



ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

TECHNICAL REPORT
2020-21

CROP PRODUCTION



Compiled by
Dr T.K. Srivastava
Principal Scientist (Agronomy)
&
Principal Investigator



भाकृअनुप-भारतीय गन्ना अनुसंधान संस्थान, लखनऊ-226 002
ICAR-INDIAN INSTITUTE OF SUGARCANE RESEARCH, LUCKNOW – 226 002



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PROJECT NO.: AS 72

PROJECT TITLE: Agronomic performance of elite sugarcane genotypes

- Objective** : To assess the performance of 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 centre.
- Planting time** : North West, North Central & North East Zones: February-March
Peninsular & East Coast Zones: 1st fortnight of January
- Treatments** :
1. **Genotypes** : Varieties and checks of the zone are given at the end.
 2. **Agronomy** : **Spacing** : Spacing for all the entries
 - 120 cm (for North West, North Central, North East and East Coast Zones).
 - 150 cm (for the Peninsular Zone).**Fertilizer levels:** (2)
100 % and 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 be recorded** :
- i) Initial soil fertility status for available NPK, soil 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 2020-21

I. North West Zone (AVT II Plant)

Early maturing varieties (6): Co 15023, Co 15024, Co 15027, CoLk 15201, CoLk 15205, CoPb 15212

Zonal Check (3): CoJ 64, Co 0238 and Co 05009

Mid-late maturing varieties (7): Co 15026, CoLk 15206, CoLk 15207, CoLk 15209, CoPb 15213, CoS 15232, CoS 15233

Zonal Check (3): CoS 767, CoPant 97222 and Co 05011

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

Early maturing varieties (5): CoLk 15466, CoLk 15467, CoP 15436, CoSe 15452, CoSe 15455

Zonal Check (3): CoLk 94184, CoSe 95422, CoSe 01421

Mid-late maturing varieties (7): CoLk 15468, CoLk 15469, CoP 15438, CoP 15439, CoP 15440, CoSe 15453 and CoSe 15454

Zonal Check (3): BO 91, CoP 06436, CoP 9301

III. Peninsular Zone (AVT II Plant)

Varieties (15): Co 14002, Co 14004, Co 14012, Co 14016, Co 14027, Co 14030, Co 14032, CoN 14073, CoSnk 14102, CoSnk 14103, CoT 14367, CoTl 14111, CoVC 14062, MS 14081, MS 14082

Zonal Check (3): Co 86032, CoC 671 and CoSnk 05103

IV. East Coast Zone (AVT II Plant)

Early maturing varieties (4): CoA 16321, CoC 16336, CoC 16337, CoV 16356

Zonal Check (3): CoA 92081, CoC 01061 and CoOr 03151

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

SUMMARY OF RESULTS OBTAINED DURING LAST YEAR (2019-20)

The trial was initiated during 2016-17 and was allotted to all the centres. During the year (2019-20) 13 centres reported the results. Centre wise summary of findings for the year are given below:

NORTH WEST ZONE

1. FARIDKOT

For early maturing genotypes although interaction between fertilizer levels and genotypes was non-significant but yield of all genotypes were better at 125% RDF. The highest cane yield was of CoPb 14181 (92.1 t/ha) followed by CoPb 14211 (89.2 t/ha). Among mid-late genotypes the yield was significantly better at 125% RDF than 100%. The number of millable canes was better at 125% than 100%. The highest cane yield was of CoPb 14185 (88.4/ha) which was at par with CoPb 14184 (87.9 t/ha) and was significantly better than other all genotypes.

2. KOTA

Among early genotypes CoLk 14201 recorded significantly higher germination (52.17 %), no. of tillers (141.07 thousand/ha) and cane length (223.00 cm). Genotypes were found at par with each other in case of single cane weight, cane yield. Highest number of millable canes was recorded (94.00 thousand/ha) under CoLk 14201 which is significantly superior over CoJ 64 (zc) and at par with other genotypes. Similarly CoLk 14201 recorded maximum and significantly higher Brix (22.67 %), sucrose (22.20%) CCS percent (14.03%) and CCS yield (13.54 t/ha).

Performance of mid-late maturing genotypes at 100% RDF level revealed that among genotypes CoLk 14203 recorded higher germination (50.30 %). Significantly superior cane length (239.65 cm), single cane weight (1015.00 gm), tillers (142.75 thousand/ ha) and number of millable cane (92.80 thousand/ha) were there under CoLk 14203. Similarly, CoLk 14203 recorded maximum and significantly higher CCS yield (12.77 t/ha). Whereas, Brix (22.05), sucrose (19.57 %) and CCS (13.56 %) was recorded highest with CoLk 14203 and also significantly superior over zonal checks (CoS 767, CoPant 97222 and Co 05011) and at par with Co 14035 and CoPb 14184, CoPb 14185 and CoH 14261 genotypes. Cane yield (94.35 t/ha) was recorded maximum with CoLk 14203 which was significantly higher over rest of genotypes and zonal checks.

3. LUCKNOW

Among different mid-late genotypes CoLk 14204 gave highest MNC, cane and CCS yield closely followed by CoLk 14203 over rest of the genotypes. The 125 % RDF did not affect any of the growth and yield parameters significantly over recommended doses of fertilizer.

4. SHAHJAHANPUR

In early group, standard Co 0238 produced significantly higher cane yield (94.00 t/ha) followed by genotype CoLk 14201 (85.60 t/ha). In mid – late group standard Co 05011 produced significantly higher cane yield (84.10 t/ha) followed by standard CoS 767 (80.30 t/ha)

and genotype CoPb 14184 (79.20 t/ha). Regarding fertility levels significantly higher cane yield was obtained with 125% recommended dose of NPK than that of 100% RDF of NPK in both early and mid-late genotype.

5. UCHANI

Germination per cent, tillers, NMC, cane weight and cane yield were not affected significantly due to different fertility levels. Varieties in early group differed significantly in terms of germination whereas, mid late entries did not differ significantly. Varieties Co 0238 (107.2 t/ha) and CoLk 14201 (104.9 t/ha) being at par produced significantly highest cane yield in comparison to rest of the varieties. Varieties CoJ 64 (79.1 t/ha) and CoPb 14211 (80.6 t/ha) being at par produced the lowest cane yield. Interaction between fertility levels and varieties was not found significant. Among mid maturing entries, Varieties CoH 14261 (108.0 t/ha), CoPb 14184 (107.2 t/ha) and CoPb 14185 (106.5 t/ha) being at par produced significantly highest cane yield among all the entries. Lowest cane yield was recorded in variety CoS 14233 (91.9 t/ha). Interaction was not found significant.

PENINSULAR ZONE

6. PUNE

In the light of results obtained from present investigation, it can be concluded that, for securing maximum cane yield and net returns crop should be fertilized with 125% RDF. In the case of genotypic performance Co 13020 found better with maximum germination, whereas, CoSnK 13106 performed better in tillering, CoSnK 05103 for NMC and MS 13081 for growth attributes. While cane yield, CCS yield and B;C ratio was higher in Co 13008. Whereas, CoC 671 showed superior juice quality.

7. KOLHAPUR

Among genotypes cane yield and yield parameters did not differ significantly with 100 or 125 % RDF application and also due to interaction between fertilizer levels and cultivars. Among the cultivars Co 13008 recorded significantly superior cane yield and CCS yield.

8. SANKESHWAR

Among cultivars cane yield and yield parameters did not differ significantly with 100 or 125 % RDF application and for interaction effects of both fertilizer levels and cultivars. Among the cultivars MS 13081 recorded significantly higher cane yield. The next best cultivar was Co 13009 which was on par with MS 13081 with respect to cane yield.

9. COIMBATORE

Sugarcane cane yield was influenced significantly due to different elite genotypes wherein, elite sugarcane genotype Co 13008 recorded significantly higher cane yield (134.00 t/ha) than two standard check varieties Co 86032 (122.65 t/ha) and CoC 671(118.39t/ha). Cane yield and juice quality were not influenced significantly due to fertilizer levels. Juice quality (Brix, sucrose, purity and CCS percent) was studied by collecting cane samples at harvest. Juice Brix, Sucrose%, Purity % and CCS % at harvest showed significant varietal differences. Among different entries, Co13020 recorded significantly higher mean sucrose % of 20.57 than Co 86032.

EAST COAST ZONE

10. NAYAGARH

Analysis of variance suggested that there is significant variations among the genotypes with respect to germination %, number of tillers at 180 days and number of millable canes ('000/ha). The genotype CoC 15338 produced the highest average cane yield of 95.36 t/ha with application of 125 % RD of fertilizers.

NORTH CENTRAL ZONE

11. PUSA

Zonal check variety (early) CoSe 95422 was still doing best among the varieties. Among mid-late group variety CoP 06436 recorded higher growth, yield attributes and cane yield which was statistically similar to CoSe 14455. Application of 125% recommended dose of NPK brought significant improvement in plant population, millable canes and cane yield for both the group of genotypes.

12. SEORAH

In early genotypes significantly higher cane yield was observed in CoSe 14455, CoSe 14451 and CoLk 14206 over checks i.e. CoLk 94184 and CoSe 01421. Among mid late genotypes CoLk 14208 produced significantly higher cane yield over all genotypes and checks except CoSe 14455. Sucrose per cent was not affected significantly by different treatments of fertility levels and early genotypes. RDF applied @125 per cent improved the shoot population, NMC and cane yield significantly but there was no significant improvement observed for germination and sucrose per cent.

13. BETHUADHARI

In early group the highest NMC, cane yield, pol (%) and CCS yield was obtained with the check variety CoSe 95422. Among elite genotypes tested numerically higher cane yield (71.83 t/ha) was recorded with CoP 14437 followed by CoLk 14206 and CoSe 14451. Effect of fertilizer levels was not found significant as far as growth, yield and quality of various genotypes are concerned. Among elite mid-late genotypes CoSe 14455 performed better than other genotypes by recording highest germination (43.66%), NMC, cane yield (74.41 t/ha) and CCS yield (8.51 t/ha). However, the performance was not significantly better over superior check CoP 06436 which performed at par.

IMPORTANT OBSERVATIONS:

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

Sl. No.	Zone	Early genotypes	Mid-late genotypes	RDF levels
1	North Western	CoPb 14181, Co 14034, CoLk 14201	CoPb 14184, CoPb 14185, CoLk 14203, CoLk 14204, CoH 14261	Majority of the centres did not report any significant influence of higher RDF on sugarcane growth, yield and quality.
2	Peninsular	Co 13008, Co 13009, CoSnk 13073, MS 13081		Significant influence of higher RDF was not found.
3	East Coast	CoC 15338	--	No influence of higher RDF
4	North Central	CoSe 14454, CoP 14437	CoSe 14455, CoLk 14208	Significant effect of higher RDF was noticed.

CURRENT YEAR (2020-21) REPORT

NORTH WESTERN ZONE

1. FARIDKOT

Early

Experiment was planted on 17th February 2020 by planting nine sugarcane early genotypes at 90 and 120 cm spacing and by applying 100% and 125% of recommended N. The yield was significantly better at 90 cm than 120 cm row spacing. The cane yield was significantly better with 125% N than 100% of recommended N (**Table AS 72.1.1**). The highest cane yield was of Co 15024 (117.8 t/ha) followed by Co 15027 (115.7 t/ha) and CoPb 15212 (110.4 t/ha). The number of millable canes and number of tillers were significantly better at 90 cm spacing than 120 cm. The application of 125% of recommended N gave significantly better millable canes than 100% N.

Mid-late

The experiment was conducted by planting ten sugarcane genotypes at 90 and 120 cm spacing and by applying 100% and 125% of recommended N. The yield was significantly better at 90 cm than 120 cm row spacing. The cane yield was significantly better with 125% N than 100% of recommended N (**Table AS 72.1.2**). The highest cane yield was of CoS 15233 (102.4 t/ha) followed by CoS 15232 (101.3 t/ha). The number of millable canes and number of tillers were significantly better at 90 cm spacing than 120 cm but single cane weight was higher at 120 cm row spacing. The application of 125% of recommended N gave significantly better millable canes than 100% N.

Table AS 72.1.1: Cane yield (t/ha) of early maturing genotypes at different nitrogen levels at Faridkot

Varieties	90 cm		120 cm		Mean
	N1 (150 kg/ha)	N2 (187.5 kg/ha)	N1 (150 kg/ha)	N2 (187.5 kg/ha)	
Co 15023	61.2	69.8	46.8	56.1	58.4
Co 15024	106.2	142.0	99.6	123.6	117.8
Co15027	126.6	130.9	97.2	108.3	115.7
CoLk 15201	104.3	103.1	69.5	101.9	94.7
CoLk 15205	92.6	91.4	76.4	89.8	87.5
CoPb 15212	129.1	130.9	87.1	94.5	110.4
CoJ 64	87.7	103.7	71.8	95.4	89.6
Co 238	120.4	123.5	92.1	102.8	109.7
Co5009	111.8	136.4	83.8	104.7	109.1
Mean	104.4	114.6	80.5	97.5	
Mean Spacing	109.5		89.0		
Mean N levels	N1	92.5	N2	106.0	
CD (5%)	Varieties	15.2			
	Spacing	7.2			
	N levels	7.2			
	Interaction	NS			

Table AS 72.1.2 a: Cane yield of mid-late maturing genotypes at Faridkot

Varieties	90 cm		120 cm		Mean
	N1 (150 kg/ha)	N2 (187.5 kg/ha)	N1 (150 kg/ha)	N2 (187.5 kg/ha)	
Co 15026	94.5	114.8	87.5	95.9	98.2
CoLk 15206	84.6	93.3	75.5	94.5	87.0
CoLk 15207	84.6	91.4	82.0	91.2	87.3
CoPb 15209	82.7	91.4	70.1	81.5	81.4
CoPb 15213	99.4	116.1	84.2	89.2	97.2
CoS 15232	101.2	115.5	79.6	108.8	101.3
CoS15233	100.0	117.9	87.9	103.8	102.4
CoS 767	82.1	93.2	76.4	86.2	84.5
Co Pant 97222	87.0	104.9	78.0	85.6	88.9
Co 05011	98.8	106.8	93.6	106.9	101.5
Mean	91.5	104.5	81.5	94.4	
Mean Spacing	98.0		87.9		
Mean N levels	N1	86.5	N2	99.4	
CD (5%)	Varieties	12.5			
	Spacing	5.6			
	N levels	5.6			
	Interaction	VxSxN= NS			

Table AS 72.1.2 b: Growth and quality performance of different mid-late genotypes at Faridkot

Treatment	Germination %	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (g)	Sucrose %
Spacing							
90 cm	32.1	118.8	100.5	231.2	2.75	1.169	16.65
120 cm	30.8	98.8	87.4	215	2.81	1.288	16.69
CD (5%)	NS	4.2	3.2	NS	NS	0.082	NS
N levels							
100% N	31.5	106.4	91.0	214.0	2.76	1.212	16.72
125%N	31.5	111.1	96.9	214.2	2.79	1.246	16.63
CD (5%)	NS	4.2	3.2	NS	NS	NS	NS
Genotypes							
Co 15026	30.6	96.9	84.6	214.6	3.27	1.607	16.18
CoLk 15206	36.7	102.7	89.3	212.9	3.08	1.420	16.85
CoLk 15207	34.2	92.5	85.8	236.7	2.59	1.205	18.25
CoPb 15209	35.2	116.3	90.5	176.8	2.68	1.004	17.33
CoPb 15213	29.0	132.9	113.2	208.1	2.44	1.036	16.35
CoS 15232	29.0	124.3	114.3	236.2	2.41	1.046	15.49
CoS15233	34.0	104.2	88.8	223.1	2.96	1.425	16.41
CoS 767	28.8	105.4	90.3	213.0	2.7	1.110	17.35
Co Pant 97222	23.4	91.4	78.6	202.5	2.95	1.250	16.41
Co 05011	33.8	121.3	104.2	217.4	2.7	1.186	16.09
CD (5%)	3.8	9.3	7.1	32.4	0.19	0.183	0.23

2. KOTA

Early

The experiment was planted in spring on 10.03.2020 and harvested on 15.03.2021. The experiment consisted of 9 genotypes viz. Co 15023, Co 15024, Co 15027, CoLk 15201, CoLk 15205, CoPb 15212 and zonal checks : CoJ 64, Co 0238 and Co 05009 planted at 120 cm row spacing with 125% of the recommended dose of NPK (250:75:50 kg/ha) & 100 % of the recommended dose of NPK (200:60:40 kg/ha).

Among genotypes Co 15027 recorded significantly higher germination (51.37%), no. of tillers (139.57 thousand/ha) and cane length (220.5 cm) over zonal check CoJ64 but at par with CoLk 15201, Co 15023 and Co 0238 (zc). Similarly Co 15027 recorded significantly higher Brix (22.37 %), Sucrose (20 %) CCS percent (13.83 %) and CCS yield (13.34 t/ha) over CoJ 64 (zc) and at par with Co 15023, Co 15024, CoLk 15201 and Co 0238 (zc). Genotype Co 15027 at 120 cm row spacing and 100 % fertility level recorded significantly higher cane yield (93.83 t/ha) over CoJ 64 (zc) and at par with Co 15023, Co 15024, CoLk 15201 and Co 0238 (zc). Effect of higher doses of nutrients was not significant.

Mid-late

Among genotype CoLk 15209 at 120 cm row spacing and 100 % fertility level recorded significantly higher germination (49.5 %), no. of tillers (141.55 thousand/ha) and cane length (236.6 cm), single cane weight (1010 g), cane yield (93.65 t/ha), millable cane (92.0 thousand/ha), Brix (21.85 %), Sucrose (19.47 %) CCS % (13.46 %) and CCS yield (12.65 t/ha over CoS 767, CoPant 97222 and Co 05011 zonal checks but was at par with, CoLk 15207 and CoLk 15206 genotypes. There was no influence of higher fertilizer doses on performance of the genotypes.

