with bio-fertilizer (Azotobacter + PSB) and 100% RDF (44.09 t/ha) and the yield recorded by application of FYM (20 t/ha) along with soil test based fertilizer (40.39t/ha) respectively.

IMPORTANT OBSERVATIONS:

The experiment was carried out at 21 stations out of allotted 24. Following salient points emerged from findings:

- Combined application of organic and inorganic sources of nutrients was found conspicuously better over the use of fertilizers alone across the centres located in different agro-climatic conditions.
- Sugarcane trash used as mulch in ratoon crops has little contribution as a source of nutrients as organic amendments like FYM or compost recorded significant improvement in cane and sugar yield over that with trash mulching under the use of recommended dose of fertilizers across the locations.
- Use of organic sources of nutrients in plant ratoon system brings about substantial enhancement of soil health parameters in most of the sugarcane growing soils.

AS 69: Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane

The trial was initiated during 2015-16 with an objective to assess the response of sugarcane crop to plant growth regulators for improvement in germination, growth and yield of the crop. The trial was allocated to all the centres however, only 21 centres conducted the trial. Centre wise summary is given below.

NORTH WEST ZONE

1. FARIDKOT

Germination of sugarcane (Co 118) was better with treating the seed by 50 and 100 ppm ethrel solution than control. Ethrel helped in advancing the germination process helping in higher germination at early stage. The highest cane yield (107.6 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than T1, T2 and T5.

2. KOTA

Among treatment combination of PGR, planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray at 90,120,150 DAP treatment was found excellent for increasing DMA, leaf area, root dry weight, NMC, cane weight, cane yield ,o Brix, sucrose , CCS % , CCS yield and purity , GR and NR which was significantly superior over T1 and T2 treatments and at par with rest of treatments. Whereas, significant enhancement in germination at 10, 30, 40, and 50 DAP, recorded with the planting of setts after overnight soaking in 50 ppm ethrel solution over T1, T2, T5 and T6 and at par with the rest of treatments during both the years.

3. KAPURTHALA

Germination of sugarcane under the treatments, where setts were soaked in water and ethrel solution, was significantly better than the treatment where no soaking was done. There was improvement in germination when soaked in ethrel solution than soaking water but the differences were non-significant. The highest cane yield (97.8 t/ha) was observed in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better thanT1, T2 & T5 and was at par with others). The number of shoots (121.5 thousands/ha), millable canes (95.8 thousand /ha) and single cane wt. (1467 g) was also higher in T8 than other treatments.

4. LUCKNOW

The findings during 2016-17 revealed that planting of three budded cane setts after overnight soaking in 100 ppm ethrel solution and three GA3 (35 ppm) spay at 90, 120 and 150 DAP resulted early cane setts germination and enhanced the cane yield to 98.17 t/ha over the conventional planting treatment cane yield 80.67 t/ha without affecting the cane juice quality.

5. PANTNAGAR

Higher germination, higher shoot population, higher NMC, higher cane weight and longer canes were recorded in the treatment T4 (soaking of setts in ethrel 100 ppm solution) and T8 (T4 + GA3 35 ppm spray at 90, 120 and 150 DAP). Germination also improved through overnight sett soaking with water.

6. SHAHJAHANPUR

Germination (%) recorded under overnight soaking in 100 ppm ethrel solution was at par with overnight soaking in 50 ppm ethrel solution and it was significantly superior to conventional and overnight soaking in water. Planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) resulted significantly higher number of shoots, millable canes and cane yield than those of other treatments.

7. UCHANI

Overnight soaking of setts in 50 ppm and 100 ppm ethrel being at par recorded significantly higher germination at 20, 30, 40 and 50 DAP as compared to control and water soaked treatments. Soaking of setts in 50 ppm ethrel+ GA3 spray (T7) and 100 ppm ethrel+GA3 (T8) being at par recorded significantly higher number of tillers, NMC, cane yield and sugar yield as compared to soaking of setts in ethrel at 50 and 100 ppm ethrel alone, conventional practices with and without GA3 and water soaking treatments with and without GA3 spray at 90, 120 and 150 Days after planting.

8. SRIGANGANAGAR

Soaking of sugarcane setts in water or 50 ppm or 100 ppm ethrel solutions resulted in significant increase in sugarcane germination. Overnight soaking of setts in 50 ppm or 100 ppm ethrel being at par resulted significantly improvement in sugarcane germination as compared to farmers' practice and water soaked treatments. The highest cane yield (98.4 t/ha) was recorded in T8 (planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) spray at 90, 120 and 150 DAP) which was significantly better than T1, T2 and T5 but at par with T3, T4, T6 & T7.

PENINSULAR ZONE

9. PADEGAON

Germination was found significantly higher with planting of setts after overnight soaking in 50 ppm ethrel solution while it was found at par with treatments T7, T4, T8 and T6 at 30, 40, and 50 DAP. The planting of setts after overnight soaking in 50 ppm ethrel solution with GA3 spray (35 ppm) at 90, 120 and 150 DAP recorded significantly the highest cane while CCS yield was not affected significantly by

different treatments. However, it was at par with planting of setts after overnight soaking in 100 ppm ethrel solution and GA3 spray (35 ppm) at 90, 120 and 180 DAP, Planting of setts after overnight soaking in water with GA3 spray (35 ppm) at 90, 120 and 150 DAP, planting of setts after overnight soaking in 50 ppm ethrel solution and planting of setts after overnight soaking in 100 ppm ethrel solution. All quality parameters like, brix (c), sucrose (%), purity (%) and CCS% were not affected by different treatments.