Table AS 72.2.1: Performance of early genotypes of sugarcane at Kota at different RDF levels

Treatment (Varieties)	Germination on 45 DAP (%)	Millable cane (000/ ha)	Single cane weight (g)	Cane yield (t/ha)	Sucrose (%)	CCS (%)	CCS yield (t/ha)
Co 15027	50.8	89.13	998.33	93.83	19.35	13.45	12.97
CoLk 15201	44.57	84.8	813.33	88.67	18.32	12.68	11.45
Co 15023	45.57	86.3	756.67	87.6	19.35	13.45	10.37
Co 15024	42.8	79.67	748.33	77.97	18.32	12.68	10.22
CoLk 15205	43.9	82.8	656	88.11	17.2	11.91	10.4
CoPb 15212	43.4	82.3	655.3	87.6	16.89	11.9	10.3
CoJ 64 (Zc)	44.9	82.93	658.33	88.37	17.29	11.92	10.47
Co 0238 (Zc)	45.2	82.93	918.33	80.93	18.73	12.99	10.94
Co 05009 (Zc)	43.3	83.7	868.33	81.37	18.83	13.07	11
SEm ±	1.45	2.46	40.85	1.11	0.40	0.29	0.32
CD (P=0.05)	4.60	7.80	128.84	3.50	1.29	0.94	1.02
CV	4.73	4.30	7.32	1.88	3.23	3.45	4.45

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

Treatment (Varieties)	Germination on 45 DAP (%)	Cane length (cm)	Millable cane (000/ha)	Single cane weight (g)	Cane yield (t/ha)	Sucrose (%)	CCS yield (t/ha)
CoLk 15209	49.5	236.65	92.0	1010	93.65	19.47	12.65
CoLk 15207	48.4	205.35	89.85	992.1	91.55	19.26	12.25
CoLk 15206	47.75	207.8	88.5	760	90.9	18.9	11.92
Co 15026	46.05	196.8	86.25	944	90.15	19	11.91
CoPb 15213	47.05	197.55	89.2	827	90.4	18.54	11.61
CoS 15232	43.6	188.35	88.05	725	81.65	18.9	10.73
CoS 15233	43.15	164.7	85.7	630	76.9	18.13	9.68
COS 767 (Zc)	44.3	176.7	81.2	690	78.65	18.08	9.82
CoPant 97222 (Zc)	44.35	127.05	82.05	655	81.2	17.77	9.97
Co 05011 (Zc)	45.4	165.4	79.55	965	78.1	18.49	9.99
SEm ±	1.35	23.14	2.95	29.51	2.75	1.17	0.96
CD (P=0.05)	4.40	75.45	9.65	96.28	9.02	3.83	3.17
CV	37.32	174.92	46.90	38.73	24.74	20.85	22.91

3. SHAHJAHANPUR

The soil of experimental field was low in organic carbon (0.33%) and medium in phosphorus (10.80 kg/ha) and potash (112 kg/ha) with pH 7.13. Experimental sugarcane crop of early and mid – late genotypes were planted on 11.02.2020. Crop of early genotypes was harvested on 08.02.2021 and mid –late genotypes on 10.02.2021.

Early

Experimental results of early genotypes (**Table AS 72.3.1**) revealed that standard Co 0238 produced significantly higher cane yield (105.1 t/ha) followed by genotype Co 15023 (98.3 t/ha). Regarding fertility levels significantly higher cane yield (88.50 t/ha) was recorded with 125% recommended dose of NPK than that of 100% RDF of NPK (78.30 t/ha). CCS% in cane at harvest was found significantly higher in genotype Co 15023 than that of 15027 and CoPb 15212 genotypes.

Mid-late

Experimental data of mid – late genotypes (Table AS 72.3.2) showed that genotypes Co 15026 produced significantly higher cane yield (86.20 t/ha) followed by genotype CoLk 15206 (84.0 t/ha). Regarding fertility levels significantly higher cane yield (82.20 t/ha) was recorded with 125% recommended dose of NPK than that of 100% RDF of NPK (72.80 t/ha). CCS% in cane at harvest was observed significantly superior in genotype CoLk 15207 over other genotypes except genotype CoPb 15213.

Table AS 72.3.1: Performance of early maturing genotypes at Shahjahanpur

Treatment	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)
A-Genotypes					
V ₁ - Co 15023	55.3	104.4	83.6	98.3	12.84
V ₂ - Co 15024	48.2	120.6	97.7	82.0	12.27
V ₃ - Co 15027	42.1	107.5	86.2	96.1	11.67
V ₄ - CoLk 15201	46.0	97.4	80.5	79.9	12.17
V ₅ - CoLk 15205	54.4	132.7	105.4	73.2	12.80
V ₆ -CoPb 15212	58.8	124.3	110.5	82.8	11.82
V ₇ -CoJ 64	48.8	120.0	100.0	76.1	12.15
V ₈ - Co 0238	41.9	111.1	95.5	105.1	12.53
V ₉ - Co 05009	33.9	105.2	73.8	57.5	12.42
SE±	1.38	2.66	2.29	2.17	0.36
CD at 5%	2.81	5.41	4.65	4.41	0.73
B –Fertilizer level					
F ₁ -100% RDF of NPK	48.00	110.0	89.5	78.3	12.08
F ₂ - 125% RDF of NPK	47.4	117.4	95.7	88.5	12.09
SE±	0.65	1.25	1.08	1.02	0.17
CD at 5%	NS	2.54	2.19	2.07	NS

Table AS 72.3.2: Performance of mid-late genotypes at Shahjahanpur

Treatment	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)
A-Genotypes					
V ₁ - Co 15026	41.7	111.5	94.7	86.2	11.97
V ₂ - CoLk 15206	44.5	106.9	89.8	84.0	11.52
V ₃ - CoLk 15207	53.1	104.7	87.4	66.7	12.34
V ₄ - CoLk 15209	52.5	125.3	108.5	76.6	11.87
V ₅ - CoPb 15213	45.2	116.8	100.5	63.8	12.06
V ₆ - CoS 15232	45.3	120.0	102.2	61.7	11.39
V ₇ - CoS 15233	52.1	119.9	106.5	63.8	11.82
V ₈ - CoS 767	45.0	114.2	97.9	68.0	11.00
V ₉ - CoPant 97222	44.2	112.6	104.9	63.5	11.67
V ₁₀ - Co 05011	39.2	111.8	94.9	75.7	11.48
SE±	1.19	2.51	2.50	1.83	0.26
CD at 5%	2.42	5.08	5.07	3.69	0.53
B –Fertilizer level					
F ₁ -100% RDF	47.9	111.1	94.4	66.8	11.76
F ₂ - 125% RDF	44.3	119.4	102.5	75.2	11.64
SE±	0.53	1.12	1.11	0.81	0.12
CD at 5%	NS	2.27	2.26	1.65	NS

4. UCHANI

All the varieties were planted at 90 cm and 120 cm spacing with RDF (150-50-50 NPK kg/ha) and 125% of recommended dose of NPK (187.5+ 62.5+62.5 NPK kg/ha) in randomized block design with two replications during spring season on March 7-8, 2020. Separate trials were conducted for early and mid-late varieties. Full dose of P and K was applied at the time of planting in furrows through DAP and MOP fertilizers, respectively. Nitrogen through Urea was applied in three equal splits (April, May and June months). The soil of the experimental field was sandy loam in texture with pH 8.1, EC 0.4 dSm⁻¹, organic carbon 0.40%, available P 12.3 kg/ha and available K 195 kg/ha. The crop was irrigated at 8-10 days interval during pre-monsoon seasons and 15-20 days interval during post monsoon seasons. Rests of the inputs were applied as per package of practices of CCSHAU, Hisar. The early and mid-late trials were harvested on March 2, 2021 and March 9, 2021, respectively.

Early

Significantly higher number of millable cane (NMC) and cane yield was recorded at 90 cm spacing as compared to wider row spacing (120 cm). However average cane weight and cane girth was significantly higher under 120 cm spacing. Higher fertility levels (125% RD) did not produce any significant effect on cane weight, plant height and cane girth, but significantly higher NMC (103.64 thousand/ha) and cane yield (86.38 t/ha) was recorded in 125% RD as compared to recommended dose of fertilizer (RDF). Among early genotypes, highest number of millable canes were recorded in variety CoLk 15205 (127.06 thousand/ha) which was significantly higher than other varieties. Significantly higher cane weight was recorded in variety Co 15027 (1.32 kg) followed by Co 0238 (1.20 kg). Lowest cane weight was observed in CoLk 15205 which was at par with CoPb 15212. Highest cane yield was recorded in standard check i.e. Co 0238 (103.73 t/ha) followed by Co 15027 (97.96 t/ha) but significantly higher than other varieties. CoLK 15201 was found significantly tallest (2.39 m) than other varieties. Highest average girth was recorded in variety Co 15027, which was significantly higher than other varieties. Significant interaction in cane yield was observed in spacing with variety as well as fertility levels and variety. Highest cane yield was recorded in variety Co 0238 at 125% RDF which was at par with RDF and with Co 15027 variety at 125% RDF, but significantly higher than other varieties at different fertility levels. Among spacings levels, highest cane yield was recorded in Co 15027 (112.66 t/ha) at 90 cm which was significantly higher than other varieties under different spacing arrangement. (**Table AS 72.4.1**).

Mid-late

Number of millable canes, cane yield and plant height was significantly higher in 90 cm row to row spacing as compared to 120 cm spacing, while cane weight was statistically similar under both spacing. Among fertility levels, no significant impact was observed in NMC, plant height and cane girth due to different fertilizer levels. However, significantly higher cane weight (1.13 kg) and cane yield (89.46 t/ha) was recorded in 125% RD over RDF. Among mid late genotypes, highest NMC (000/ha) were recorded in CoS 15232 which was at par with CoPb 15213 and CoS 767 (standard check). Average cane weight was found highest in variety Co 15026 which was at par with CoS 15233. CoS 15233 variety was found to be the best in terms of cane yield which was at par with standard check CoS 767 but significantly higher than other varieties. Plant height was recorded maximum in CoS 97222 which was statistically at par with CoS 15232, CoS 15233 and CoS 767. Significantly highest cane girth was recorded in Co

15026. Significant interaction was observed between spacing and mid-late genotypes. Highest cane yield was recorded in CoS 767 (102.90 t/ha) in 90 cm wide rows which was at par with CoS 15233 (102.33 t/ha) at 90 cm spacing but significantly higher than other varieties under different spacing arrangement. (Table AS 72.4.2).

Table AS 72.4.1: Performance of early maturing genotypes at Uchani

Treatment	NMC (000/ha)	Cane weight (kg)	Cane Yield (t/ha)	Plant height (m)	Girth (cm)
Spacing					
90 cm	107.94	1.03	89.89	2.12	2.43
120 cm	93.23	1.07	80.57	2.08	2.52
CD at 5%	3.76	0.03	2.36	NS	0.05
Fertility levels					
RDF	97.54	1.05	83.02	2.10	2.47
125% RDF	103.64	1.06	87.43	2.11	2.48
CD at 5%	3.76	NS	2.36	NS	NS
Early genotypes					
CoLk 15201	99.66	1.16	92.96	2.39	2.46
CoLk 15205	127.06	0.75	72.04	2.02	2.17
CoPb 15212	115.43	0.80	70.41	2.04	2.17
Co 15023	95.12	1.15	90.21	2.11	2.60
Co 15024	102.58	1.04	77.35	2.05	2.59
Co 15027	87.85	1.32	96.88	1.91	3.00
CoJ 64	102.62	1.02	83.66	2.08	2.45
Co 5009	88.83	1.00	81.08	2.19	2.29
Co 0238	93.12	1.20	102.45	2.14	2.54
CD at 5%	7.97	0.06	5.01	0.09	0.10

Table AS 72.4.2: Performance of mid-late maturing genotypes at Uchani

Treatment	NMC (000/ha)	Cane weight (kg)	Cane Yield (t/ha)	Plant height (m)	Girth (cm)
Spacing					
90 cm	92.22	1.10	92.79	2.24	2.41
120 cm	80.64	1.12	83.82	2.09	2.50
CD at 5%	2.40	NS	1.83	0.05	0.04
Fertility levels					
RDF	85.83	1.10	87.15	2.15	2.44
125% RDF	87.02	1.13	89.46	2.18	2.47
CD at 5%	NS	0.02	1.83	NS	NS
Mid-late genotypes					
Co 15026	80.29	1.28	93.81	2.16	3.06
CoLK 15206	78.40	1.20	87.21	2.03	2.56
CoLK 15207	75.95	1.02	79.30	2.23	2.27
CoLK 15209	80.76	0.96	75.83	1.99	2.35
CoPb 15213	97.48	0.88	86.70	1.98	2.09
CoS 15232	98.14	1.04	92.26	2.37	2.26
CoS 15233	83.15	1.27	98.88	2.38	2.69

CoS 97222	87.42	1.20	88.54	2.41	2.42
Co 05011	86.42	0.94	84.09	1.80	2.51
CoS 767	96.26	1.12	96.46	2.31	2.34
CD at 5%	5.38	0.06	4.08	0.12	0.06

PENINSULAR ZONE

5. PUNE

Data indicated that, application of 125% of RDF recorded significantly higher tiller count (1.09 lakh/ha) at 120 DAP as against 100% RDF. Different genotypes manifested their significant influence on tiller count at 120 DAP. Genotype CoSnK 14103 registered significantly higher tiller count (1.34 lakh/ha) at 120 DAP, which was on same bar with CoVC 14062. Significantly higher NMC count (0.77 lakh/ha) gained at 12 months after planting -MAP respectively by applying 125% RDF over 100% RDF. Significantly higher NMC count 0.97 lakh/ha was observed under genotype CoSnK 14103 at 12 MAP, which was at par with Co14004, Co 14016, Co 14030, CoN 14073 and CoSnK 14102 (**Table AS 72.5.1**).

Higher cane yield (118.48 t/ha) and CCS yield (15.96 t/ha) was noted with 125% RDF as compared to 100% RDF. As far genotypes the significantly higher cane yield (155.00 t/ha) was observed under genotype CoN 14073, which was comparatively similar with Co 14004, Co 14012, Co 14016, CoSnK 14102, CoVC 14062. CCS yield found to be non-significant but genotype CoN 14073 registered higher value (18.75 t/ha) of CCS yield. The mean data on juice quality as influenced by genotypes showed that, genotypes CoT 14367 secures significantly higher brix (23.20%), sucrose (20.64%) and CCS (14.51%). Interaction effect between fertilizer levels and genotypes found to be non-significant for all the parameters (**Table AS 72.5.2**).

Table AS 72.5.1: Growth performance of different genotypes at Pune

Treatment detail	Germination % at 30 DAP	Germination % at 45 DAP	Tiller count at 120 DAP (Lakh/ha)	Millable cane count at 12 MAP (Lakh/ha)
Factor A: Fertilizer levels				
F1: 100% RDF	46.01	59.05	0.98	0.69
F2: 125% RDF	49.05	60.81	1.09	0.77
Sem±	1.87	1.53	0.02	0.02
C.D. @ 5%	NS	NS	0.06	0.05
Factor B: Genotypes				
V1: Co14002	50.94	65.27	1.08	0.78
V2: Co14004	45.71	56.91	1.14	0.89
V3: Co14012	53.46	64.68	1.07	0.76
V4: Co 14016	47.69	59.71	0.98	0.80
V5: Co 14027	42.41	54.41	1.00	0.59

V6: Co 14030	46.38	58.67	1.14	0.85
V7:Co 14032	41.42	54.88	0.77	0.61
V8: CoN 14073	50.99	62.76	0.99	0.84
V9: CoSnK 14102	54.95	69.25	1.02	0.88
V10: CoSnK 14103	43.43	54.36	1.34	0.97
V11: CoT 14367	37.70	51.99	1.03	0.61
V12: CoTL 14111	37.46	51.22	1.03	0.70
V13: CoVC 14062	52.97	66.58	1.16	0.76
V14: MS 14081	53.30	64.05	1.09	0.64
V15: MS 14082	47.69	59.69	0.96	0.67
V16: Co 86032	51.81	64.64	1.08	0.76
V17: CoC 671	57.92	65.88	1.05	0.60
V18: CoSnk 05103	39.44	53.92	0.80	0.68
Sem±	5.62	4.60	0.06	0.06
C.D. @ 5%	NS	NS	0.19	0.17
Interaction F×V				
Sem±	7.95	6.51	0.09	0.08
C.D. @ 5%	NS	NS	NS	NS
C. V. %	23.68	15.37	13.16	16.79

Table AS 72.5.2: Cane yield and juice quality as influenced due to different genotypes at Pune

Treatment details	Cane yield (t/ha)	CCS (t/ha)	Brix %	Sucrose %	CCS %
Factor A: Fertilizer levels					
F1: 100% RDF	99.08	13.01	21.61	18.87	13.15
F2: 125% RDF	118.48	15.96	21.97	19.37	13.56
Sem±	5.13	0.64	0.19	0.18	0.13
C.D. @ 5%	14.74	1.84	NS	NS	0.40
Factor B: Genotypes					
V1: Co14002	102.27	13.86	21.66	19.26	13.54
V2: Co14004	116.19	16.70	22.65	20.36	14.39
V3: Co14012	117.64	16.76	22.82	20.27	14.25

V4: Co 14016	119.93	15.31	20.88	18.34	12.82
V5: Co 14027	77.09	10.74	22.80	19.84	13.80
V6: Co 14030	87.97	12.52	22.67	20.36	14.38
V7: Co 14032	98.87	13.31	22.45	19.59	13.65
V8: CoN 14073	155.00	18.75	20.26	17.44	12.07
V9: CoSnK 14102	139.79	17.82	20.78	18.20	12.70
V10: CoSnK 14103	106.53	12.12	19.59	16.64	11.44
V11: CoT 14367	93.73	13.89	23.20	20.64	14.51
V12: CoTL 14111	91.56	12.55	22.07	19.48	13.65
V13: CoVC 14062	130.38	18.46	23.06	20.14	14.04
V14: MS 14081	99.07	13.87	22.12	19.67	13.83
V15: MS 14082	98.44	13.45	22.78	19.77	13.74
V16: Co 86032	119.90	15.13	20.95	18.16	12.61
V17: CoC 671	103.36	13.45	21.29	18.65	13.02
V18: CoSnk 05103	100.39	12.13	20.30	17.41	12.03
Sem±	13.73	1.93	0.58	0.56	0.41
C.D. @ 5%	39.44	NS	1.66	1.62	1.20
Interaction F×V					
Sem±	19.42	2.73	0.82	0.80	0.59
C.D. @ 5%	NS	NS	NS	NS	NS
C. V. %	25.25	29.00	5.32	5.92	6.27

6. KOLHAPUR

The experiment was planted on 29.01.2020 and harvested on 7.02.2021. The yield attributing characters viz., number of tillers, 120 and 150 DAP, number of millable canes (NMC, 000/ha), average single cane weight (kg/cane), cane yield and CCS yield (t/ha) did not differ significantly due to fertilizer levels. However, 125 % RDF has recorded numerically higher cane yield, CCS yield, NMC and other growth attributes than 100 % RDF. Among the genotypes/cultivars, CoN 14073 recorded significantly superior cane yield (127.43 t/ha) and average cane weight (1.83 kg/cane) than rest of varieties and checks. However, the varieties Co 86032 (120.27 t/ha & 15.55 t/ha), Co 14027 (117.86 t/ha & 16.58 t/ha) and CoSnK 14102 (114.80 t/ha & 13.30 t/ha) were on par with CoN 14073 in respect of cane yield and CCS yield, respectively. Variety Co 14027 recorded significantly higher CCS yield than rest of the varieties. The remaining varieties were on par with each other in respect of cane yield and CCS yield. (Table AS 72.6.1).

The quality parameters did not differ significantly due to fertilizer levels except OBrix at 10 months and CCS % at 12 months crop age. The 125 % RDF recorded significantly higher Brix (22.66) at 10 months and CCS (12.81%) at 12 months. However, significant differences were observed among studied genotypes for 10 and 12 months. The standard check CoC 671 recorded significantly higher °Brix (22.30°), sucrose (18.57 %) and CCS (12.45 %) in 10 months' crop age. And at 12 months' juice analysis the standard check CoC 671 recorded significantly higher brix (23.43), Sucrose (20.70 %) and CCS % (14.35 %) than rest of the genotypes and found at par with other genotypes. Similar trend was observed at 10 months' quality parameters. However, the interaction effect was found to be non-significant (**Table AS 72.6.2**).

Table AS 72.6.1: Growth and cane yield performance of different genotypes at Kolhapur

Fertilizer levels(F) /Cultivars (C)	Germination At 8 th Week	Tillers (000/ha) (120DAP)	Tillers (000/ha) (150 DAP)	NMC (000/ha) at harvest	Average cane weight (kg)	Cane yield (t/ha)	CCS Yield (t/ha)
Fertilizer levels							
100 % RDF	61.20	69.01	72.50	66.021	1.35	89.79	11.12
125 % RDF	65.40	79.86	85.60	71.53	1.43	102.49	13.13
S.Em±	0.68	1.11	1.46	1.48	0.01	2.10	0.25
CD at 5 %	NS	NS	NS	NS	NS	NS	NS
Cultivars							
Co 14002	66.24	87.50	92.01	74.09	1.22	89.97	11.93
Co 14004	71.31	82.57	88.61	74.51	1.20	89.93	11.87
Co 14012	62.24	74.44	82.30	68.40	1.25	85.57	12.22
Co 14016	53.75	70.83	75.69	64.72	1.40	91.27	12.05
Co 14027	70.57	84.15	84.72	79.51	1.47	117.86	16.58
Co 14030	59.94	68.54	72.70	62.50	1.57	98.40	10.32
Co 14032	56.25	69.78	74.44	66.18	1.20	79.59	10.52
CoN 14073	67.01	62.36	66.87	69.38	1.83	127.43	14.90
CoSnk14102	68.66	78.19	85.83	74.86	1.54	114.80	13.30
CoSnk14103	49.48	65.20	73.61	60.50	1.46	88.70	10.41
CoTl14367	73.26	75.27	80.13	62.24	1.27	80.00	8.36
CoTl14111	66.23	62.84	64.30	66.73	1.18	79.67	10.37
CoVc14062	75.00	68.26	72.50	58.19	1.26	73.93	9.11
MS14081	50.17	60.88	65.83	54.09	1.38	77.15	10.04
MS14082	62.15	74.30	79.86	72.50	1.50	108.85	14.03
Co86032	69.53	93.52	97.22	78.48	1.52	120.17	15.55
CoC671	49.26	76.04	78.47	72.98	1.48	109.04	15.65
CoSnk5103	68.92	85.20	87.77	78.05	1.24	97.58	11.01
S.Em ±	6.40	4.35	4.50	3.26	0.03	5.30	0.72
CD @5%	NS	12.53	12.95	9.37	0.10	15.24	2.07
CV. %	20.22	11.71	11.40	9.49	4.89	11.03	11.89
Interaction (F × C)							
	NS	NS	NS	NS	NS	NS	NS

Table AS 72.6.2: Quality performance of different genotypes at Kolhapur

Fertilizer levels(F) /Cultivars ©	10 Months			12 Months			
	°Brix	Sucrose (%)	CCS (%)	°Brix	Sucrose (%)	Purity (%)	CCS (%)
Fertilizer levels							
100 % RDF	20.29	16.06	10.48	21.57	18.29	84.81	12.41
125 % RDF	20.66	16.19	10.49	21.88	18.68	86.13	12.81
S.Em±	0.03	0.04	0.04	0.04	0.09	0.50	0.03
CD at (5 %)	0.11	NS	NS	NS	NS	NS	0.10
Cultivars							
Co 14002	20.78	16.00	10.29	22.28	19.34	86.83	13.25
Co 14004	21.35	17.64	11.78	22.40	19.45	86.89	13.20
Co 14012	21.88	19.34	13.37	22.63	20.35	89.96	14.19
CoN 14016	21.95	16.70	10.57	22.30	19.36	86.14	13.27
Co 14027	21.38	16.74	10.86	22.83	20.33	88.86	14.06
Co 14030	19.73	14.98	9.54	21.33	16.50	77.34	10.46
Co 14032	20.80	15.57	9.77	22.40	20.19	90.17	13.32
CoN 14073	17.15	13.04	8.32	20.88	17.01	81.70	11.66
CoSnk14102	19.83	15.16	9.56	20.73	17.24	83.68	11.56
CoSnk14103	20.40	15.66	10.05	21.43	17.60	82.15	11.73
CoTl14367	19.08	14.34	9.08	20.28	15.99	78.88	10.62
CoTl14111	20.00	15.55	9.98	20.15	18.50	92.20	13.04
CoVc14062	20.98	16.82	11.06	22.20	18.23	83.79	12.30
MS14081	20.85	16.97	11.25	21.75	18.82	86.51	12.87
MS14082	20.20	15.97	10.42	21.03	18.62	88.56	12.88
Co86032 (C)	19.95	16.10	10.69	21.88	18.88	88.69	12.91
CoC671 (C)	22.30	18.57	12.45	23.43	20.74	89.18	14.35
CoSnk5103(C)	19.78	15.16	9.71	21.25	16.77	78.93	11.30
S.Em ±	0.25	0.19	0.18	0.21	0.14	1.06	0.24
CD at (5 %)	0.73	0.57	0.54	0.63	0.40	3.04	0.68
CV %	2.47	3.18	3.46	2.95	5.18	3.47	3.75
Interaction (F × C)							
NS							

7. SANKESHWAR

CCS yield, Number of millable canes (NMC) and cane girth did not differ significantly due to fertilizer levels (100 and 125 % RDF). Whereas, application of 125 % RDF recorded significantly higher cane yield and single cane weight than application of 100% RDF. Among the cultivars CoN 14073 recorded significantly higher cane yield (136.5 t/ha) which was on par with the cultivars Co 14002 (133.7 t/ha) and Co Snk 14102 (132.9 t/ha). The significantly lower yield was with cultivar CoSnk 14103 (78.9 t/ha). The NMC and single cane weight followed the same trend. Significantly higher cane girth was with cultivar Co14027 and CoT 14367. While significantly higher cane height was with CoTl 14111 (3.4 m) followed by CoN 14073 and MS14081 which were at par with each other. The interaction effect was non-significant for both fertilizer levels and cultivars with respect to yield and yield parameters. (Table AS 72.7.1).

Quality parameters viz., brix (%), pol (%) and purity (%) did not differ significantly for the fertilizer levels and for interaction effects for both fertilizer levels and cultivars. Among the cultivars, significantly higher brix (%) was recorded with Co 14012 (24.2%) followed by cultivars Co14004 (23.8%) and Co14030 (23.7%) which were at par with each other. Lowest brix was recorded with CoT 14367 (19.7%).Whereas, significantly higher pol % was with Co 14012 (22.2%) followed by Co 14030 (21.8%) and Co 14004 (21.7%) which were at par with each other. Purity followed the same trend as that of brix and pol.

Table AS 72.7.1: Growth performance of elite genotypes at Sankeshwar

Fertilizer levels(F) /Cultivars(C)	Cane yield (t/ha)	Single cane weight(kg)	NMC (000/ha)	CaneGirth (cm)	Cane Height (m)
Fertilizer levels					
100 % RDF	95.1	1.4	71.1	2.3	2.4
125 % RDF	99.3	1.6	76.3	2.8	2.8
S.Em±	0.1	0.01	0.8	0.2	0.2
CD at (5 %)	0.3	0.03	NS	NS	NS
Cultivars					
Co 14002	133.7	2.1	90.1	2.5	3.1
Co 14004	110.9	1.7	82.6	2.5	2.7
Co 14012	95.8	1.5	83.1	2.5	2.8
Co 14016	96.7	1.6	83.6	2.3	2.5
Co 14027	117.8	1.7	84.6	2.8	2.5
Co 14030	77.8	1.3	74.5	2.5	2.3
Co 14032	115.2	1.7	81.8	2.6	2.8
CoN 14073	136.5	2.2	93.8	2.6	3.2
CoSnk 14102	132.9	1.9	87.9	2.3	2.8
CoSnk 14103	78.9	1.3	74.6	2.7	3.0
CoT 14367	92.0	1.3	73.2	2.8	2.7
CoTl 14111	118.7	1.8	86.8	2.6	3.4
CoVC 14062	125.4	1.8	85.3	2.6	3.0
MS 14081	98.1	1.6	82.3	2.7	3.2
MS 14082	108.7	1.6	82.6	2.6	2.7
Co 86032 (c)	108.7	1.6	86.2	2.4	2.9
CoC 671 (c)	93.7	2.0	70.2	2.8	2.8
CoSnk 05103 (049) (c)	102.9	1.7	88.9	2.4	3.3
S.Em ±	1.4	0.1	2.1	0.1	0.1
CD at (5 %)	4.3	0.3	6.0	0.3	0.3
Interaction (F × C)					
S.Em ±	18.6	0.4	8.0	0.2	0.4
CD at (5 %)	NS				

Table AS 72.7.2: Quality performance of elite genotypes at Sankeshwar

Fertilizer levels (F)/Cultivars (C)	Brix (%)	Pol (%)	Purity (%)	CCS (%)	CCS yield (t/ha)
Fertilizer levels					
100%	19.8	18.0	80.5	12.7	13.2
125%	20.4	18.3	81.5	12.6	14.0
S.Em ±	0.2	0.3	0.6	0.2	0.3
CD at 5 %	NS	NS	NS	NS	NS
Cultivars					
Co 14002	23.0	20.7	90.1	14.4	19.3
Co 14004	23.8	21.7	90.9	15.2	16.9
Co 14012	24.2	22.2	91.8	15.7	15.0
Co 14016	22.3	19.9	89.0	13.8	13.4
Co 14027	23.0	20.8	90.7	14.6	17.2
Co 14030	23.7	21.8	91.7	15.3	11.9
Co 14032	23.4	21.0	89.7	14.7	16.9
CoN 14073	21.0	18.4	87.6	12.6	17.3
CoSnk 14102	20.7	18.1	87.5	12.5	16.6
CoSnk 14103	21.2	19.2	90.5	13.4	10.6
CoT 14367	19.7	16.8	85.0	11.4	10.5
CoTl 14111	21.3	18.8	88.0	12.9	15.4
CoVC 14062	23.1	20.8	90.0	14.5	18.2
MS 14081	23.2	21.3	91.6	14.9	14.7
MS 14082	21.7	19.7	90.4	13.8	14.9
Co 86032 (c)	21.7	20.1	92.4	14.2	15.4
CoC 671 (c)	23.6	22.1	93.6	15.7	14.7
CoSnk 05103 (049) (c)	21.5	19.2	89.3	13.3	13.7
S.Em ±	0.4	0.4	1.0	0.4	0.4
CD at 5 %	1.1	1.2	2.8	1.0	1.2
Interaction (F × C)					
S.Em ±	1.1	1.3	2.9	0.5	1.3
CD at 5 %	NS				

8. COIMBATORE

In all 9 elite sugarcane genotypes Co 14002, Co 14004, Co 14012, Co 14016, Co 14027, Co14030, Co 14032, Co 86032, and CoC 671 with two fertilizer levels (100%RDF and 125 % RDF) were planted in wide row spacing (150 cm). Sugarcane cane yield was influenced significantly due to different elite genotypes wherein, elite sugarcane genotype Co 14016 (122.56 t/ha) and Co 14012 (117.98 t/ha) recorded significantly higher cane yield than CoC

671(77.50 t/ha). Data were recorded on growth, juice quality, cane yield and yield attributes. Cane yield and juice quality were not influenced significantly due to fertilizer levels.

Juice quality (Brix, sucrose, purity and CCS percent) was studied by collecting cane samples at harvest. Juice Brix, Sucrose%, Purity % and CCS % at harvest showed significant varietal differences. Among different entries, Co 14012 recorded significantly higher mean sucrose % of 21.16 than Co 86032. Amongst the 9 elite sugarcane genotypes Co 14012 was found more promising and recorded significantly higher CCS yield of 18.26 t/ha than the check entries CoC 671 (12.28 t/ha) and Co 86032 (14.46 t/ha).

Table AS 72.8.1: Growth performance of evaluated genotypes at Coimbatore

Particulars	Cane height (Cm)	Single cane weight(kg)	NMC (10 ³ /ha)	Cane yield (t/ha)
Co 14002	241	1.35	75.275	117.28
Co 14004	210.75	1.20	74.35	106.10
Co 14012	218.5	1.25	89.16	117.98
Co 14016	206	1.55	82.843	122.56
Co 14027	224.25	1.55	67.355	114.17
Co 14030	246.25	1.40	85.193	103.20
Co 14032	262.25	1.80	71.803	84.35
Co 86032	224	1.50	81.105	101.25
CoC 671	216.25	1.48	70.41	77.50
SE(d)	11.99	0.21	4.79	9.72
CD	28.09	NS	11.21	22.76
100 % RDF	224.389	1.52	76.80	102.04
125 % RDF	224.389	1.38	78.20	107.82
Sed	7.00	0.10	2.56	4.36
CD	NS	NS	NS	NS
Interaction				
Sed	21.07	0.28	7.69	9.71
CD	NS	NS	NS	NS

Table AS 72.8.2: Quality performance of evaluated genotypes at Coimbatore

Particulars	Brix	Sucrose (%)	Purity	CCS (%)	CCS yield (t/ha)
Co 14002	21.11	19.95	94.49	14.22	16.73
Co 14004	21.16	20.26	95.73	14.52	15.39
Co 14012	21.09	21.16	99.12	15.47	18.26
Co 14016	20.79	19.87	95.60	14.24	17.64
Co 14027	20.94	20.46	97.73	14.79	16.96
Co 14030	20.81	20.27	97.42	14.64	15.10
Co 14032	20.91	19.36	92.57	13.68	11.54
Co 86032	20.91	19.94	95.39	14.28	14.46
CoC 671	21.34	21.60	99.28	15.85	12.28
SE(d)	0.18	0.45	2.03	0.45	1.69
CD	NS	1.06	NS	1.06	3.95
100 % RDF	21.01	20.37	96.53	14.68	15.02

125 % RDF	20.97	20.26	96.21	14.59	15.72
Sed	0.09	0.39	1.57	0.38	1.19
CD	NS	NS	NS	NS	NS
Interaction					
CD	NS	NS	NS	NS	NS

9. POWARKHEDA

Among varieties Co 86032 (126.55), Co Snk 14102 (123.37), Co C 671 (122.45), Co 14016 (122.27), Co 14032 (120.19), Co Snk 05103 (119.09), Co 14002 (118.05), CoN 14073 (117.07), MS 14082 (116.60), Co 14012 (116.19) and CoVC 14062 (112.84) showed higher number of millable canes over Co 14030 (92.76), Co Snk 14103 (90.67), Co 14027 (90.62), CoT 14367 (85.87), Co 14004 (85.81), CoT 14111 (81.36), and MS 14081 (81.01). The number of millable canes was not influenced significantly due to fertility levels. Similarly, Co 86032 (127.02), Co Snk 14102 (123.49), CoC 671 (122.57), Co 14016 (122.34), Co 14032 (120.31), Co Snk 05103 (119.15), Co 14002 (118.11), CoN 14073 (117.88), MS 14082 (116.66), Co 14012 (116.32) and CoVC 14062 (113.25) recorded higher cane yield than Co 14030 (92.94), Co 14027 (90.74), CoSnk 14103 (90.68), and MS 14081 (81.19). The differences for cane yield did not record significance due to fertility levels.