10. NAVSARI

Germination (%) at 20, 40 and 50 DAP were recorded significantly highest with T3 (planting of setts after overnight soaking in 50 ppm ethrel solution) over other treatments and remained at par with T4, T7 and T8. Significantly highest cane yield (127.27 t/ha) was noticed with treatment T8 (planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 (35 ppm) spray at 90, 120 and 150 DAP) but remained at par with T3, T4, and T7 over T1. CCS yield was not significantly influenced due to various treatments. Various quality parameters were not significantly influenced.

11. MANDYA

Overnight soaking of setts in 50 or 100% ethereal solution followed by 35ppm GA3 spray at 90, 120 and 150 DAP found to enhance the germination percentage and cane yield.

12. POWARKHEDA

The cane yield increased significantly due to planting of setts after overnight soaking in 50 ppm ethrel solution (125.93 t/ha) as compared to T2 + GA3 (35 ppm) spray at 90, 120 and 150 DAP (117.08 t/ha), planting of setts after overnight soaking in water (117.80 t/ha), T1 + GA3 (35 ppm) spray at 90, 120 and 150 DAP (118.11 t/ha) and conventional planting/Farmers practice (3- bud setts) (118.83 t/ha). The cane yield obtained at par in between T7 (T3 + GA3 (35 ppm) spray), T3 (planting of setts after overnight soaking in 50 ppm ethrel solution), T4 (planting of setts after overnight soaking in 100 ppm ethrel solution) and T8 (T4 + GA3 (35 ppm) spray).

13. PUNE

The results of the second year trial indicated that, highest germination (70.40%) at 30 DAP, tillering (1.41 lac/ha) at 120 DAP, NMC (0.76 lac/ha),cane girth (11.25 cm), cane yield (158.67 t/ha) and B:C ratio (2.71) was recorded when the setts were overnight soaked in 50 ppm ethrel before planting and foliar spray of GA3 (35ppm) at 90,120 and 150 DAP followed by cane yield of 155.67 t/ha in overnight soaking of setts in 100 ppm ethrel and spraying of GA3 (35ppm).

14. THIRUVALLA

The highest germination percentage and tiller population were recorded by T8 (T4 +GA3 spray (35ppm) at 90,120 and 150 DAP) and the lowest value for the above

parameters were recorded by T2 (planting of setts after overnight soaking in water). The highest cane length (261.76 cm), MCC (93180/ ha), cane yield (118.11 t/ha) were recorded under T8. Sugar yield also showed same trend and recorded significantly higher value (13.24 t/ha) for the very same treatment (T8). The highest BC ratio of 1.32 was also recorded by T8.

15. SANKESHWAR

The treatment variation due to use of growth regulators was not conspicuous owing to occurrence of drought during both years. However, T3 (Planting of setts after overnight soaking in 50 ppm ethrel solution) recorded few of the growth (germination and tiller number). Yield (NMC) and quality parameters (juice purity) significantly higher.

EAST COAST ZONE

16. ANAKAPALLE

The experimental results indicated that significantly higher cane yield was recorded in planting of setts after overnight soaking in 100 ppm (88.1 t/ha) or 50 ppm ethrel solution (85.8 t/ha) followed by spraying of GA3 at 90,120 and 150 days after planting. Conventional 3 budded sett planting recorded significantly lower cane yield of 73.3 t/ha.

17. CUDDALORE

Among the treatments, the setts treated with ethrel 100 ppm with foliar spray of GA3 (35 ppm) on 90, 120 and 150 DAS was recorded significantly the highest millable cane (172650/ha), cane yield (145.36 t/ha), CCS (12.75) and sugar yield (18.53).

18. NAYAGARH

Planting of setts after soaking in 100 ppm ethrel solution along with GA3 spray at 90, 120 and 150 DAP proved to be the best with highest number of millable canes (81200/ha), cane (121.4 t/ha) and CCS yield (12.82.t/ha. Planting of setts after overnight soaking in water along with GA3 spray at 90, 120 & 150 DAP produced NMC of 74330/ha, cane and CCS yield of 115.5 and 12.18 t/ha, respectively.

NORTH CENTRAL ZONE

19. PUSA

Planting of setts after overnight soaking in 50 ppm ethrel solution + GA3 spray (35 ppm) at 90, 120 and 150 DAP (T7) produced higher cane yield (98.6 t/ha) followed in order by planting of setts after overnight soaking in 100 ppm ethrel solution + GA3 spray (35 ppm) at 90, 120 and 150 DAP (T8).

20. BETHUADHARI

The trial was initiated during the year with sugarcane planting on 03.02.2016 (CoB 99161). There was significant improvement in germination at 40 and 50 DAP under soaking of setts in ethrel solution (50 or 100 ppm). Significant increase in cane yield was also recorded under these treatments. Spray of GA3 registered increase in cane yield but that was not significant over T4.