Table AS 72.9.1: Performance of new genotypes at Powarkheda

Treatment	Germination (%)	Shoots (000'/ha)	NMC (000'/ha)	Cane Yield (t/ha)
Genotypes				
Co 14002	63.82	124.93	118.05	118.11
Co 14004	63.59	92.64	85.81	86.46
Co 14012	66.95	121.81	116.19	116.32
Co 14016	67.18	129.10	122.27	122.34
Co 14027	63.94	97.50	90.62	90.74
Co 14030	60.99	99.76	92.76	92.94
Co 14032	64.63	127.13	120.19	120.31
CoN 14073	63.77	124.53	117.07	117.88
CoSnk 14102	67.01	130.26	123.37	123.49
CoSnk 14103	63.42	97.56	90.67	90.68
CoT 14367	63.71	92.64	85.87	86.34
CoT 14111	64.64	88.07	81.36	81.71
CoVC 14062	64.86	119.67	112.84	113.25
MS 14081	61.74	87.78	81.01	81.19
MS 14082	61.57	123.61	116.60	116.66
CoSnk 05103	65.50	125.98	119.09	119.15
Co 86032	68.86	133.44	126.55	127.02
Co C 671	63.19	129.16	122.45	122.57
S Em +	0.79	1.82	1.79	1.74
CD at 5%	2.32	5.35	5.25	5.13

Fertilizer dose (% Recommended NPK)				
100%	64.48	113.40	106.54	106.59
125%	64.34	113.88	107.16	107.53
S Em +	0.79	1.82	1.79	1.74
CD at 5%	2.32	5.35	5.25	5.13

EAST COAST ZONE

10. NAYAGARH

The experiment was laid out in randomized block design with three genotypes from AVT viz: CoA 16321, CoC 16336, CoC 16337 and CoV16356 along with three standard check i.e. CoA 92081, CoC 01061 and CoOr 03151 on red laterite soil of the experimental farm of Sugarcane Research Station, Nayagarh. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dSm⁻¹. Available N content was in lower range (155 kg/ha), but the soil was medium in available P (19.6 kg/ha) and (K 164 kg/ha) content. Analysis of variance suggested that there is significant variations among the genotypes with respect to germination %, number of tillers at 180 days and number of millable canes ('000/ha). The genotype CoV 16356 with 120 cm spacing produced the highest average cane yield of 100.35 t/ha with application of 125 % RD of fertilizer which is at par with application of 100% RDF (98.05 t/ha). (Table AS 72.10.1).

Table AS 72.10.1: Performance of early genotypes at Nayagarh

Treatment	Germination % at 45 DAP	No of tillers (000/ha) at 180 DAP	NMC (000/ha)	Cane yield (t/ha)	Juice Brix %	Juice Sucrose %	CCS %
CoA 16321(100% RDF)	50.34	83.46	82.14	86.48	17.85	17.12	11.12
CoA 16321(125% RDF)	52.65	85.78	83.66	88.24	18.46	17.56	11.06
CoC 16336 (100% RDF)	51.80	86.37	84.10	90.89	18.20	16.80	11.20
CoC 16336 (125% RDF)	54.33	85.90	84.86	92.17	18.09	17.00	11.04
CoC 16337 (100% RDF)	54.27	88.43	86.84	95.73	18.09	17.50	11.60
CoC 16337 (125% RDF)	56.97	90.10	87.14	96.36	18.22	17.80	11.03
CoV16356 (100% RDF)	54.83	90.93	88.89	98.05	17.40	16.60	11.58

CoV16356 (125% RDF)	57.77	92.10	90.34	100.35	18.47	18.55	11.90
CoA 92081 (100% RDF)	52.43	86.33	84.41	93.77	18.12	17.50	11.23
CoA 92081 (125% RDF)	53.30	86.93	86.11	95.27	18.37	18.20	11.62
CoC 01061 (100% RDF)	54.27	87.28	85.46	93.68	18.23	17.65	11.25
CoC 01061 (125% RDF)	55.65	88.13	86.32	96.45	18.73	16.67	11.56
CoOr 03151 (100% RDF)	55.48	88.90	86.18	94.79	19.27	17.30	11.36
CoOr 03151 (125% RDF)	57.22	90.43	88.27	96.73	18.83	16.80	11.67
SEm±	2.263	1.342	2.276	1.504	0.597	0.359	0.294
CD at 5 %	5.522	5.012	5.629	6.563	NS	NS	NS
CV%	6.46	5.96	5.35	6.84	5.28	5.31	4.42

NORTH CENTRAL ZONE

11. PUSA

Early

Genotypes had significant impact on most of the growth and yield attributing character of sugarcane. Significantly higher millable canes (115600/ha) was noticed due to the genotype CoP 15436 which was followed by CoSe 15452 (112800/ha) and CoLk 15466 (109200/ ha). Similarly, higher cane yield (81.7 t/ha) was obtained with the variety CoP 15436 which was followed by CoSe 15452 (80.3 t/ha) and CoLk 15466 (78.5 t/ha). Closer (90 cm row spacing) produced significantly higher plant population (1, 51,600/ha), plant height (294.5 cm), millable canes (1, 17, 500/ha) and cane yield (80.2 t/ha). Though brix, pol and purity percent juice was found to be non-significant. Fertility level had significant impact on plant population, plant height, millable canes and cane yield. The maximum plant population (147400/ ha), plant height (301.8 cm), millable canes (113800/ha) and cane yield (82.3 t/ha) was obtained with 125% recommended dose of NPK. Though, fertility level did not cause significant impact on brix, pol and purity percentage. (**Table AS 72.11.1**).

Mid-late

The genotypes differed significantly in respect to growth, yield and quality of sugarcane. Significantly higher germination (32.8%), plant population (165200/ ha), plant height (304.6 cm), millable canes (118500/ ha) and cane yield (84.5 t/ha) was obtained with the variety CoSe 15454 which was followed in order by CoP 15439 and CoSe 15453. Among

fertility level, 125% recommended dose of NPK gave higher plant population (1, 44,500/ha), plant height (291.7 cm), millable canes (1, 09,900/ ha) and cane yield (80.4 t/ha). Though, brix, pol and purity percent juice was found to be non-significant. (Table AS 72.11.2).

Table AS 72.11.1: Performance of early genotypes at Pusa

Treatment	Germination (%)	Plant population ($\times 10^3$ /ha)	Plant height (cm)	Millable canes ($\times 10^3$ /ha)	Cane yield (t/ha)	Brix (%)	Pol (%)	Purity (%)
<i>Early promising genotype</i>								
CoLk 15466	31.4	146.3	292.1	109.2	78.5	21.4	18.62	86.90
CoP 15467	29.5	138.6	282.9	103.7	74.7	20.9	18.18	87.48
CoP 15436	34.8	165.7	301.5	115.6	81.7	19.8	17.66	89.38
CoSe 15452	33.6	155.4	298.3	112.8	80.3	21.4	18.65	87.71
CoSe 15455	30.2	139.9	284.7	105.4	75.9	19.9	17.57	88.21
CoLk 94184 (ZC)	27.9	129.8	278.8	100.8	65.6	21.0	18.26	87.40
CoSe 95422 (ZC)	28.1	131.5	280.5	101.3	74.2	19.6	17.33	88.34
CoSe 01421 (ZC)	26.7	120.7	262.7	96.1	72.8	20.1	17.84	88.74
SEm \pm	0.91	5.15	9.64	3.00	2.02	0.32	0.254	0.497
CD (P=0.05)	2.5	14.3	NS	8.4	5.6	0.9	0.70	1.38
<i>Spacing (cm)</i>								
90	30.9	151.6	294.5	117.5	80.2	20.5	18.05	87.99
120	29.7	130.4	275.9	93.7	70.8	20.5	17.98	88.04
SEm \pm	0.45	2.58	4.82	1.52	1.01	0.16	0.127	0.248
CD (P=0.05)	NS	7.1	13.4	4.2	2.8	NS	NS	NS
<i>Fertility level (% Recommended dose of NPK)</i>								
100	31.4	134.6	268.6	97.4	68.7	20.4	17.91	87.84
125	29.2	147.4	301.8	113.8	82.3	20.6	18.12	88.20
SEm \pm	0.45	2.58	4.82	1.52	1.01	0.16	0.127	0.248
CD (P=0.05)	1.3	7.1	13.4	4.2	2.8	NS	NS	NS
CV (%)	10.4	12.7	11.7	9.9	9.3	4.4	3.99	1.60

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

Treatment	Germination (%)	Plant population ($\times 10^3$ /ha)	Plant height (cm)	Millable canes ($\times 10^3$ /ha)	Cane yield (t/ha)	Brix (%)	Pol (%)	Purity (%)
<i>Mid-late promising genotype</i>								
CoLk 15468	28.5	133.3	275.3	103.8	77.6	19.7	17.35	88.3
CoLk 15469	27.8	128.5	274.6	98.6	69.3	19.3	16.91	87.9
CoP 15438	28.5	134.5	275.6	105.9	79.2	19.1	16.80	87.8
CoP 15439	31.9	151.4	301.4	114.5	82.7	19.1	16.59	87.1
CoP 15440	27.3	122.9	274.0	96.4	68.3	18.9	16.35	86.7
CoSe 15453	31.2	147.7	298.2	113.3	81.9	19.8	17.24	87.1
CoSe 15454	32.8	165.2	304.6	118.5	84.5	19.4	17.04	87.8
BO 91 (ZC)	25.3	127.8	265.3	92.2	62.9	19.3	16.63	85.9
CoP 06436 (ZC)	29.9	141.3	285.7	108.7	79.8	19.5	17.12	87.9
CoP 9301 (ZC)	24.8	122.6	262.7	88.5	65.7	19.5	17.32	88.7
SEm \pm	0.84	4.98	9.40	3.61	2.35	0.226	0.228	0.38
CD (P=0.05)	2.3	13.8	26.1	10.0	6.5	NS	0.63	1.1
<i>Spacing (cm)</i>								
90	27.9	142.7	285.6	112.7	79.3	19.4	16.98	87.7
120	29.7	132.4	278.0	95.4	71.1	19.4	16.86	87.3
SEm \pm	0.63	2.23	4.20	1.61	1.05	0.101	0.102	0.17
CD (P=0.05)	NS	6.1	NS	4.5	2.9	NS	NS	NS
<i>Fertility level (% Recommended dose of NPK)</i>								
100	29.4	130.6	271.9	98.3	70.0	19.3	16.91	87.6
125	28.2	144.5	291.7	109.9	80.4	19.4	16.93	87.4
SEm \pm	0.63	2.23	4.20	1.61	1.05	0.101	0.102	0.17
CD (P=0.05)	NS	6.1	11.7	4.5	2.9	NS	NS	NS
CV (%)	10.1	12.5	11.6	12.0	10.8	3.3	3.80	1.2

12. SEORAH

The experimental field was medium in organic carbon (0.570 per cent), low in available phosphorus (9.06 kg/ha) and low in potash (37.25 kg/ha) with pH 8.05. Sugarcane crop was

planted on 18.02.2020 and 19.02.2020 as early and mid-late genotypes experiments, respectively and both the experiments were harvested on 26.02.2021.

Early

Significantly higher germination (53.10 per cent) was recorded in genotype CoSe 15452 as compared to CoSe 01421 which was used as check. Shoot population was observed significantly higher in CoLk 15466, CoLk 15467, CoP 15436 and CoSe 15452 over CoSe 01421 which was used as zonal check. Genotype CoSe 15455 (107.74 thousand per ha) produced significantly higher number of millable cane over CoLk 98184 and CoSe 01421 zonal checks. Cane yield was obtained significantly more in CoLk 15466 (88.76 t/ha) CoSe 15452 (90.99 t/ha) and CoSe 15455 (91.39 t/ha) against all early zonal checks. Sucrose per cent was not affected significantly by different genotypes against all checks. 125 per cent RDF application gave significantly higher shoot population (146.19 thousand per ha), NMC (105.98 thousand/ha) and cane yield (87.57 t/ha) against 100 per cent recommended dose of fertilizer application (**Table AS 72.12.1**).

Mid-late

Genotype CoSe 15453 showed significantly higher germination (58.81 per cent) over all the checks but genotype CoP 15438 and CoP 15453 gave significant increase in germination per cent over only Bo 91 and CoP 9301 checks. Shoot population was recorded significantly higher in CoLk 15469 (149.21 thousand per ha) and CoSe 15453 genotypes (152.88 thousand per ha) over all zonal checks. Genotypes CoLk 15468, CoLk 15469, CoSe 15453 and CoSe 15454 produced significantly higher NMC and cane yield over all the zonal checks. Sucrose per cent was recorded significantly higher in CoLk 15469 (18.24) against Bo 91 check. 125 per cent RDF was obtained. Significantly higher shoot population (146.35 thousand per ha) and cane yield (89.60 t/ha) as compared to 100 percent application of RDF. No significant variation was observed in germination, NMC and sucrose per cent between 100 and 125 per cent recommended dose of fertilizer application but maximum value was obtained in 125 per cent recommended dose of fertilizer applied plots (**Table AS 72.12.2**).

Table AS 72.12.1: Performance of early genotypes at Seorahi

Treatment	Germination %	Shoot population (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Sucrose %
Genotypes					
CoLk 15466	47.62	138.15	90.97	88.76	17.51
CoLk 15467	47.14	142.11	100.79	84.05	17.10
CoP 15436	47.86	147.12	91.47	85.69	17.43
CoSe 15452	53.10	142.16	101.39	90.99	18.15
CoSe 15455	51.67	149.75	107.74	91.39	18.03
CoLk 98184	49.76	134.13	97.62	73.04	18.07
CoSe 95422	51.90	139.43	100.25	73.83	18.56
CoSe 01421	42.14	122.52	87.30	75.32	18.22
SEm±	2.10	5.20	3.50	3.77	0.40
CD(P=0.05)	6.09	15.03	10.27	10.50	NS
Fertility Levels					

100 % RDF	48.15	132.65	88.41	78.20	17.87
125 % RDF	49.64	146.19	105.98	87.57	17.90
SEm±	1.05	2.60	1.77	1.88	0.19
CD(P=0.05)	NS	7.51	5.14	5.44	NS
C.V.	10.54	9.15	8.92	10.94	5.30

Table AS 72.12.2: Performance of mid-late genotypes at Seorahi

Treatment	Germination %	Shoot population (000/ha)	NMC (000/ha)	Cane Yield (t/ha)	Sucrose %
Genotypes					
CoLk 15468	46.90	144.49	109.97	94.36	17.62
CoLk 15469	50.00	149.21	110.22	99.39	18.24
CoP 15438	56.19	133.83	98.56	78.17	17.21
CoP 15439	48.81	131.55	99.70	83.58	17.45
CoP 15440	58.33	121.78	94.89	78.57	17.65
CoSe 15453	58.81	152.88	116.07	100.49	17.50
CoSe 15454	49.52	130.41	102.23	83.93	17.69
Bo 91	45.00	130.06	82.14	72.07	17.06
CoP 06436	50.71	122.47	89.78	77.84	17.61
CoP 9301	44.76	127.48	83.63	75.62	18.10
SEm±	2.97	5.68	4.61	4.88	0.37
CD(P=0.05)	8.54	16.34	12.23	14.03	1.10
Fertility Levels					
100 % RDF	50.05	122.48	97.95	79.20	17.54
125 % RDF	51.76	146.35	99.49	89.60	17.68
SEm±	1.33	2.54	2.06	2.18	0.17
CD(P=0.05)	NS	7.31	NS	6.27	NS
C.V.	14.20	10.36	11.43	12.20	5.12

IMPORTANT OBSERVATIONS:

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

Sl. No.	Zone	Early genotypes	Mid-late genotypes	RDF levels
1	North Western	Co15024, Co 15027, CoPb 15212, CoLk 15205	CoS15233, CoS15232, CoLk15209	Majority of the centres reported significant influence of higher RDF on sugarcane growth, yield and quality.
2	Peninsular	CoN14073, Co14016, CoSnk14102		Significant influence of higher RDF was not found.
3	East Coast	CoV16356	--	No influence of higher RDF
4	North Central	CoP15436, CoSe15455	CoSe15455, CoLk15468	Significant effect of higher RDF was noticed.

PROJECT NO.: AS 73

PROJECT TITLE: Assessment of climate change impact on sugarcane productivity

Objective : To assess long term variability in weather parameters and the change of sugarcane production.

Year of start : 2018-2019

Duration : One year

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

Methodology : Long term daily weather data (30 years or more) is to be collected from nearest meteorological station for following parameters.

1. Daily maximum temperature
2. Daily minimum temp.
3. Daily relative humidity morning
4. Daily RH noon
5. Daily rainfall
6. Daily wind velocity
7. Daily evaporation
8. Daily BSSH (Bright Sun Shine Hours)

Analysis for means and general trends of weather over the years has to be performed by the stations at the following intervals.

1. Weekly
2. Monthly, seasonal
3. Annual
4. Decadal

Daily weather data and analyzed data is to be submitted to P.I. in soft format using MS and excel sheets along with following:

1. Representative cane yield for corresponding years
2. Representative sucrose content for corresponding years
3. Soil data
4. Plant data (Biometric)
5. Lat long information including elevation

SUMMARY OF RESULTS OBTAINED DURING LAST YEAR (2019-20)

The project was initiated during this year and was allocated to the centres where agronomists are posted in the scheme. Only 3 centres Lucknow, Faridkot and Pusa submitted a report presented here under:

1. LUCKNOW

The long term trend analysis of weather parameters reveals that minimum temperature of February, March and December showed significantly increasing trend and maximum temperature showed decreasing trend in the months of January and May but an increasing trend was recorded in the month of August. Morning relative humidity showed an increasing trend in all the months except August and similar increasing trend was also observed in afternoon relative humidity from January to May and further from November to December. Monthly rainfall showed significantly increasing trend in February (0.97 mm decade⁻¹) however declining trend was recorded in August (17.28 mm decade⁻¹). Significantly declining trend in evaporation rate and wind speed was also recorded in different months of year.

2. FARIDKOT

During grand growth stage (July to September, in autumn planting) of sugarcane the high relative humidity and rainy days significantly contributed for higher yield. Results also depicted that rainfall during germination and maturity stages had negative impacts on sugarcane yield however, during tillering and grand growth stage rainfall increased the cane yield, number of millable canes and plant height. Morning relative humidity during germination stage had significant positive correlation with cane yield ($r = 0.878^{**}$), number of millable canes ($r = 0.846^{**}$) and plant height ($r = 0.849^{**}$). Morning relative humidity during tillering and grand growth stages had also positive influence on cane yield, number of millable canes, plant height and brix percentage. Rainfall and relative humidity crop maturity negatively affected the cane yield, number of millable canes and plant height. Similarly, the duration of the bright sunshine hours was positive but not significant all growth stages except the tillering and maturity stages of the crop. Results also revealed that at physiological maturity stage of the crop air temperatures had positive impacts on the cane yield, number of millable canes and plant height of sugarcane though; it affected negatively at previous phases of the crop.