NORTH EASTERN ZONE

21. BURALIKSON

Planting of setts after overnight soaking in water (T2), Planting of setts after overnight soaking in 50 ppm ethrel solution (T3), planting of setts after overnight soaking in 100 ppm ethrel solution (T4) significantly increased the germination over conventional planting (T1). Likewise, in terms of cane yield planting of setts after overnight soaking in 100 ppm ethrel solution followed by spraying of GA3 (35ppm) at 90,120 and 150 DAP i.e. T8 recorded significantly the highest cane yield (57.75t/ha) which is statistically at par with the cane yield recorded by the treatments T6 (54.80 t/ha), T7 (53.21 t/ha), respectively.

Important Observations:

- There was significant improvement in the rate and extent of germination of sugarcane due to overnight soaking of setts in ethrel solution.
- The effective concentration of ethrel solution for germination improvement was found to be 100 ppm in north western zone and east coast zone and 50 ppm in peninsular, north central, north eastern zones.
- Foliar spray of GA_3 during tillering phase could not improve the cane yield significantly over sett soaking in ethrel solution at most of the centres.

AS 70: Scheduling irrigation with mulch under different sugarcane planting methods

The trial was initiated during 2016-17 and was allocated to all the centres. In all 18 centres carried out the trial as per common technical programme for the year. Centre wise summary of findings are given below.

NORTH WEST ZONE

1. FARIDKOT

Cane yield increased successively and significantly with increase in irrigation water application from 0.6 to 1.0 IW/CPE. Interaction effects between method of planting and irrigation schedules revealed highest cane productivity was obtained from paired row planting with mulching and irrigation at 1.0 IW/CPE, which was statistically at par with

paired row planting with mulching and irrigation at 0.8 IW/CPE and paired row planting without mulching and irrigation at 1.0 IW/CPE but significantly higher than all other combinations. Thus, data manifested that trash mulching resulted in saving of 20 % evaporation equivalent and 26.6 % irrigation water input than no mulching in paired row trench planting.

2. KOTA

Based on the one year of study, it can be concluded that paired row trench planting (30:120 cm row spacing) with mulching (sugarcane trash 6 t/ha) was found better with respect to millable canes, cane yield and water use efficiency. It resulted in significantly higher net return over P1 and P2 planting methods. However, irrigation at IW: CPE ratio of 0.80 was found economical in sugarcane yield when compared with 0.60 and 1.00 IW: CPE ratios and also noted significant enhancement in economics with each successive increase in irrigation regimes from 0.60 to 0.80 IW: CPE ratio.

3. KAPURTHALA

Among the planting methods the highest cane yield was obtained under the paired row trench planting with trash mulching (100.1 t/ha) and significantly higher cane yield than other methods of planting. The cane yield increased significantly with trash mulching over that of without trash mulching irrespective of planting methods. The significant increase in cane yield was obtained with increase in irrigation water application from 0.6 to 1.0 IW/CPE. Interaction effects between methods of planting and irrigation schedules revealed maximum cane productivity was obtained from paired row planting with mulching and irrigation at 1.0 IW/CPE, which was statistically at par with paired row planting with mulching and irrigation at 0.8 IW/CPE and paired row planting without mulching and irrigation at 1.0 IW/CPE but significantly higher than all other combinations.

4. LUCKNOW

Paired-row trench planting with trash mulching (120.97 t/ha) being at par with conventional flat method of planting along with trash mulching (115.19 t/ha) resulted in significantly higher cane yield than that of conventional flat method of planting (109.86 t/ha). The higher cane yield under paired row trench planting was attributed to more number of millable cane (1.38 and 1.34 lakh / ha) than paired-row trench planting and conventional flat method of planting with no trash mulching. The trash application led to higher sugarcane yields irrespective of irrigation scheduling. The irrigation schedules though did not influence the cane yield significantly but the irrigation at IW: CPE 0.8 recorded 2.3 and 3.9 per cent higher cane yield compared to 0.6 and 1.0 IW: CPE ratio, respectively.

5. PANTNAGAR

On the basis of present study it was observed that cane yield and NMC were significantly higher in the treatment of paired row planting (30: 120) + trash mulching and at 1.0 IW/CPE ratio. Sucrose (%) was not influenced due to planting method or

trash management and irrigation methods, though the CCS yield was highest in the treatment of paired row planting + mulch and was significantly higher over rest of the treatments. Cane yield was statistically similar in treatment 0.8 or 1.0 IW/CPE but were significantly higher over 0.6 IW/CPE.

6. SHAHJAHANPUR

Paired row trench planting (120: 30 cm row spacing) with organic mulch @ 6 t/ha produced higher cane yield (88.77 t/ha) and maximum water use efficiency (1138.08 Kg/ha-cm) than those of other planting methods and mulch practices. Irrigation schedule at 1.00 IW/CPE ratio (I3) resulted in significantly higher cane yield (89.57 t/ha) than that of rest irrigation schedule while, maximum water use efficiency (1806.89 Kg/ha-cm) was obtained at 0.60 IW/CPE ratio (I1) followed by 0.80 IW/CPE ratio (I2) with water use efficiency of 1396.17 Kg/ha-cm.