3. PUSA

Geographically Pusa enjoys sub-humid, sub-tropical climate with moderate rainfall, hot dry summer and cold winter. Generally south-wet monsoon sets in third or fourth week of June and continues up to September. The average annual rainfall on the basis of thirty year data (1990-2019) is 1202 mm out of which nearly 90% are received during the monsoon extending from the middle of June to middle of October with an average winter rainfall of about 10% only by north-east monsoon. The heavy rainfall is in the month of July-August. The period between last week of December and first half of January receives occasional winter showers. May and early part of June happens to be the hottest month. December-January is the coldest month of year. On the basis of ten years average comparatively higher cane yield (82.7 t/ha) and sucrose

content juice (17.23%) noticed during 2010 to 2019. The increase in cane yield and sucrose content juice by 2010 to 2019 and 2000 to 2009 over 1990 to 1999 was to the extent of 16.2; 1.29 and 23.6; 1.95 per cent, respectively.

CURRENT YEAR (2020-21) REPORT

The trial was initiated during 2018-19 and was allotted to the centres equipped with meteorological observatory. Daily meteorological data from various centres have been received and compiled for long term trend analysis. A comprehensive trend analysis in weather parameters across the zones has to be done to correlate the weather variability with sugarcane growth and yield. DSSAT model is being calibrated for assessing the impact of weather variability on sugarcane growth and yield in different sugarcane producing zones of the country. The trial is proposed to be closed as the weather data from various centres have been received. Weather trend analyses and its correlation with sugarcane growth and yield for different zones will be done at Lucknow and will be reported subsequently. Centres that have not been able to submit the daily weather data can submit the same at the earliest.

The weather parameter of ICAR-Sugarcane Breeding Institute, Coimbatore, Regional Research Station, Faridkot, Sugarcane Research Institute Pusa, Regional Sugarcane and Jaggery Research Station Kolhapur and Sugarcane Research Station, Nayagarh were studied for monthly seasonal and annual level of climate change. The long-term average annual maximum rainfall (1576.2 mm) was recorded at Nayagarh and minimum average annual rainfall (502.4 mm) was recorded at Faridkot (Fig.1). The minimum and maximum temperatures are another important weather parameter in sugarcane production. The minimum temperature showed significantly increasing trend in March at Faridkot, February to April at Kolhapur and December at Coimbatore. The maximum temperature showed significantly increasing trend in August to September at Faridkot, May at Kolhapur and in October at Coimbatore.

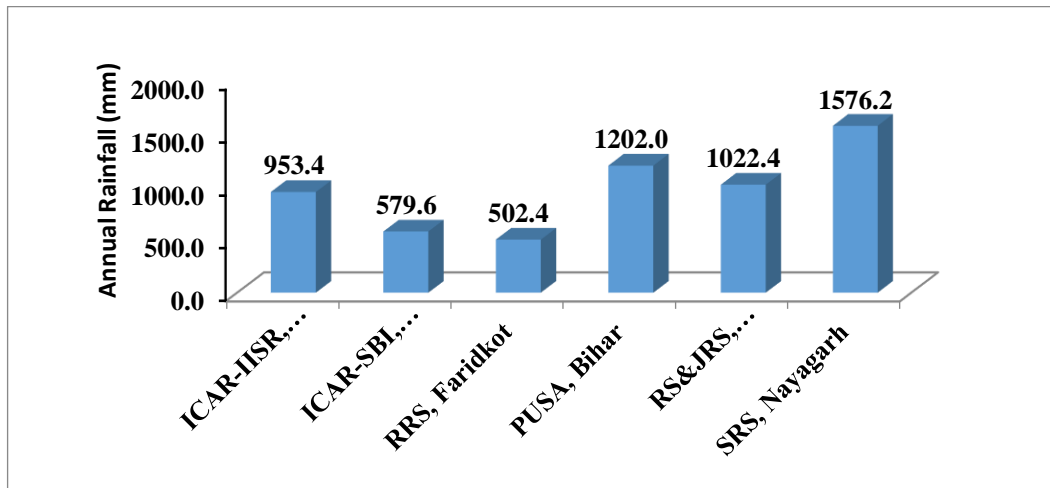


Fig1: Long-term average annual rainfall pattern at different sugarcane research centres

PROJECT No.: AS 74

PROJECT TITLE: Evaluation of sugarcane varieties for drought tolerance

- Objective** : Identification of drought tolerant varieties suitable for specific agro-climatic condition.
- Year of start** : 2018-2019
- Duration** : Long term (Based on 2-years crop performance)
- Locations** : All centres where post of Agronomist has been provided as well as any voluntary centre.
- Planting time** : North West, North Central & North East Zones: February-March
Peninsular & East Coast Zones: 1st fortnight of January
- Treatments** : **(a) Newly released varieties:**
 - Early maturing (3)
 - Mid-late maturing (3)**(b) Irrigation regimes: 2**
 - IW/CPE ratio 1.0
 - IW/CPE ratio 0.3
- Total no. of treatments:** 12
- Design** : Strip plot design
- Replication** : 3
- Plot size** : North West, North Central, North East and East Coast Zones: 8 rows of 8 m length.
Peninsular Zone: 8 rows of 8 m length.
- Methodology** : All the irrigation regimes would be applied 50 days after planting in the main season crop of the region.
- Observations to** :
 - i) Root dry weight at 50, 100, 150 and 200 DAP.
 - ii) Relative leaf water content 24 hrs before and after each irrigation 50 DAP onwards.
 - iii) Soil moisture content before and after each irrigation.
 - iv) Leaf area index and specific leaf weight at 50, 100, 150 and 200 DAP.

- v) Dry matter accumulation at 50, 100, 150, 200 and at harvest.
- vi) Monthly tiller count and other plant biometric data.
- vii) Yield attribute and cane yield
- viii) Juice quality at 10 and 12 months stages including juice extraction percentage.

Protocol for determination of:

1. Relative leaf water content
2. Leaf area index (LAI) and specific leaf weight

SUMMARY OF RESULTS OBTAINED DURING LAST YEAR (2019-20)

The project was initiated during this year. In all 10 centres conducted the trial and centre wise report are presented here under:

NORTH WEST ZONE

1. FARIDKOT

Well-watered (I1) crop gave significantly higher cane yield than water stressed crop (I2). The yield reduction varied from 6.3 percent (CoPb 92) to 24.4 percent (CoPb 93). During the crop season there was about 462 mm rainfall and most of it was up to September.

2. KOTA

CoPk 05191 was found better with respect to number of tillers, plant height, millable canes, cane yield, brix, CCS yield (t/ha) resulting in significantly higher net return over other varieties under early maturing group and CoS 8436 variety in respect of germination, growth, juice extraction and quality parameters but in respect to cane length, cane diameter, cane yield Co 05011 performed best under mid-late group. The higher GR (239708.33 Rs/ha) and NR (131160.00 Rs/ha) and B:C ratio (2.21) recorded with CoPk 05191 in early maturing group and with Co 05011 in mid-late group with gross return (221833.33 Rs /ha), net return (113285.00 Rs /ha) and B:C ratio (2.04). The higher GR (234834.72Rs/ha) and NR (125138.06 Rs/ha) and B:C ratio (1:2.14) was recorded with I1 (I/W CPE ratio 1.0) irrigation regime over I2 (I/W CPE ratio 0.3) irrigation regime.

3. LUCKNOW

Among the six varieties of sugarcane, CoPK 05191 produced highest NMC, cane length, cane girth, sugarcane yield, juice extraction percentage, CCS t/ha, which may be due to production of higher root dry weight, LAI and average cane weight. Minimum reduction in sugarcane yield (13.7%) due to moisture stress was found with CoPk 05191 followed by CoLk 11206 which was at par with CoLk 94184 (18.38%).

4. SHAHJAHANPUR

Genotype CoLk 94184 produced significantly higher cane yield (92.80t/ha) followed by CoSe 11453 with cane yield of 88.20 t/ha. IW/CPE ratio 1.0 recorded significantly higher cane yield of 85.75 t/ha.

5. UCHANI

No significant differences in terms of growth and yield were observed between 1.0 and 0.3 IW/CPE ratios due to frequent rains during pre-monsoon period. Variety CoH 119 (96.9 t/ha) in mid late and Co 0238(96.2 t/ha) in early group being at par produced significantly higher cane yield as compared to variety CoH 167 (90.5 t/ha), Co 0118 (88.4 t/ha), Co 5011 (91.6 t/ha) and CoH 160 (91.4 t/ha) and later four being at par with each other. Among early varieties Co 0238 (12.97 kg) and CoH 119 (12.99 kg) among mid late varieties produced the highest yield of cane produced/1000 litres of irrigation at irrigation schedule of 0.3 IW/CPE ratio. Total irrigation water applied during pre-monsoon season was calculated 22.5 and 15.0 cm at 1.0 and 0.3 IW/CPE schedule, respectively. Total (pre+ post monsoon) irrigation water of 82.5, and 75 cm was applied at 1.0 and 0.3 IW/CPE irrigation schedule, respectively. Total (Irrigation+ rainfall) water was calculated as 219.9 and 212.4 at 1.0 and 0.3 IW/CPE irrigation schedule, respectively.

PENINSULAR ZONE

6. PUNE

. Irrigation at 1.0 IW/CPE ratio gave significantly higher cane yield (122.42 t/ha) over application of irrigation water at 0.3 IW/CPE ratio. Among genotype VSI 12121 registered significantly higher cane yield (137.48 t/ha), but in the same line with the CoM 0265 &CoVSI 18121. Genotype VSI 434 recorded lower cane yield (81.19 t/ha).

7. SANKESHWAR

At IW/CPE ratio 0.3, genotypes SNK 09227 (mid-late) and SNK 088789 (early) performed better than rest of the genotypes. The cane yield differed significantly due to influence of irrigation regimes and genotypes. Among mid-late genotypes Co 86032 recorded significantly higher cane yield (157.47 t/ha) than SNK 09227 and SNK 09268. In early genotypes SNK 088789 recorded higher yield (133.71 t/ha) over SNK 07680 and CoC 671.

NORTH CENTRAL ZONE

8. PUSA

It can be concluded that sugarcane varieties, CoP 2061, CoP 16437 and CoP 9437 when irrigated at IW: CPE ratio 1.00 are better for higher productivity under Bihar condition.

9. BETHUADHARI

Moisture stress (IW: CPE 0.3) caused significant reduction in cane yield across the varieties. Among the varieties CoLk 94184 performed best with highest yield (94.28 t/ha) followed by BO 91 (90.8 t/ha). These two varieties were found to be most resilient against moisture stress with least reduction in cane yield.

EAST COAST ZONE

10. NAYAGARH

Among early maturing varieties, CoOr 03151 with IW/CPE ratio 0.3 recorded significantly different growth and yield parameters compared to other varieties CoOr 03152, CoOr 05346. Similarly among mid-late maturing varieties, CoOr 04151 with IW/CPE ratio 0.3 recorded significantly different growth and yield parameters compared to other varieties CoOr

10346, Co 86249. So this is possibly due to better drought tolerant capacity of these two varieties compared to other varieties.

CURRENT YEAR (2020-21) REPORT

NORTH WESTERN ZONE

1. FARIDKOT

Well-watered (I1) crop gave significantly higher cane yield (**Table AS 74.1.1**) than water stressed crop (I2). The yield reduction varied from 4.5 percent (CoPb 91) to 34.5 percent (Co118). During the crop season there was about 629 mm rainfall and 509 mm of it was from July to September.

Table AS 74.1.1: Cane yield of sugarcane genotypes under different Irrigation regimes.

Irrigation regimes /Geno	I1	I2	Mean
CoPb 92	135.6	115.6	125.6
Co 118	122.2	80.0	101.1
CoJ 64	105.5	97.5	101.5
CoPb 91	121.1	115.6	118.4
CoPb 93	129.4	115.6	122.5
CoPb 94	150.0	130.6	140.3
Mean	127.3	109.2	
CD (5%)	Irrigation regimes	Genotypes	Interaction
	16.1	11.6	15.8

Table AS 74.1.2: Growth and quality parameters of sugarcane genotypes under different irrigation regimes

Treatment	Germination %	No. of Shoots 000/ha	NMC 000/ha	Cane length (cm)	Cane diameter (cm)	Single cane wt. (kg)	Sucrose (%)
Irrigation regimes							
IW/CPE ratio 1.0	43.3	162.4	122.4	209.7	2.86	1.223	17.55
IW/CPE ratio 0.3	42.4	136.3	106.7	192.0	3.00	1.119	17.06
CD (5%)	NS	23.5	NS	NS	0.12	NS	NS
Genotypes							
CoPb 92	43.6	169.9	138.3	224.8	2.56	1.069	18.75
Co 118	46.6	120.3	87.2	200.4	3.10	1.363	18.29
CoJ 64	43.2	135.3	122.4	188.7	2.70	0.921	17.4
CoPb 91	36.6	129.3	98.9	208.3	3.21	1.346	16.93
CoPb 93	46.9	161.8	108.6	195.1	2.89	1.141	16.91
CoPb 94	40.3	179.4	131.7	187.7	3.11	1.188	15.54
CD (5%)	3.1	9.8	7.1	16.8	0.27	0.103	0.34

2. KOTA

Based on the three years of study, it can be concluded that CoPk 05191 was found better with respect to number of tillers, plant height, millable canes, cane yield, juice extraction (%), brix (%), CCS (%), CCS yield(t/ha) and purity (%). All this resulted in significantly higher net return over rest of varieties under early maturing group. CoH 9264 was found better with respect to plant height, root dry weight & dry matter accumulation, cane diameter, cane length, cane yield and economics under mid-late maturing group. However, irrigation schedule at IW/CPE ratio 1.0 was found economical in sugarcane yield as compared to IW/CPE ratio 0.3.

The higher gross return, net return and B: C ratio were recorded with CoPk 05191 in early maturing group. However, highest gross return, net return and B: C ratio were recorded with CoH 9264 variety. The higher gross return, net return and B: C ratio recorded with irrigation schedule IW/CPE ratio 1.0 over IW/CPE ratio 0.3.

Table AS 74.2.1: Growth and yield parameters of sugarcane genotypes under different irrigation regimes at Kota

Treatment	Cane length (cm)	Cane diameter (cm)	NMC (000/ ha)	Cane weight (g)	Cane yield (t/ha)
Drought tolerant varieties:					
Early Maturing Varieties:					
V ₁ : CoPk 5191	250.0	1.7	131.72	687	86.83
V ₂ : Co 0238	239.0	2.4	117.67	885	80.15
V ₃ : Co 5009	235.6	2.0	117.42	945	83.33
Mid-late Maturing Varieties:					
V ₄ : Co 05011	240.9	2.5	122.92	793	79.17
V ₅ : CoH 9264	243.6	2.3	123.62	640	79.75
V ₆ : CoS 8436	232.8	1.8	121.92	920	77.17
SEm ±	2.53	0.08	4.33	38.06	2.95
CD (P=0.05)	8.01	0.29	13.68	119.91	9.32
CV	2.56	9.45	8.48	11.40	8.78
B. Irrigation schedule (IW/CPE)					
I ₁ : 1.00	246.4	2.2	125.27	838	84.82
I ₂ : 0.30	234.2	1.9	119.82	786	77.32
SEm ±	2.44	0.04	1.29	8.61	1.78
CD (P=0.05)	15.05	0.24	7.91	52.41	10.89
CV	4.32	7.73	4.39	4.46	9.20

Table AS 74.2.2: Quality parameters of sugarcane genotypes under different irrigation regimes at Kota

Treatment	Brix (%)	Sucrose (%)	Purity (%)	CCS (%)	CCS yield (t/ha)
A. Drought tolerance varieties:					
Early Maturing Varieties:					
V ₁ : CoPk 5191 (Pratap Ganna- 1)	22.60	20.1	89.0	14.0	12.3
V ₂ : Co 0238	24.05	21.5	89.7	15.0	12.2
V ₃ : Co 5009	21.88	19.3	88.5	13.3	11.3
Mid-late Maturing Varieties:					
V ₄ : Co 05011	22.67	20.2	89.1	14.0	11.4
V ₅ : CoH 9264	21.87	19.4	88.6	13.4	10.9
V ₆ : CoS 8436	23.57	21.1	89.6	14.7	11.6
CD (P=0.05)	1.25	28.32	-	0.96	NS
B. Irrigation schedule (IW/CPE)					
I ₁ : 1.0	23.40	20.95	89.52	14.58	12.58
I ₂ : 0.3	22.15	19.67	88.77	13.62	10.75
CD (P=0.05)	1.71	70.58	-	1.31	NS

3. LUCKNOW

This experiment was laid out on 22nd February 2020 in Strip plot design with three replications. Sugarcane crop was irrigated 9 times in treatment IW/CPE ratio 1.0 (IS 1.0), and five times in IW/CPE ratio 0.3 (IS 0.3). Crop was irrigated 7.5 cm in depth in each time of irrigation. Well distributed 987.8 mm rainfall was received during the crop duration. Rainfall distributed from June to September. In winter rainfall occurred in the month of November 2020 only. At 50 days after planting number of tillers, weight of roots and total dry weight was numerically nonsignificant.

Result revealed that, highest sugarcane yield (91.31 t/ha) was recorded with IS 1.0 with CoPk05191 followed by CoLk 11206. Cane yield production was recorded numerical significant with irrigation scheduling and among varieties. Cane yield production was recorded significant with interaction of irrigation scheduling and varieties of sugarcane. Minimum 10.76 % reduction in cane yield production was recorded with CoPk 05191 followed by CoLk 11206 (13.96 %). Quality parameters of sugarcane was recorded at harvest and were statistically analyzed. Irrigation schedule treatment recorded significantly higher juice extraction percentage with IS 1.0 over IS 0.30. Irrigation scheduling recorded nonsignificant effect on CCS%. Production of commercial cane sugar (CCS) was significantly affected due to varieties as well as irrigation scheduling. The highest CCS production (10.31 & 10.54 t/ha) was recorded with variety CoPk 05191 at 10 and 12 months age of the crop, respectively.