7. UCHANI

Significantly higher germination, tillers, NMC, cane weight, cane yield and sugar yield were recorded in paired row trench planting (30:120 cm) as compared to conventional planting at 75 cm row spacing. Trash mulching resulted in significantly higher cane and sugar yield as compared to without mulching treatments. CCS percent was not affected due to different planting methods and irrigation levels. Interaction between method of planting and irrigation levels was found non-significant. Total (Irrigation+ rainfall) water was calculated as 177.1, 192.1 and 207.1 cm in conventional and 152.1, 161.1 and 170.1 in paired row trench planting at 0.6, 0.8 and 1.0 IW/CPE irrigation schedule, respectively. Highest yield of cane produced/1000 litres of irrigation (11.23 kg) water was recorded in trench planting at 0.8 IW/CPE irrigation schedule.

PENINSULAR ZONE

8. PADEGAON

The furrow planting (120 cm row spacing) with green manure (sun hemp) sowing at 30 DAP, mulching at 75 DAP and earthing-up at 110 DAP (P2) and irrigation schedule with 1.00 IW/CPE was found significantly superior for cane yields. While CCS yield was not affected by different planting methods and irrigation schedules. The higher water use efficiency was recorded in Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing –up with green manure/brown mulching and irrigation schedule with 0.60 IW/CPE. All quality parameters were found to be non-significant.

9. POWARKHEDA

Results revealed that the cane yield was influenced significantly due to different planting methods. Furrow planting (120 cm row spacing) with green manure (cowpea) sowing at 30 DAP, mulching at 75 DAP and earthing -up at 110 DAP recorded higher cane yield of (105.83 t/ha) than furrow planting (120 cm row spacing) with alternate skip furrow irrigation, after earthing- up without mulching (98.45), but the cane yield

recorded at par in between P4 (100.64), P1 (99.61) and P3 (98.45). Among irrigation schedules significantly higher cane yield was obtained at I3 1.00 (103.50) as compared to cane yield recorded with I1 0.60 (98.24) but the cane yield recorded at par in between I3 1.00 (103.50) and I2 0.80 (101.36) and I2 0.80 (101.36) and I1 0.60 (98.24) irrigation schedules.

10. MANDYA

Furrow planting (120 cm row space) with alternate skip furrow irrigation after earthing up + *dhaincha* green manure mulching found to enhance the water use efficiency and gave at par yield as that of 120 cm row spaced furrow planting with *dhaincha* green manure with irrigation at IW/CPE ratio 1.0.

11. NAVSARI

Significantly highest cane (117.26 t/ha) and CCS (16.28 t/ha) yield was noticed with planting method P4 but remained at par with P2 over other methods. Significantly highest cane (122.12 t/ha) and CCS (16.68 t/ha) yield was observed with irrigation level I3 over I1 and I2. Among various quality parameters only CCS % and pol % cane were significantly influenced due to planting methods. Significantly highest CCS % and pol % cane were observed with planting method P4 and remained at par with P2 and P3 over P1. Quality parameters were not significantly influenced due to irrigation levels. Field water use efficiency was recorded highest (129.15 kg ha-1 mm-1) with irrigation level I1 followed by I2 (105.81 kg ha-1 mm-1) and I3 (101.77 kg ha-1 mm-1).

12. THIRUVALLA

The growth and yield attributes recorded in P4 (furrow planting at 120 cm spacing with alternate skip furrow irrigation after earthing up + green manure/ brown mulching was significantly superior to other planting methods and mulch practices tried. The maximum cane length (251.44 cm), cane girth (10.00 cm), single cane weight (1.60 kg), MCC (85000/ha), cane yield (105.42 t/ha), and sugar yield (11.59 t/ha) were recorded by P4. With regard to irrigation schedule, the highest value for cane length (253.15 cm), cane girth (10.10 cm), MCC (8702/ha), cane yield (108.50 t/ha), and sugar yield (11.94 t/ha) were recorded by I3 (IW/CPE ratio -1.00).

EAST COAST ZONE

13. ANAKAPALLE

Significantly higher cane yield (87.7 t/ha) was recorded in scheduling more number of irrigations at 1.0 IW/CPE (I3) as compared to scheduling irrigations at I1 (78.1 t/ha) and I2 (81.3 t/ha) treatments. Significant differences in cane yield were not observed due to different mulching treatments. However furrow irrigation with mulching recorded higher cane yield of 84.80t/ha. Scheduling irrigations at 0.6 IW/CPE registered highest water productivity of 1.38.

14. CUDDALORE

Among the methods of planting, the furrow planting of sugarcane setts at 120 cm spacing with green manure sowing at 30 DAP, mulch at 75 DAP and earthing up 120 DAP recorded significantly the maximum cane yield (139.65 t/ha), sugar yield (17.72 t/ha) and B:C ratio of 3.78 and adopting the IW/CPE ratio of 1.0 recorded significantly the maximum cane yield (131.87 t/ha), sugar yield (16.43 t/ha) and B:C ratio 3.58.