Table AS 74.3.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Lucknow

Treatment	IS 1.0	IS 0.30	Mean
Co Lk 94184	86.36	73.24	79.80
Co Pk 05191	91.31	81.48	86.40
Co 0238	82.38	58.66	70.52
Co Lk 9204	82.92	60.60	71.76
Co Lk 11206	86.68	74.59	80.64
CoS 08279	83.49	67.33	75.41
Mean	85.52	69.32	
Factor A- CD at 5%			5.86
Factor B- CD at 5%			3.58
Two Horizontal means at same level of Vertical factor- CD at 5%			6.53
Two Vertical means at same level of Horizontal factor- CD at 5%			4.91

Table AS 74.3.2: Root dry weight and total dry matter production of sugarcane genotypes under different irrigation regimes at Lucknow

Treatment	Root dry wt. kg/ha					Total dry weight kg/ha				
	50 DAP	100 DAP	150 DAP	200 DAP	At harvest	50 DAP	100 DAP	150 DAP	200 DAP	At harvest
IS1.0	65.84	126.15	357.59	647.77	738.42	657.41	1612.77	5890.81	27800.97	30849.30
IS0.3	62.05	100.10	296.40	583.48	663.26	622.28	1282.90	4838.32	23610.09	27655.71
CD at 5%	NS	11.91	5.42	49.65	72.64	NS	186.75	49.32	1123.99	2827.05
Co Lk 94184	65.77	116.04	333.13	619.10	705.79	653.37	1476.42	5468.31	26191.88	29689.85
Co Pk 05191	68.25	131.05	365.16	672.31	739.04	681.89	1670.99	5946.64	28026.85	30679.36
Co Lk 9709	61.47	100.82	304.27	579.93	669.05	621.52	1300.83	4990.05	24196.55	27738.49
Co Lk 9204	60.45	104.12	302.13	583.48	672.61	606.00	1336.12	4970.88	24138.81	28146.67
Co Lk 11206	64.70	121.41	343.83	637.30	723.74	645.23	1558.73	5668.59	26820.76	30257.40
CoS 08279	62.54	105.33	313.44	601.64	694.82	631.05	1343.94	5142.92	24558.33	29003.27
CD at 5%	NS	11.94	28.10	58.06	41.47	NS	166.67	463.53	2411.74	1990.27

4. UCHANI

Variety CoH 167 (102.8t/ha) and Co 0238 (101.7 t/ha) being at par recorded the highest cane yield while variety Co 0118 (76.3 t/ha) recorded significantly lowest cane yield. Variety Co 05011 (108.4 thousand/ha) recorded significantly higher number of NMC which was at par with Co 0238, CoH 160 and CoH 167. Higher moisture regimes recorded significantly higher number of tillers, NMC, cane weight and cane yield. Based on one year study it is concluded that varieties CoH 167 (mid late) and Co 0238 (early) are the best choice under drought conditions with highest yield as well as higher water productivity (cane yield produced per 1000 litres of irrigation water). During post monsoon, 52.5 cm irrigation water was applied in both the irrigation levels. Total (pre+ post monsoon) irrigation water of 97.5 and 67.5 cm was applied at 1.0 and 0.3 IW/CPE irrigation schedule, respectively. Total (Irrigation+ rainfall) water was calculated as 200.3 and 170.3 at 1.0 and 0.3 IW/CPE irrigation schedule, respectively.

Table AS 74.4.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Uchani

Irrigation/ varieties	NMC (000/ha)		Mean	Cane yield (t/ha)		Mean
	1.0	0.3		1.0	0.3	
Co 0118	101.8	76.3	89.0	93.2	59.3	76.3
Co 0238	108.7	95.7	102.2	115.3	88.0	101.7
CoH 160	118.5	89.8	104.1	99.0	61.2	80.1
Co 05011	114.8	102.0	108.4	106.9	81.5	94.1
CoH 119	110.6	75.8	93.2	114.1	61.7	87.9
CoH 167	111.2	100.5	105.9	115.1	90.5	102.8
Mean	110.9	90.0		107.3	73.7	
CD at 5% for irrigation levels			6.7			5.8
CD at 5% for varieties			8.1			7.3
CD at 5%- Two horizontal mean at same level of vertical factor			9.0			10.3
CD at 5%- Two vertical mean at same level of horizontal factor			11.5			13.1

Table AS 74.4.2: Irrigation water applied, rainfall received and other water parameters during the crop season at Uchani

Varieties	IW/ CP E	No. of irrigation as per schedule	Irrigation depth (cm)	Total irrigatio n (cm)	Total rainfal l (cm)	Total water (Irrigatio n + rainfall) (cm)	Cane yield (t/ha)	Cane yield produced per 1000 litres of irrigation water (kg)
CoH 167	1	5	7.5	97.5	102.8	200.3	115.1	11.81
CoH 119	1	5	7.5	97.5	102.8	200.3	114.1	11.70
Co 5011	1	5	7.5	97.5	102.8	200.3	106.9	10.96
CoH 160	1	5	7.5	97.5	102.8	200.3	99	10.15
Co 0238	1	5	7.5	97.5	102.8	200.3	115.3	11.83
Co 0118	1	5	7.5	97.5	102.8	200.3	93.2	9.56
CoH 167	0.3	1	7.5	67.5	102.8	170.3	90.5	13.41
CoH 119	0.3	1	7.5	67.5	102.8	170.3	61.7	9.14
Co 5011	0.3	1	7.5	67.5	102.8	170.3	81.5	12.07
CoH 160	0.3	1	7.5	67.5	102.8	170.3	61.2	9.07
Co 0238	0.3	1	7.5	67.5	102.8	170.3	88	13.04
Co 0118	0.3	1	7.5	67.5	102.8	170.3	59.3	8.79

5. SHAHJAHANPUR

The soil of experimental field was low in organic carbon (0.33%) and medium in phosphorus (10.80 kg/ha) and potash (112 kg/ha) with PH 7.13. Experimental sugarcane crop was planted on 13.02.2020 and harvested on 16.02.2021. Experimental data (**Table AS 74.5.1**) showed that variety CoLk 94184 recorded significantly higher cane yield (93.30 t/ha) followed by CoSe 11453 with cane yield of 89.20 t/ha. IW/CPE ratio 1.0 produced significantly higher cane yield of 86.20 t/ha as compared to IW/CPE ratio 0.3 with cane yield of 78.20 t/ha. CCS% was not affected significantly with different varieties and IW/CPE ratio.

Table AS 74.5.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Shahjahanpur

Treatment	Germination (%)	Shoots (000/ha)			NMC (000/ha)	Cane yield (t/ha)	CCS (%)
		90 DAP	120 DAP	150 DAP			
A – Varieties							
UP 05125	62.7	113.9	137.6	154.7	118.7	72.9	12.06
CoS 13231	45.4	116.4	139.8	161.3	127.4	67.5	12.05
CoLk 94184	59.1	115.6	138.9	158.1	132.1	93.3	12.00
CoS 08279	62.4	104.5	129.5	149.0	115.6	87.3	12.05
CoS 09232	51.4	100.3	119.2	139.2	109.1	82.4	11.85
CoSe 11453	53.7	103.8	132.2	154.1	119.4	89.2	11.80
SE±	2.87	2.25	2.65	3.33	3.02	2.47	0.30
CD at 5%	6.40	5.02	5.89	7.42	6.73	5.51	NS
B – Irrigation regimes							
I ₁ - IW/CPE ratio 1.0	53.4	116.2	138.4	159.9	124.1	86.2	12.03
I ₁ - IW/CPE ratio 0.3	54.8	101.9	127.3	147.1	116.8	78.2	11.90
SE±	0.35	0.98	1.48	1.14	1.32	0.49	0.27
CD at 5%	NS	4.24	6.39	4.91	5.69	2.09	NS

PENINSULAR ZONE

6. PUNE

The experiment was planted on 6th February 2020 and harvest was done on 13.03.2021. Findings revealed that significantly higher tiller count (0.98 lakh/ha) at 120 DAP was found with irrigation at 1.0 IW/CPE ratio. Cane variety CoM 0265 registered significantly higher tiller count (1.04 lakh/ha) at 120 DAP, but it was similar with most of the varieties except, CoVSI 13020 and VSI 434. Similarly irrigation at 1.0 IW/CPE ratio gained significantly higher NMC count 0.66 lakh/ha at 12 months after planting (MAP) and genotype CoVSI 18121 recorded significantly higher NMC count (0.72 lakh/ha) at 12 MAP, but it was not significantly different

from CoM 0265, VSI 8005, Co86032 and VSI 12003. Irrigating the field at 1.0 IW/CPE ratio gave significantly higher cane yield (118.33 t/ha) over application of irrigation water at 0.3 IW/CPE ratio, variety CoVSI 18121 registered significantly higher cane yield (160.61 t/ha), but in the same line with the CoM 0265, VSI 8005 & VSI 12003.

The results of juice quality parameters viz. brix, sucrose%, CCS% and juice extraction percentage recorded after harvest indicated that different irrigation levels failed to exert its significant effect on juice quality. The mean data on juice quality as influenced by different varieties showed that, brix and sucrose percentage was positively influenced by varieties. Significantly maximum brix (22.49%) and sucrose (19.29%) was registered under variety VSI 434.

Table AS 74.6.1: Growth attributes and cane yield of sugarcane genotypes under different irrigation regimes at Pune

Treatment details	No. of internodes	Girth of internodes (cm)	Total cane height (cm)	Single cane wt. (kg)	Cane yield (t/ha)
Irrigation level					
I ₁ : 0.3 IW/CPE	21.70	9.67	228.66	1.21	83.54
I ₂ : 1.0 IW/CPE	22.23	11.41	242.98	1.83	118.33
Sem±	0.67	0.20	4.95	0.08	4.67
C.D. @ 5%	NS	1.24	NS	0.51	28.46
CV%	14.97	9.54	10.28	27.24	22.70
Genotypes					
V ₁ : CoM 0265	23.61	11.32	263.44	1.93	117.98
V ₂ : VSI 8005	22.00	10.57	256.89	1.72	105.30
V ₃ : Co 86032	21.83	10.73	221.00	1.59	98.54
V ₄ : CoVSI18121	22.05	10.73	251.94	1.86	130.61
V ₅ : VSI 12003	20.28	10.59	248.66	1.47	107.93
V ₆ : CoVSI 03102	20.11	11.12	205.44	1.62	91.42
V ₇ : CoVSI 13020	23.83	9.62	243.89	1.24	80.43
V ₈ : VSI 434	22.05	9.67	205.33	1.10	75.32
Sem±	1.27	0.32	10.87	0.14	9.48
C.D. @ 5%	NS	0.99	32.97	0.45	28.78
CV%	14.17	7.65	11.29	24.01	23.02
Interaction I×V					
Sem±	1.14	0.49	18.77	0.43	16.71
C.D. @ 5%	NS	NS	NS	NS	NS
CV%	9.01	8.11	13.78	16.47	28.67

Table AS 74.6.2: Effect of irrigation levels and genotypes on juice quality at Pune

Treatment details	CCS yield (t/ha)	Juice extraction percentage	Brix (%)	Sucrose (%)	CCS (%)
Irrigation levels					
I ₁ : 0.3 IW/CPE	9.94	39.73	20.77	17.39	11.87
I ₂ : 1.0 IW/CPE	17.05	41.26	21.89	18.56	12.82
Sem±	0.43	1.61	0.27	0.27	0.19
C.D. @ 5%	2.62	NS	NS	NS	NS
CV%	15.65	19.53	6.40	7.37	7.87
Genotypes					
V ₁ : CoM 0265	15.67	38.75	21.61	18.52	12.79
V ₂ : VSI 8005	14.51	41.51	21.93	18.45	12.62
V ₃ :Co 86032	12.51	41.38	20.97	17.20	11.61
V ₄ :CoVSI18121	13.41	40.42	20.85	17.92	12.39
V ₅ : VSI 12003	16.62	41.79	20.21	16.91	11.53
V ₆ : CoVSI 03102	13.26	38.53	21.50	18.42	12.72
V ₇ :CoVSI 13020	10.69	41.15	20.31	17.15	11.75
V ₈ : VSI 434	11.35	40.47	22.49	19.29	13.32
Sem±	1.34	1.47	0.34	0.42	0.39
C.D. @ 5%	NS	NS	1.03	1.27	NS
CV%	24.44	8.91	3.93	5.73	7.87
Interaction I×V					
Sem±	2.49	2.10	0.61	0.64	0.55
C.D. @ 5%	NS	NS	NS	NS	NS
CV%	32.02	8.98	4.98	6.21	7.82

7. SANKESHWAR

Among irrigation regimes, IW/CPE ratio 1.0 recorded significantly higher cane yield (118.3 t/ha) as compared to IW/CPE ratio 0.3 (113.2 t/ha). The data on sugarcane juice quality indicated that IW/CPE ratio 1.0 recorded significantly superior viz., Pol, CCS % and CCS yield (16.4 t/ha) compared to irrigation scheduling at IW/CPE ratio 0.3.

The mid-late cultivar CoSnk 09227 recorded significantly higher cane yield (127.4 t/ha) compared to other cultivars. However, cane yield with midlate cultivars SNK 09268 (123.0 t/ha) and Co86032 (122.7 t/ha) were on par with each other. Significantly lower yield was with early cultivar CoSNK 07680 (99.9 t/ha). Similar trend was noticed with NMC, cane girth and single cane weight. Effect of cultivars on sugarcane juice quality parameters viz., pol %, purity % and CCS % indicated that, significantly higher value were with midlate cultivar Co 86032 and CoSnk 09227 both were on par with each other. However, brix was non-significantly differed among the cultivars. Midlate cultivars, Co 86032 (16.3 t/ha) and CoSnk 09227 (16.2 t/ha) recorded significantly higher CCS yield compared to other cultivars. Significantly lower CCS yield was with SNK 088789 (14.3 t/ha).

Higher cane yield and yield attributes were recorded for interactions. Among the interaction CoSnk 09227 with IW/CPE ratio 1.0 (131.1 t/ha) recorded significantly higher cane yield as compared to other interactions. This was due to higher NMC and single cane weight in this interaction. The next best interactions were I1 C1 and I1 C3 which were at par with each other. Irrigation scheduling at IW/CPE ratio 0.3 with midlate cultivar CoSnk 09227 and early cultivar SNK 088789 recorded higher cane yield of 123.6 t/ha and 114.2 t/ha respectively. The quality parameters viz., brix, pol, purity and CCS % did not differ significantly due to interaction effects. CCS yield followed the same trend as that of cane yield among interactions.

- Among irrigation regimes, IW/CPE ratio 1.0 irrigation schedule recorded significantly higher cane yield (120.4 t/ha) compared to IW/CPE ratio 0.3 (108.5 t/ha).
- The midlate cultivar CoSnk 09227 recorded significantly higher cane yield (130.7 t/ha) compared to other cultivars. Significantly lower yield was with early cultivar CoSNK 07680 (97.4 t/ha). Similar trend was noticed with NMC, cane girth and single cane weight.

Table AS 74.7.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Sankeshwar

Vertical strips {Cultivars}	Cane yield (t/ha)			NMC ('000/ha)			Single cane weight (kg)			Cane girth (cm)		
	Horizontal strips (IW/CPE ratio)											
	I ₁	I ₂	Mean	I ₁	I ₂	Mean	I ₁	I ₂	Mean	I ₁	I ₂	Mean
Co 86032 (Mid late)	123.9	121.3	122.7	97.4	93.3	95.3	1.7	1.8	1.7	2.7	2.4	2.5
Co SNK 09227 (Mid late)	131.1	123.6	127.4	99.6	95.4	97.5	1.8	1.8	1.8	2.8	2.8	2.8
SNK 09268 (Mid late)	123.3	122.8	123.0	88.4	84.1	86.3	1.7	1.7	1.7	2.6	2.6	2.6

Co SNK 07680 (Early)	108.7	91.1	99.9	75.3	73.3	74.3	1.2	1.3	1.2	2.5	2.4	2.4	
SNK 088789 (Early)	114.7	114.2	114.5	90.6	87.8	89.2	1.8	1.7	1.7	2.5	2.5	2.5	
CoC 671 (Early)	107.8	106.1	106.9	77.9	72.6	75.2	1.6	1.4	1.5	2.6	2.8	2.7	
Mean	118.3	113.2		88.2	84.4		1.6	1.6		2.6	2.6		
		S.Em±	C.D at 5%	S.Em±	C.D at 5%	S.Em±	C.D at 5%	S.Em±	C.D at 5%	S.Em±	C.D at 5%	S.Em±	C.D at 5%
IW/CPE ratio (I)		0.5	2.9	0.8	NS	0.03	NS	0.02	NS				
Cultivars (C)		1.1	3.4	2.0	6.4	0.03	0.1	0.1	0.3				
Horizontal strips at same level of Vertical strips		1.3	4.6	1.8	NS	0.1	NS	0.1	0.3				
Horizontal strips at same or different level of Vertical strips		1.4	4.5	2.4	NS	0.1	NS	0.1	0.3				

8. KOLHAPUR

Among irrigation regimes, IW/CPE ratio 1.0 irrigation schedule recorded significantly higher cane yield (88.62 t/ha) compared to IW/CPE ratio 0.3 (80.76 t/ha). The higher cane yield recorded with IW/CPE ratio 1.0 was owing to significantly higher yield attributing characters viz., number of millable canes (64005/ha), single cane weight (1.38 kg / cane), cane diameter (2.9 cm) and higher leaf area index at 100, 150, 200 DAP as compared to IW/CPE ratio 0.3. The data on sugarcane juice quality indicated that IW/CPE ratio 1.0 recorded significantly superior quality parameters viz., brix, sucrose %, CCS % and CCS yield (11.50 t/ha) as compared to irrigation scheduling at IW/CPE ratio 0.3. The mid late cultivar Co86032 recorded significantly higher cane yield (104.47 t/ha) as compared to other cultivars except mid late cultivar CoM 09057 (97.95 t/ha). However, cane yield with early cultivar CoC 671 (82.71 t/ha) was on par with mid-late cultivar CoM 0265 (80.08 t/ha) respectively. The cultivars Co86032 and CoM 09057 recorded the higher cane yield at 1.0 irrigation regime than 0.3 irrigation regime. This is due to higher values growth and yield growth attributing characters viz., NMC (69.06 and 66.12/ha), average cane weight (1.54 & 1.51 kg/cane), cane diameter (2.9 & 3.1 cm) and higher LAI at all crop growth stages, respectively

Juice quality parameters viz., brix, Sucrose % and CCS % indicated that, significantly higher value were with early cultivar CoC 671 and mid late cultivar Co 86032, both were on par with each other. However, purity % differed non-significantly among the cultivars. Mid-late cultivars Co 86032 (13.07 t/ha) and CoM 09057 (12.57 t/ha) recorded significantly higher CCS yield as compared to other cultivars. Significantly lower CCS yield was in MS 10001 (9.11 t/ha).