15. NAYAGARH

Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up+brown mulching method produced significantly higher NMC (92930/ha) and cane yield (103.93 t/ha) which is closely followed by furrow planting (120 cm row spacing) with brown mulching (NMC and cane yield 92.68 '000/ha and 103.36 t/ha, respectively) (Table AS 70.15.1). Irrigating the crop at IW/CPE ratio of 1.0 produced highest NMC and sugarcane yield of 96.22 '000/ha and 106.17 t/ha, respectively which is significantly different from irrigating the crop at IW/CPE ratio of 0.6 (NMC and cane yield 82.62'000/ha and 98.94 t/ha, respectively).

NORTH CENTRAL ZONE

16. PUSA

Paired row trench planting (30: 120 cm row spacing) with or without trash mulching is more productive and efficient water user compared to conventional flat planting (75 cm row spacing) with or without trash mulching. Application of irrigation water at 1.00 IW: CPE ratio is most effective for realizing higher productivity from sugarcane cultivation in Bihar.

17. SEORAHI

Among planting methods, Paired row trench planting (120:30 cm row spacing) with organic mulch @6t/ha (P3) treatment produced significantly higher shoot population, NMC and cane yield over Conventional flat planting (75 cm row spacing) with organic mulch @6t/ha (P1) and Conventional flat planting (75 cm row spacing) without mulch (P2) treatments but among the irrigation scheduling, IW/CPE 1.0 ratio was best. Cane yield increased with increase the IW/CPE ratio.

NORTH EASTERN ZONE

18. BURALIKSON

The highest cane yield was recorded by paired row trench planting (30:120 cm row spacing) with organic mulching @ 6 t/ha (53.72 t/ha) which is statistically at par with paired row trench planting (30:120 cm row spacing without mulch (50.22 t/ha) but superior over other two planting methods. Moreover, no significant differences were recorded in case of quality of sugarcane.

Important Observations: The experiment was initiated during the year (2016-17) and was allotted to all the centres, however only 18 centres carried out the trial as per the technical programme. Salient findings are enumerated below:

- Planting of sugarcane in paired rows (120: 30) with mulching of trash (6 t/ha) in the inter-row spaces out yielded the conventional flat method with or without mulch at all the centres in north western, north central and north eastern zones. Being in the climatic region of high evaporative demand sugarcane crop responded up to 1.0 IW/CPE irrigation regime in the zones, however similar yields have been recorded with 0.8 IW/CPE ratio at many centres. Trash mulching could effectively save 20-26% irrigation water over no-mulching.
- Sugarcane crop in peninsular and east coast zones responded to furrow planting (120 cm) and skip furrow irrigation combined with the use of leguminous crop as green manure till 75 DAP, as a mulch during tillering and thereafter residue incorporation. As far irrigation regimes, IW/CPE ratio 1.0 was found to result in higher cane productivity, however it can be restricted to 0.8 for getting higher water use efficiency in these zones.
- Use of mulch in sub-tropical zones and green manuring followed by mulching and residue incorporation resulted in tropical zones resulted in higher net return.

AS 71: Carbon sequestration assessment in sugarcane based cropping system

The trial was initiated during 2016-17 with allocation to all the centres. In all 15 centres conducted the trial in accordance with the approved technical programme. Being the initial year sugarcane plant crop was raised for adoption of treatment in the subsequent ratoon crop and effect of different treatments on cane productivity and soil health would be available during the next crop season. However, effect of residue incorporation in the rice-wheat crop rotation in north western and north central zones and soybean-maize rotation in other zones have been found to be positive on productivity of succeeding crops and soil health.

AS-72: Agronomic performance of elite sugarcane genotypes

The trial was initiated during 2016-17 and was allotted to all the centres. Centre wise summary of findings are given below:

NORTH WEST ZONE

1. FARIDKOT

The highest cane yield in early group was obtained for CoH 11262 (83.6 t/ha) which was at par with other genotypes except CoLk 11201 and CoLk 11202. Same was the case in sugar yield. CoH 11262 was found promising in cane and sugar yield. Among mid-late test entries the highest cane yield was of CoPb 11214 (98.3 t/ha) which was at par with CoLk 11206 (91.7 t/ha). Sugar yield was higher in CoLk 11206 but was at par with CoPb 11214.

2. KOTA

Among early genotypes, CoH 11262 recorded significantly higher germination (48.20 %), tiller count (139000/ha), number of millable cane (86800 thousand/ha) and cane yield (85.63 t/ha) over CoJ 64 and Co 0238 and at par with CoLK 11201, CoL11202 and CoLK 11203. Similarly CoH 11262 recorded significantly higher CCS yield (11.13 t/ha) over CoLK 11201, CoLK 11202 and CoJ 64 and on par with rest of the genotypes. Among mid-late entries cane yield (88.15 t/ha) was recorded significantly higher in genotype CoLK 11206 over CoPb 11214, CoS 11232 and CoS 767 and at par with rest of genotypes. Similarly CoLK 11206 recorded significantly the highest CCS yield (11.41 t/ha) over CoLK 11204, CoS 11232 and CoS 767 and at par with rest of genotypes.

3. KAPURTHALA

The highest cane yield among early entries was of CoLk 11203 (82.9t/ha) & CoLk 11202 (81.9 t/ha) that was significantly higher over other genotypes. CoLk 11202 & CoLk 11203 were found promising in cane and sugar yield. Among mid late genotypes the highest cane yield was of CoS 11232 (85.2 t/ha) which was at par with CoPb 11214 & CoLk 11206 and significantly superior to all other genotypes. Sugar yield was highest in CoPb 11214 which was at par with CoS 11232 & CoLk 11206.

4. LUCKNOW

In the early genotypes CoLk 11203 was superior over CoLk 11201 and CoLk 11202 in respect to all the parameters. The performance of genotype CoH 11262 was significantly inferior over rest of the genotypes and gave lowest cane yield (18.84 t/ha). Highest brix, sucrose and purity % measured at 10-month stage was recorded with Co 0238, which was at par with CoLk 11203. While genotype CoLk 11201 showed the lowest value of all these parameters at the same growth stage. Among mid-late entries with the yield level of 80.76 t/ ha, the genotype CoLK 11206 proved to be the highest yielder but was at par with genotypes CoPb 11214 and CoLk 11204. The genotype CoLk 11206 gave highest sugar yield at both the stages (viz. 10 and 12 months stage) but was at par with genotypes Co Pb 11214 and CoLk11204.

5. PANTNAGAR

Among early entries CoH 11262 performed better with regard to cane yield, NMC, germination %, individual cane weight, sucrose % and commercial cane yield. Sucrose % was on par to Co Pant 3220. Mid-late entries were not evaluated.

6. SHAHJAHANPUR

In early genotypes CoLk 11202 and mid–late genotype CoLk 11206 produced significantly higher cane yield than standards and other entries with cane yield of 105.50 t/ha and 97.60 t/ha, respectively. Row spacing of 90 cm was found superior to

120 cm spacing in cane yield under both early and mid – late genotypes with cane yield of 99.30/ha and 91.52 t/ha, respectively. CCS percent was not affected significantly due to various genotypes and spacing treatments.

7. UCHANI

In early group, genotypes CoH 11262, CoLk 11202 and Co 0238 being at par recorded significantly highest cane weight (986, 952, 978 g), cane yield (101.2, 103.1, 107.5 t/ha) and sugar yield (12.63, 12.85, 13.59 t/ha) as compared to CoLk 11201, CoLk 11203 and CoJ 64. In mid late group, entries CoH 11263 (102.9 t/ha), CoLk 11206 (100.3 t/ha) and CoPb 11214 (97.1 t/ha) being at par produced significantly higher cane yield as compared to checks and rest of the varieties. Varieties did not differ significantly for CCS % at harvest. Varieties CoH 11263 (12.99 t/ha) and CoLk 11206 (12.35 t/ha) being at par produced significantly highest sugar yield among all the varieties.

PENINSULAR ZONE

8. PADEGAON

The genotype Co 10006 was found significantly superior for cane and CCS yields than the other genotypes. Genotype Co 10027 recorded significantly highest sucrose %, CCS and purity as compared to the other early maturing genotypes. For mid-late group genotypes CoT 10369 was found significantly superior for cane and CCS yields than the other genotypes. Genotype PI 10132 recorded significantly the highest brix (c), sucrose % and CCS% as compared to the other genotypes.

9. POWARKHEDA

Results revealed that among early genotypes Co 10004 recorded significantly higher cane yield (99.17 t/ha) than Co 85004 (93.43 t/ha), Co 94008 (93.15 t/ha) and Co C 671 (93.15 t/ha) but the cane yield obtained at par in between Co 85004 (93.43 t/ha) Co 94008 (93.15 t/ha), Co C 671 (93.15 t/ha) and CoT 10367 (93.06 t/ha). Among mid-late genotypes Co10031 recorded significantly higher cane yield (106.48 t/ha) than Co 86032 (100.00 t/ha) and Co 99004 (97.87 t/ha).

10. PUNE

The results indicated that, the early genotype Co 10004 found better with maximum germination (70.20 %), tillering (0.74 lac/ha), single cane weight (2.22 kg), cane girth (11.08 cm), cane yield (119.81 t/ha), CCS yield (16.47 t/ha) and B:C ratio (1:2.22), but inferior in juice quality than check variety CoC 671.The mid-late genotype Co 10033 was found better with tillering (1.14 lac/ha), NMC (0.86 lac/ha), cane yield (134.41 t/ha), CCS yield (20.18t/ha), B:C ratio (2.68) and juice quality than the check variety Co 86032.

11. MANDYA

Among early genotypes, Co 10005 recorded significantly higher cane yield (104.3 t/ha). For mid-late genotypes, Co 10033 was found superior with respect to cane yield (113.7 t/ha). But, was on par with PI 10131 (106.3 t/ha), PI 10132 (110.0 t/ha), CoVC 10061 (113.4 t/ha), CoT 10369 (103.4 t/ha) and Co 09009 (103.8 t/ha).