Significantly higher cane yield and yield attributes were recorded for interactions. Among the interaction Co 86032 with IW/CPE ratio 1.0 (105.11 t/ha) recorded significantly higher cane yield as compared to other interactions. This was due to higher NMC and single cane weight in this interaction.

Table AS 74.8.1: Effect of irrigation regime and genotypes on sugarcane growth and cane yield at Kolhapur

Vertical strips {Cultivars}	Germination (%) at 8 th week			Cane yield (t ha ⁻¹)			NMC 000 ha ⁻¹			Single cane weight (kg)			Cane diameter (cm)		
	Horizontal strips (IW/CPE ratio)														
	I ₁	I ₂	Mea n	I ₁	I ₂	Mea n	I ₁	I ₂	Mea n	I ₁	I ₂	Mea n	I ₁	I ₂	Mea n
CoC 671 (early)	45.5	37.1	41.3	87.2	78.20	82.7	64.2	59.6	61.9	1.35	1.3	1.3	2.8	2.7	2.8
MS 10001 (early)	37.4	37.7	37.5	76.4	67.46	71.9	59.2	55.0	57.1	1.29	1.2	1.2	2.8	2.7	2.8
CoM 11082 (early)	43.9	36.9	40.4	76.6	65.35	70.9	63.5	56.0	59.8	1.20	1.1	1.1	2.6	2.5	2.6
Co 86032 (Mid-late)	51.9	51.0	51.5	105	103.8	104	70.9	67.1	69.0	1.47	1.5	1.5	2.9	2.8	2.9
CoM09057 (Mid-late)	54.0	46.6	51.3	99.8	96.03	97.9	69.1	63.1	66.1	1.44	1.5	1.4	3.2	3.0	3.1
CoM 0265 (Mid-late)	42.4	37.5	39.9	86.4	73.73	80.0	57.1	52.8	54.9	1.52	1.3	1.4	3.0	2.8	2.9
Mean	45.8	41.5	-	88.6	80.76	-	64.0	58.9		1.38	1.3	1.3	2.9	2.8	-
	S.Em±		C.D at 5%	S.Em±		C.D at 5%	S.Em±		C.D at 5%	S.Em±		C.D at 5%	S.Em±		C.D at 5%
IW/CPE ratio (I)	1.43		NS	0.29		1.78	0.55		3.36	0.01		NS	0.01		0.08
Cultivars (C)	2.40		7.55	3.30		9.55	1.75		5.53	0.04		0.12	0.05		0.16
Horizontal strips at same level of Vertical strips	1.61		NS	1.25		3.94	0.65		NS	.02		0.063	0.03		NS

9. POWARKHEDA

Among varieties CoJN 86-600 (159.28), CoJN 95-05 (159.01), Co 85004 (158.66), 99004 (157.66), Co C 671 (156.58) recorded significantly higher numbers of tillers ('000/ha) than CoJN 86-141 (148.06), but the number of tillers recorded at par among CoJN 86-600 (159.28), CoJN 95-05 (159.01), Co 85004 (158.66), 99004 (157.66), Co C 671 (156.58). Irrigation scheduled at IW: CPE ratio 1.0 recorded higher tillers (157.20) as compared to number of tillers recorded with ratio of 0.3 (155.8). Further, CoJN 86-600 (136.40), CoJN 95-05 (135.94), Co 85004 (135.56), 99004 (134.59), Co C 671 (133.43) recorded significantly higher numbers of millable cane than CoJN 86-141 (125.14). Irrigation regime I1 produced 134.13 ('000/ha) millable canes as compared to 132.89 recorded with I2. The cane yield (t/ha) was influenced significantly due to different varieties. CoJN 86-600 (113.26), CoJN 95-05 (112.80), Co 85004 (112.41), 99004 (111.45), Co C 671 (110.68), recorded significantly higher cane yield

than CoJN 86-141 (100.84). Cane yield recorded at par in between I1 (110.60) and I2 (109.88) irrigation schedules.

Table AS 74.9.1: Effect of irrigation regimes and genotypes on growth and yield of sugarcane at Powarkheda

Treatments	Germination (%)	Tillers (000'/ha)	NMC (000'/ha)	Root dry wt. (g) 50 & 200 DAS		Plant dry wt.(g) 50 DAS	Brix (%)	Cane Yield (t/ha)
Varieties								
CoJN 86-141	55.47	148.06	125.14	0.91	3.82	14.59	21.23	100.84
CoC 671	64.76	156.58	133.43	1.10	3.93	13.71	21.23	110.68
Co 85004	66.88	158.66	135.56	1.02	4.00	15.94	21.24	112.41
CoJN 95-05	64.38	159.01	135.94	1.37	4.00	21.88	21.23	112.80
CoJN 86-600	64.76	159.28	136.40	0.70	3.94	12.89	21.23	113.26
Co 99004	65.84	157.66	134.59	0.70	3.88	17.25	21.22	111.45
S Em +	1.74	1.77	1.79	-	-	-	0.01	1.94
CD at 5%	5.07	5.15	5.23	-	-	-	NS	5.66
Irrigation schedule								
I1: 1.0	63.80	157.20	134.13	1.00	4.10	15.20	21.23	110.60
I2: 0.3	63.56	155.8	132.80	0.97	3.76	16.89	21.23	109.88
S Em +	1.74	1.77	1.79	-	-	-	0.01	1.94
CD at 5%	5.07	5.15	5.22	-	-	-	NS	NS

EAST COAST ZONE

10. NAYAGARH

The experiment was laid out in strip plot design with three early maturing varieties viz: CoOr 12346, CoA 92081, CoC 15336 and three mid-late maturing varieties CoOr 13346, CoOr 15346, CoV 92102 with two irrigation regimes i.e IW/CPE ratio 1.0 and IW/CPE ratio 0.3 to evaluate the drought tolerance capacity of the varieties. There is significant difference between two irrigation regimes i.e IW/CPE ratio 1.0 and IW/CPE ratio 0.3. The crop recorded higher NMC and cane yield with IW/CPE ratio 1.0 due to uniform availability of water and nutrients to the crop throughout the crop cycle. However with IW/CPE ratio 0.3, with very limited water supply, among early maturing varieties, CoOr 12346 recorded significantly different growth and

yield parameters compared to other varieties CoA 92081, CoC 15336. Similarly among mid-late maturing varieties, CoOr 15346 with IW/CPE ratio 0.3 recorded significantly different growth and yield parameters compared to other varieties CoOr 13346, CoV 92102. So this is possibly due to better drought tolerant capacity of these two varieties compared to other varieties.

Table AS 74.10.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Nayagarh

Treatment	Germination % at 45 DAP	No of tillers (000/ha) at 120 DAP	NMC (000/ha)	Cane yield (t/ha)	Juice Brix %	CCS %	CCS yield (t/ha)
Irrigation schedule							
I ₁	53.35	86.50	85.20	99.42	21.17	11.72	11.60
I ₂	51.58	76.25	75.65	86.35	20.93	11.36	9.81
Sem_±	0.649	0.476	0.357	0.692	0.279	0.082	0.054
CD at 5 %	NS	2.897	2.174	4.212	NS	NS	0.327
Variety							
CoOr 12346	52.46	84.59	82.47	95.86	21.25	11.60	11.13
CoA 92081	52.96	81.36	80.25	92.10	21.52	11.61	10.71
CoC 15336	52.43	80.62	80.62	92.96	21.18	11.48	10.67
CoOr 13346	52.94	79.89	78.28	89.39	21.34	11.64	10.42
CoOr 15346	53.26	82.51	82.08	95.97	21.00	11.35	10.89
CoV 92102	50.73	79.27	78.87	91.03	20.01	11.56	10.38
SEm_±	1.034	0.950	0.706	0.940	0.450	0.245	0.281
CD at 5 %	NS	2.801	2.083	2.773	NS	NS	0.828

Table AS 74.10.2: Effect of interaction on cane yield at Nayagarh

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	Mean
I ₁	101.24	99.65	99.74	95.36	103.78	96.74	99.42
I ₂	90.48	84.56	86.18	83.41	88.15	85.31	86.35
Mean	95.86	92.10	92.96	89.39	95.97	91.03	92.88
	Irrigation	Variety	I within	V within I			
SEm_±	0.692	0.940	1.397	1.330			
CD 5%	4.212	2.773	5.196	3.922			

NORTH CENTRAL & NORTH EASTERN ZONE

11. PUSA

Varieties had significant impact on growth, yield attributes, cane yield and most of the quality parameters. Higher plant population (1, 76,300/ ha), plant height (305 cm), LAI (3.62) and millable canes (1, 29,300/ ha) was noticed with the variety CoP 2061. Similarly, the maximum cane yield (85.1 t/ ha) was also noticed due to the variety CoP 2061 which was followed in order by CoP 16437 (83.2 t/ha) and CoP 9437 (74.7 t/ha). The higher brix and pol percent at 10 and 12th months stage was noticed due to the variety CoP 16437. Similarly, higher sugar yield (10.6 t/ha) was noticed due to the variety CoP 16437 which was followed by CoP 2061 (10.3 t/ha).

Irrigation regimes had non-significant impact on all the parameters. As per IW: CPE ratio none of the irrigation was scheduled at 1.00 and 0.30 IW: CPE ratio. The evaporation and rainfall during the cropping period were 701.9 and 1647 cm, respectively. The rainfall was also well distributed in 58 rainy days needs no extra irrigation to any treatment.

Table AS 74.11.1: Yield attributes and cane yield of sugarcane genotypes under different irrigation regimes at Pusa

Varieties	Plant population ($\times 10^3$ /ha)	Plant height (cm) at 240 DAP	Cane diameter (cm)	LAI	Millable canes ($\times 10^3$ /ha)	Single cane weight (g)	Cane yield (t/ha)
CoP 16437	115.8	301	2.77	3.60	88.5	961	83.2
CoP 112	123.4	286	2.41	2.78	93.2	675	61.4
BO 153	156.7	252	1.98	3.21	115.7	631	70.9
CoP 2061	176.3	305	2.31	3.62	129.3	665	85.1
BO 154	132.6	289	1.96	3.17	105.8	625	65.8
CoP 9437	121.5	265	2.55	2.91	96.9	776	74.7
SEm (\pm)	6.52	13.29	0.10	0.14	5.16	33.7	3.49
CD (P=0.05)	20.6	42	0.33	0.46	16.3	106	11.0
CV (%)	11.6	12	10.91	11.05	12.1	11	11.6
Irrigation regimes (IW/CPE)							
I ₁ :1.00	136.0	285	2.35	3.21	104.6	725	75.2
I ₂ : 0.30	139.4	280	2.31	3.23	105.2	719	71.8
SEm (\pm)	2.75	5.48	0.05	0.05	2.52	15.7	1.68
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS
CV (%)	8.5	8	8.45	8.65	10.2	9	9.7

Table AS 74.11.2: Juice quality of sugarcane genotypes under different irrigation regimes at Pusa

Treatment	Brix (%)		Pol (%)		Purity (%)	
	10 th month	12 th month	10 th month	12 th month	10 th month	12 th month
Variety						
CoP 16437	20.5	20.7	18.10	18.34	88.3	88.6
CoP 112	19.5	19.9	17.15	17.76	88.2	89.5
BO 153	19.3	19.8	17.02	17.55	88.2	88.9
CoP 2061	19.3	19.6	16.86	17.39	87.4	89.0
BO 154	19.4	19.7	16.95	17.42	87.7	88.4
CoP 9437	19.5	20.0	17.19	17.61	88.4	88.4
SEm (±)	0.18	0.20	0.17	0.22	1.09	0.40
CD (P=0.05)	0.6	0.6	0.52	0.69	NS	NS
CV (%)	2.3	2.4	2.36	3.02	3.0	1.1
Irrigation regimes (IW/CPE)						
I ₁ : 1.00	19.5	19.9	17.17	17.62	88.1	88.7
I ₂ : 0.30	19.6	20.0	17.25	17.73	87.8	88.9
SEm (±)	0.07	0.08	0.070	0.15	0.54	0.52
CD (P=0.05)	NS	NS	NS	NS	NS	NS
CV (%)	1.5	1.6	1.71	3.61	2.6	2.5

IMPORTANT OBSERVATIONS:

- Moisture stress during pre-monsoon growth phase brought about significant reduction in cane yield across all the zones. The loss in yield ranged within 20 to 35 % in different sugarcane growing zones.
- Sugarcane varieties found resilient against moisture stress in different sugarcane growing zones are:

Zone	Early maturing	Mid-late maturing
North West	CoPb 91, CoPk 05191, CoLk 94184, CoH 9264, CoH 167	Co 05011, CoSe 11453
Peninsular	CoVSI 18121, CoSNK 088789, CoC 671, Co 85004	Co 86032, CoSnk 09227, CoJn 86-600
North central	CoP 16437	CoP 2061, CoP 9437
East coast	CoOr 12346	CoOr 15346

AS 75	:	Precision nutrient management through rescheduling time of application for widely spaced sugarcane plant - ratoon system
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Objectives

1. To assess the effect of split application of N & K till advanced crop growth stages on nutrient use efficiency, crop growth, yield and quality.
2. To find the most efficient method and application schedule of nutrients for widely planted sugarcane plant-ratoon system.

Year of Start: 2020 (to be carried out for one plant – ratoon cycle)

Treatment Details

Main Plot : Method of application (2)

1. Broadcasting
2. Band placement

Note: Basal dose should be applied in furrows. Broadcasting and band application will be initiated with first application after basal application. Band application: 3 inches away from cane clump and 3 inches below the soil surface.

Sub Plots

1. RDN + RDK in five splits
(Basal 10% remaining at 45, 75, 90 and 120 DAP in equal splits)
2. RDN + RDK in six splits
(Basal 10% remaining at 45, 75, 90,120 and 150 DAP in equal splits)
3. RDN + RDK in seven splits
(Basal 10% remaining at 45, 75, 90,120,150 and 180 DAP in equal splits)
4. Recommended dose and schedule of nutrient applications*

North West and North Central Zone	Half of total N and full dose of P & K at planting rest of N at 45 and 90 DAP in equal quantity.
North Eastern Zone	25 % of total N and full dose of P & K at planting rest of N at 45 and 90 DAP in equal doze
Peninsular zone	25 % of total N and full dose of P & K at planting rest of N at 35, 65 and 95 DAP in equal doze
East Coast	25 % of total N and full dose of P & K at planting and rest of N at 35, 65 and 95 DAP in equal doze

*May be fine-tuned as per local recommendation under information to PI

Total number of treatments (2 x 4) = 8

Design: Split plot

Replication : 03

Season : Main season of planting

Variety: Ruling common variety of the region

Spacing : 120 cm between rows with 3 bud setts

Planting method : Conventional

Note: Use of organic manures, overnight sett soaking in 100 ppm ethrel solution, *RDF and* Micronutrient application as recommended for a location is to be common for all the treatments.

Observations to be recorded:

1. Germination count/ plant population at 30 and 45 DAP / DAR
2. Tiller population at monthly interval
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, P₂O₅, K₂O in kg/ha)
7. Economics
8. Nutrient uptake (N, P, K) at harvest
9. Soil microbial parameters (optional)

CURRENT YEAR (2020-21) REPORT

The trial was initiated during 2020-21 to explore the potential of more number of splits in fertilizer application in sugarcane for enhancing nutrient's agronomic use efficiency and saving of resources. This was allocated to all the centres and following 11 centres submitted the progress report for the year.

NORTH WESTERN ZONE

1. FARIDKOT

Although band placement of N and K was numerically better than broadcasting but statistically results were at par for cane yield, growth and yield contributing characters (Table AS 75.1.1). Cane yield with five split application of N and K was at par with two splits and was significantly better than six and seven splits. Effect of different treatments on crop growth and juice quality parameters was not significant.

Table AS 75.1.1: Effect of nutrient application and scheduling treatments on sugarcane growth and yield at Faridkot

Method of application/ Time of fertilizers application	Band placement (Bp)	Broadcasting (Bc)	Mean
RDN + RDK in five splits (Basal 10% remaining at 45, 75, 90 and 120 DAP in equal splits)	120.5	103.3	111.9
RDN + RDK in six splits (Basal 10% remaining at 45, 75, 90,120 and 150 DAP in equal splits)	97.2	97.5	97.4
RDN + RDK in seven splits (Basal 10% remaining at 45, 75, 90,120,150 and 180 DAP in equal splits)	96.9	93.1	95.0
Half of total N and full dose of P & K at planting rest of N at 45 and 90 DAP in equal quantity (150 kg N, 50 kg P, 50 kg K)	114.2	104.2	109.2
Mean	107.2	99.6	
CD (5%)	Application methods		NS
	Split doses		12.9
	Interaction		NS

DOP: 20.03.2020, Row spacing: 120 cm, Variety: CoPb 14181

2. KOTA

A field experiment was planted on 12.03.2020 at ARS, Kota for precision nutrient management through rescheduling time of application for widely spaced sugarcane plant-ratoon system. To evaluate the fertilizer application methods viz. broadcasting & band application and nutrient levels viz. RDN + RDK in five splits (Basal 10 % remaining at 45, 75, 90 and 120 DAP

in equal split), RDN + RDK in six splits (Basal 10 % remaining at 45, 75, 90,120 and 150 DAP in equal split), RDN + RDK in seven splits (Basal 10 % remaining at 45, 75, 90,120,150 and 180 DAP in equal split) and Recommended dose and schedule of nutrient application.