12. NAVSARI

In early group significantly highest cane yield (120.18 t/ha) was recorded with variety C0 10024 over checks and remained at par with all the varieties except V3. Co10024 recorded significantly highest CCS yield (16.49 t/ha) over checks and at par with V1, V2, V5 and V8. Whereas, for mid-late genotypes significantly highest cane yield (127.78 t/ha) was recorded with variety V2 (C0 10015) over checks and remained at par with the varieties V5, V6 and V8. CCS yield was not significantly influenced due to different varieties.

13. KOLHAPUR

In early group Co10027 recorded significantly highest cane and CCS yield (95.34 and 14.05 t/ha) over standard checks, however, it was found at par with the genotype Co 10004 (92.97 and 13.03 t/ha) followed by Co10026 (89.36 and 12.66 t/ha). For mid-late group CoT10369 recorded significantly highest cane and CCS yield (t/ha) (88.07 and 12.75) over check varieties and was at par with genotypes CoM 10083 (85.35 and 11.95) and PI 10131 (84.08 and 11.46).

14. SANKESHWAR

Among the early genotypes tested significantly higher cane yield was recorded in Co 94008 (68.20 t/ha) and was on par with Co 85004 (64.96 t/ha). The lowest cane yield was recorded in CoC 671 (49.95 t/ha). In mid-late group PI 10132 and Co 86032 performed better among the varieties tested for agronomic performance for most of the growth, yield and quality parameters.

15. THIRUVALLA

The treatment variation due to various early genotypes were significant for cane length, cane girth, single cane weight, NMC, cane yield and sugar yield and COC 671 recorded the highest value for the said parameters (255.52 cm, 9.33cm, 1.62kg, 74750/ha, 85.21 t/ha, 11.40 t/ha, respectively) followed by Co 10005 (244.70cm, 9.14 cm, 1.53 Kg, 60750/ha, 72.0 t/ha, respectively). The highest BC ratio of 1.33 was also recorded by CoC 671. With regard to mid-late varieties, the highest values for cane length, cane girth, single cane weight, NMC, cane yield and sugar yield were recorded by Co10015 (250.90 cm, 9.75 cm, 1.59 Kg, 70120/ha, 87.64 t/ha and11.74 t/ha) followed by Co 99004 (248.61cm, 9.50 cm, 1.57 kg, 69350/ha, 62.25 t/ha and 9.97t/ha, respectively). The highest BC ratio of 1.35 was also recorded by Co10015.

EAST COAST ZONE

16. ANAKAPALLE

Among the five new early genotypes under test CoA12322 proved superior (89.8 t/ha) as compared to other genotypes but found on par with Co V 12356 (87.1 t/ha) and Co A 12323 (86.9 t/ha).

17. CUDDALORE

The genotype CoA 12321 significantly recorded higher cane yield (139.2 t/ha) and sugar yield (16.81 t/ha) resulted higher B: C ratio (3.18) with 125 % recommended dose of nitrogen per hectare.

18. NAYAGARH

The genotype CoOr 12346 produced the highest average cane yield of 102.34 t/ha with application of 125 % RD of fertilizer and was closely followed by CoA 12322 (100.45 t/ha) and CoA 12323 (98.64 t/ha).

NORTH CENTRAL ZONE

19. PUSA

Among early genotypes higher cane yield of 88.2 t/ha was recorded with CoP 11436 followed by CoSe 11451 (87.0 t/ha), BO 130 (81.1 t/ha), CoSe 95422 (78.0 t/ha), CoP 11437 (76.5 t/ha), BO 153 (74.1 t/ha) and lowest cane yield of 62.6 t/ha was recorded by CoP 11438. The maximum sucrose content (18.39%) was obtained with CoP 11438 which was significantly superior to CoSe 95422 and statistically comparable to rest of the genotypes. Among mid-late genotype BO 155 recorded higher germination percentage (46.2%) plant population (152100/ha) and millable canes (107800/ha) followed by CoSe 95423. Genotype CoSe 11455 (103.4 t/ha), being on a par with BO 155 (91.4 t/ha) produced the highest cane yield and BO 91 (55.4 t/ha), the lowest. The higher sucrose content (18.71%) juice was noticed by the genotype CoP 9301 which was significantly superior to BO 155 (16.53%) and statistically comparable to rest of genotypes.

20. SEORAHI

Among test genotype, maximum sucrose per cent value produced in CoSe 11453 in mid-late and CoSe 11451 in early group genotype. CoSe 11455 in mid-late and CoP 11438 in early genotype recorded significantly higher cane yield over check varieties and remaining test genotypes. Cane yield increased up to 125 per cent recommended dose of fertilizer. 90 cm spacing treatment produced significantly higher yield as compared to 120 cm row spacing treatment. Sucrose per cent was not affected significantly with different treatments of fertility levels and spacing in mid-late and early genotype experiments.

NORTH EASTERN ZONE

21. BURALIKSON

None of genotypes was found superior than the check. However, significant difference was observed in case of quality of sugarcane. The low yield recorded by genotypes might be due to high rainfall received throughout the growth period.

Important Observations:

Best performing genotypes across the centres located in different zones are listed herewith:

Sl. No.	Zone	Early genotypes	Mid-late genotypes
1	**North Western**	CoH 11262, CoLk 11202, CoLk 11203, CoLk 11201	CoLk 11206, CoPb 11214, CoH 11263, CoS 11232, CoLk 11204
2	**Peninsular**	Co 10006, Co 10004, Co 10005, Co 10024, Co 10027, CoT 10367, Co 10026	CoT 10369, Co 10031, Co 10033, PI 10131, Co 10015, CoM 10083, PI 10132, Co 09009
3	**East Coast**	CoA 12322, CoV 12356, CoA 12321, CoOr 12346	---
4	**North Central**	CoP 11436, CoSe 11451, CoP 11438	CoSe 11455, BO 155
5	**North Eastern**	All genotypes performed similar and below the performance of check varieties.	All genotypes performed similar and below the performance of check varieties.

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 67 for evaluation of surface and sub-surface drip irrigation in sugarcane stands concluded and participants are requested not to report the data for the year 2017-18.
- Sub-surface drip irrigation for sugarcane has shown its potential in saving of irrigation water and raising the cane yield.
- Use of organics in nutrient management schedule for sugarcane has shown its potential as reflected from the results obtained under the trial AS 68 for plant – ratoon system. Addition of 20 t/ha FYM/ compost along with inorganic

fertilizers applied on the basis of soil test, soil test crop response for targeted yield or on the basis of general recommendation for the region has shown positive effect on sugarcane growth and yield both in plant and ratoon crops. Response of bio-fertilizers (*Azotobacter*/ *Acetobacter*/ *Azospirillum*/ PSB) was more pronounced in peninsular zone.

- Efficacy of ethrel on accelerating and enhancing germination in sugarcane has been reported from almost all the centres and 50 ppm solution was found equally effective as 100 ppm. Spray of GA_3 (35 ppm) during tillering enhanced cane yield effectively across the zones, however for north west zone sett soaking in ethrel performed equally well and there was no additional yield increment with GA_3 spray during tillering phase.

- Planting of sugarcane in paired rows (120: 30) with mulching of trash (6 t/ha) in the inter-row spaces out yielded the conventional flat method with or without mulch at all the centres in north western, north central and north eastern zones. Being in the climatic region of high evaporative demand sugarcane crop responded up to 1.0 IW/CPE irrigation regime in the zones, however similar yields have been recorded with 0.8 IW/CPE ratio at many centres. Trash mulching could effectively save 20-26% irrigation water over no-mulching.
- Sugarcane crop in peninsular and east coast zones responded to furrow planting (120 cm) and skip furrow irrigation combined with the use of leguminous crop as green manure till 75 DAP, as a mulch during tillering and thereafter residue incorporation. As far irrigation regimes, IW/CPE ratio 1.0 was found to result in higher cane productivity, however it can be restricted to 0.8 for getting higher water use efficiency in these zones.
- Use of mulch in sub-tropical zones and green manuring followed by mulching and residue incorporation resulted in tropical zones resulted in higher net return.
- All the centres are requested to give meaningful summary of different trials by making it more informative and true representative of the findings.

SUGGESTIONS

- Trial AS 67 stands concluded.
- The crop performance, in general, must be given in light of prevailing climatic condition particularly with reference to sucrose content & flowering behaviour.
- 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 S. K. Shukla, Project Coordinator is duly acknowledged. 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 2016-17

Sl. No.	Centre	Experimental allotted						Experiments conducted					
1	Faridkot*	AS67	AS 68	AS69	AS70	AS71	AS72	AS67	AS68	AS69	AS70	AS71	AS72
2	Kota*	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
3	Lucknow	AS67	AS68	AS69	AS70	AS71	AS72	AS67	AS68	AS69	AS70	AS71	AS72
4	Kapurthala	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
5	Pantnagar	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
6	Shahjahanpur	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	-	AS72
7	Sriganganagar	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	-	-	-
8	Uchani	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
9	Akola	-	AS68	AS69	AS70	AS71	AS72		-	-	-	-	-
10	Coimbatore	-	AS68	AS69	AS70	AS71	AS72		AS68	-	-	-	-
11	Kolhapur	-	AS68	AS69	AS70	AS71	AS72		-	-	-	-	AS72
12	Mandya	AS67	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
13	Navsari	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
14	Padegaon	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
15	Powarkheda	-	AS68	AS69	AS70	AS71	AS72		-	AS69	AS70	AS71	AS72
16	Pune	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	-	-	AS72
17	Sankeshwar	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	-	-	AS72
18	Thiruvalla	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
19	Anakapalle	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72

20	Cuddalore	AS67	AS68	AS69	AS70	AS71	AS72	AS67	AS68	AS69	AS70	AS71	AS72
21	Nayagarh		AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
22	Pusa	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	AS71	AS72
23	Seorahi	-	AS68	AS69	AS70	AS71	AS72		AS68	-	AS70	-	AS72
24	Bethuadhari*	-	AS68	AS69	AS70	AS71	AS72		-	AS69	-	-	-
25	Buralikson	-	AS68	AS69	AS70	AS71	AS72		AS68	AS69	AS70	-	AS72