Significantly higher growth, cane yield and quality were observed under band fertilizer application method over broadcasting. Application of fertilizer by band application method gave higher tillers at 180 DAP (141.55, 000/ha), cane length (236.65 cm), millable cane (92.0, 000/ha), cane weight (1010 g) and cane yield (93.65 t/ha) over application of fertilizer by broadcasting. Whereas, quality parameters viz. brix (21.85 %), sucrose (19.47 %), CCS (13.46 %) and CCS yield (12.65 t/ha) were observed better under fertilizer application by band method over broadcasting fertilizer method in sugarcane.

Significantly higher growth, cane yield and quality were observed under nutrient level of RDN + RDK in seven splits (basal 10 %, remaining at 45, 75, 90,120,150 and 180 DAP in equal split) over RDN + RDK in five splits (Basal 10 % remaining at 45, 75, 90 and 120 DAP in equal split) and recommended dose and schedule of nutrient application. Application of RDN + RDK in seven splits gave significantly higher tillers at 180 DAP (139.6, 000/ha), cane length (219.83 cm), millable cane (89.13, 000/ha), cane weight (998.3 g) and cane yield (93.83 t/ha) over application of RDN + RDK in five splits and recommended dose and schedule of nutrient application. However, it was found at par with the application of RDN + RDK in six splits (Basal 10 % remaining at 45, 75, 90,120 and 150 DAP in equal split).Whereas, quality parameters viz. brix (21.83 %), sucrose (19.35 %), CCS (13.45 %) and CCS yield (12.97 t/ha) were observed higher under RDN + RDK in seven splits over application of RDN + RDK in five splits and Recommended dose and schedule of nutrient application. However, it was found at par with the application of RDN + RDK in six splits (Basal 10 % remaining at 45, 75, 90,120 and 150 DAP in equal split).

Table AS 75.2.1: Effect of nutrient application and scheduling treatments on sugarcane growth and yield at Kota

Treatment	Tillers 180 DAP (000/ha)	Cane length (cm)	Millable cane (000/ ha)	Single cane weight (g)	Cane yield (t/ha)	Sucrose (%)	CCS yield (t/ha)
Main plot (Fertilizer application method)							
F ₁ : Broadcasting	139.8	205.35	89.85	992.1	91.55	19.26	12.25
F ₂ : Band application	141.55	236.65	92	1010	93.65	19.47	12.65
CD (P=0.05)	5.78	75.45	9.65	96.28	9.02	3.83	3.17
CV	17.21	174.92	46.90	38.73	44.74	80.85	122.91
A. Sub plot (Nutrient level)							
N ₁ : RDN + RDK in five splits (Basal 10 % remaining at 45, 75, 90 and 120 DAP in equal split)	134.07	202	86.3	756.67	87.6	19.35	10.37
N ₂ : RDN + RDK in six splits (Basal 10 % remaining at 45, 75, 90,120 and 150 DAP in equal split)	133.43	189.43	84.8	813.33	88.67	18.32	11.45

N ₃ : RDN + RDK in seven splits (Basal 10 % remaining at 45, 75, 90,120,150 and 180 DAP in equal split)	139.6	219.83	89.13	998.33	93.83	19.35	12.97
N ₄ : Recommended dose and schedule of nutrient application	133.47	163.97	79.67	748.33	77.97	18.32	10.22
CD (P=0.05)	5.47	35.84	7.80	128.84	3.50	1.29	1.02
CV	1.89	8.51	4.30	7.32	1.88	3.23	4.45

3. LUCKNOW

The experimental soil was silt loam with pH 7.45 and organic carbon 0.64%, medium in available nitrogen (343.14 kg/ha), available phosphorus (37.19 kg/ha) and available potassium (318.56 kg/ha). Band placement method recorded significantly higher cane yield (100.9 t/ha) and commercial cane sugar (CCS) in plant (12.08 t/ha) as compared to broadcasting method. This method maintained similar order of performance in terms of other yield attributes with the result that band placement produced the highest cane diameter(2.6 cm), cane length (287 cm), and single cane weight (1.35 kg). Significantly higher NMC, single cane weight resulted higher cane and sugar yield under band placement method. Six Splitting of N and K (S2) produced higher cane yield (100.6 t/ha) being at par with five(S1), seven (S3) and two splitting(S4). Splitting of N and K did not affect significantly yield and other attributes. Significantly highest sucrose % was recorded with two (S4) and five(S1) splitting as compared to six(S2) and seven(S3) splitting of N and K. Band placement of fertilizer significantly increased the yield to the tune of 10 % proved better than broadcasting method. Splitting of N & K nutrient did not significantly improve cane and sugar yield compared two splitting (S4) as conventional method.

Table AS 75.3.1: Effect of nutrient application and scheduling treatments on sugarcane growth and yield at Lucknow

	Cane height (cm)	Cane Diameter (cm)	Single Cane wt. (kg)	NMC (000/ha)	Yield (t/ha)	CCS (t/ha)	Corrected Brix and Sucrose %	
							Corrected Brix	Sucrose %
Method of application								
M1- Broadcasting	281	2.2	1.23	75.66	91.83	10.94	18.84	17.049
M2- Band replacement	287	2.6	1.35	82.86	100.92	12.08	19.15	17.183
CD(0.05)	N/A	N/A	0.13	3.25	6.33	0.63	N/A	N/A
SE(m)	4.23	0.13	0.04	0.50	0.97	0.10	0.109	0.205
Application schedule								

S1- RDN + RDK in five splits	276	2.7	1.24	80.03	95.84	11.6	19.367	17.413
S2- RDN + RDK in Six splits	293	2.3	1.27	83.26	100.6	11.8	18.85	16.893
S3- RDN + RDK in seven splits	286	2.3	1.23	76.93	96.40	11.2	18.667	16.735
S4- RDF and schedule of nutrient applications (45 and 90 DAP)	281	2.3	1.22	76.82	92.64	11.3	19.093	17.423
CD(0.05)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.548
SE(m)	8.46	0.27	0.08	2.334	3.38	0.47	0.193	0.176

4. UCHANI

The experiment was started in spring 2020-21 in split plot arrangement with method of application in main plot and split application of fertilizer in split plot, replicated thrice. Variety CoH 167 was planted at a spacing of 120 cm. Recommended dose of NPK in sugarcane was 150, 50 and 50 kg/ha which was split as per the treatment. The soil of the experimental field was sandy loam in texture which was low in organic carbon (0.39) medium in available phosphorus (12.2 kg/ha) and medium in available K (167 kg/ha). Sowing of CoH 167 was done on March 25, 2020. The crop was raised as per package of practices of the region.

Significantly higher number of tillers (129.61 thousand/ha) and NMC (109.3 thousand/ha) were recorded in band placement of fertilizers as compared to broadcasting (Table AS 75.4.1). Potassium when applied in seven splits along with RDN resulted in significantly higher tillers (130.4 thousand/ha) and NMC (111 thousand/ha) which was at par with six splits but significantly higher than five and two splits. No significant influence of method of fertilizer application was noticed on cane height, but cane yield (85.3 t/ha) and cane girth (2.542 cm) was significantly higher under band placement. Cane yield (86.33 t/ha), cane height (229.9 cm) and cane girth (2.573 cm) was highest when fertilizer (N & K) were applied in seven splits, which was statistically at par with six splits application of fertilizer (N& K) but significantly higher than five and two splits fertilizer application.

Table AS 75.4.1: Effect of nutrient application and scheduling treatments on sugarcane growth and yield at Uchani

Treatment	Tillers (000/ha)	NMC (000/ha)	Cane yield (t/ha)	Cane height (cm)	Cane girth (cm)
Method of application					
Broadcasting	125.99	106.0	83.13	220.5	2.478
Band placement	129.61	109.3	85.30	222.7	2.542
CD at 5%	3.69	2.4	1.29	NS	0.052
Split application of N & K					
RDN + RDK-5 splits	127.46	107.2	84.19	218.7	2.488
RDN + RDK-6	129.09	109.9	85.79	225.4	2.535

splits					
RDN + RDK-7 splits	130.40	111.0	86.33	229.9	2.573
RDF- 2 splits	124.24	102.9	80.54	212.5	2.443
CD at 5%	2.15	1.3	0.66	9.5	0.062

5. SHAHJAHANPUR

The soil of experimental field was low in organic carbon (0.33%) and medium in phosphorus (10.80 kg/ha) and potash (112 kg/ha) with PH 7.13. Experimental sugarcane crop was planted on 13.02.2020 and harvested on 18.02.2021.

Experimental result (**Table AS 75.5.1**) indicated that band placement of fertilizer application produced significantly higher cane yield of 106.10 t/ha than that of broadcasting with cane yield of 91.60 t/ha. In case of time of fertilizer application significantly higher cane yield (108.30 t/ha) was obtained with RND+RDK in seven splits (basal 10% remaining at 45, 75, 90,120,150 and 180 DAP in equal splits) and it was at par with RDN+RDK in six splits(10%Basal Basal 10% remaining at 45, 75, 90,120 and 150 DAP in equal splits with cane yield of 105.0 t/ha). CCS% was more or less similar under different method and time of fertilizer application.

Table AS 75.5.1: Effect of nutrient application and scheduling treatments on sugarcane growth and yield at Shahjahanpur

Treatment	Germination (%)	Shoots (000/ha)			NMC (000/ha)	Cane (yield t/ha)	CCS (%)
		90 DAP	120 DAP	150 DAP			
A – Method of application							
M ₁ -Broadcasting	42.5	84.7	122.8	181.2	112.8	91.6	12.73
M ₂ -Band placement	42.9	87.9	137.9	188.2	127.8	106	12.59
SE±	0.38	0.68	1.07	1.58	2.31	0.51	0.26
CD at 5%	NS	3.15	4.96	7.32	10.69	2.34	NS
B – Time of fertilizer application							
F ₁ - RDN+RDK in five splits (Basal 10% remaining at 45,75,90,and 120 DAP in equal splits)	43.1	79.5	125.4	181.9	118.0	92	12.69
F ₂ - RDN+RDK in six splits (Basal 10% remaining at 45,75,90,120 and 150 DAP in equal splits)	43.9	87.9	134.3	185.8	124.0	105.0	12.62

F ₃ - RDN+RDK in seven splits (Basal 10% remaining at 45,75,90,120,150 and 180 DAP in equal splits)	43.3	90.4	134.8	192.5	127.2	108.3	12.73
F ₄ - Recommended dose and schedule of nutrient application-Half of total N and full dose of P&K at planting rest of N at 45 and 90 DAP in equal quantity.	43.5	87.4	126.4	178.5	115.8	90.1	12.10
SE±	1.23	2.12	2.79	4.21	2.97	2.83	0.22
CD at 5%	NS	4.67	6.16	9.28	6.56	6.23	NS

PENINSULAR ZONE

6. SANKESHWAR

Among method of application, band application of fertilizers recorded significantly higher cane yield (125.4 t/ha) compared to broadcasting in furrows (119.0 t/ha). The higher cane yield recorded with band application was owing to significantly higher yield attributing character viz., single cane weight (1.6 kg / cane) compared to broadcast method of application. The data on sugarcane juice quality parameters did not differ significantly irrespective of method of application. The application of recommended dose of nitrogen (RDN) + recommended dose of potash (RDK) in six splits (S₂) recorded significantly higher cane yield (133.4 t/ha) compared to other treatments. The next best treatment was the application of RDN + RDK in seven splits (S₃) which recorded a cane yield of (122.5 t/ha). Significantly lower yield was with recommended dose and schedule of nutrient applications (114.2 t/ha). Similar trend was noticed with single cane weight and cane girth.

Effect of time of application of fertilizers on sugarcane juice quality parameters viz., brix, Pol and purity % indicated that, no significant difference was found among the treatments. However, CCS % was significantly differed among the treatments. Application of RDN+RDK in six splits recorded significantly higher CCS yield (16.4 t/ha) compared to other schedule of nutrient applications. Significantly lower CCS yield was with S₄ (13.7 t/ha). Higher cane yield was recorded for interactions. Among the interaction M₂S₂ i.e., band application of RDN+RDK at six splits (134.9 t/ha) recorded significantly higher cane yield as compared to other interactions. This was due to higher NMC and single cane weight in this interaction. The next best interaction was M₁S₂ (131.8 t/ha) which was at par with each other. Significantly lower cane yield was with M₁S₄ (107.2 t/ha). The quality parameters viz., brix, pol and purity did not differ significantly due to interaction effects. However, CCS yield (t/ha) differed significantly among the interaction effects which followed same trend as that of cane yield.

Table AS 75.6.1: Effect of different treatments on cane growth and yield at Sankeshwar

Treatments	Cane Yield (t/ha)			Single cane weight (kg)			NMC 000/ha			Cane girth (cm)			Cane height (cm)		
	M1	M2	Mean	M1	M2	Mean	M1	M2	Mean	M1	M2	Mean	M1	M2	Mean
S1	115.9	121.	118.8	1.45	1.5	1.51	85.9	87	86.8	2.5	2.5	2.5	2.4	2.4	2.4
S2	131.8	134.	133.4	1.83	1.9	1.86	91.9	93	92.8	2.7	2.8	2.8	2.5	2.6	2.6
S3	121.1	123	122.5	1.55	1.6	1.59	86.1	85	85.7	2.6	2.6	2.6	2.5	2.5	2.5
S4	107.2	121.	114.2	1.36	1.4	1.41	84.9	88	86.8	2.4	2.4	2.4	2.4	2.4	2.4
Mean	119.0	125		1.55	1.64		87.2	88.8		2.6	2.6		2.4	2.5	
	S.Em±	CD at 5 %		S.Em±	CD at 5 %		S.Em±	CD at 5 %		S.Em±	CD at 5 %		S.Em±	CD at 5 %	
Main plot	0.8	4.7		0.01	0.08		1.9	NS		0.05	NS		0.03	NS	
Sub plot	1.1	3.3		0.03	0.1		2.5	NS		0.02	0.08		0.04	NS	
2 SP means @ same MP	1.5	4.7		0.04	0.1		2.6	7.8		0.04	NS		0.06	NS	

7. KOLHAPUR

The cane yield and yield attributing characters viz., tillers (000/ha) at 150 (115.43/ha) and 180 DAP (110.43/ha), cane length (290.70 cm), average cane weight (1.20 Kg), NMC (108.69/ha), cane yield (131.46 t/ha and CCS yield(15.06 t/ha) were found significantly higher due to band placement of fertilizer over that of broadcasting method. Among the time of fertilizer applications, tillers/shoot population at 150 DAP and 180 DAP (000/ha), NMC at harvest, (000/ha), cane height(cm), average cane weight (kg) and cane and CCS yield (t/ha) were found significant in T3 treatment (RDN+RDK in seven equal splits) over rest of the treatments. T3 recorded significantly superior cane yield (136.44 t/ha) and CCS yield (15.70 t/ha) over rest of the treatments. However, it was followed by the second best treatment, recommended dose and schedule of nutrient application (T4) gave significantly higher cane yield (120.93 t/ha) and CCS yield (14.70 t/ha) over the treatment T1 cane yield (110.25 mt/ha) and CCS (13.44 t/ha) viz., fertilizer application in equal five splits.

The quality parameters at 10 months and 12 months' crop age did not differ significantly due to method of fertilizer application in respect of all characters except ⁰brix at 10 months and CCS % at 12 months' crop age. The band placement of fertilizer application recorded numerically higher values of ⁰brix, sucrose % and CCS % than broadcasting method of fertilizer application. Among the treatments viz., time of fertilizer application, the treatment T3 (application of fertilizer in seven equal splits in band placement) recorded significantly higher ⁰brix in 12 months' crop age viz. (21.350), Sucrose (17.38 %) and CCS (11.80 %) than rest of the treatments and on par with the recommended dose of fertilizer application in respect of ⁰Brix (20.800), Sucrose (17.04 %) and CCS % (11.49) respectively. However, the interaction effect was found to be non-significant for all the quality parameters.

Table AS 75.7.1: Effect of different treatments on cane growth and yield at Kolhapur

M .Fertilizer Appl. /Time of ferti application (T)	Germination At 8 th Week	Tillers (000/ha) (150 DAP)	Tillers (000/ha) (180 DAP)	NMC (000/ha) at harvest	Average cane weight (kg)	Height (cm)	Cane Diameter (cm)	Cane yield (t/ha)	CCS Yield (t/ha)
Method of fertilizer application (M)									
M -1	78.40	107.73	102.81	97.80	1.15	278.3	2.96	113.41	13.55
M-2	82.22	115.43	110.43	108.69	1.20	290.7	3.06	131.46	15.06
S.Em±	3.31	0.29	0.36	1.88	0.004	0.646	0.027	2.77	0.154
CD at 5 %	NS	1.90	2.36	NS	0.04	4.23	NS	12.83	1.53
Time of fertilizer application (T)									
T-1	83.36	109.49	102.62	97.67	1.12	237.7	2.91	110.25	13.44
T-2	80.20	111.22	106.09	103.97	1.165	286.2	2.96	122.12	13.81
T-3	80.43	116.55	111.30	110.53	1.228	294.6	3.18	136.44	15.70
T-4	76.73	109.14	106.48	100.88	1.88	282.4	3.00	120.93	14.70
S.Em ±	4.44	0.725	0.40	0.88	0.005	2.17	0.021	1.30	0.36
C D at 5 %	NS	2.26	1.25	2.75	0.017	6.76	0.064	4.078	1.132
CV.%	2.22	18.73	10.31	4.53	3.75	4.77	3.66	8.39	5.54
Interaction (M× T)									
	NS	NS	NS	NS	NS	NS	NS		

Table AS 75.7.2: Effect of different treatments on economics at Kolhapur

M.Fertilizer Appl. /Time of ferti application (T)	10 Months juice analysis			12 Months juice analysis		
	°Brix	Sucrose (%)	CCS (%)	°Brix	Sucrose (%)	CCS (%)
Method of fertilizer application (M)						
M -1	19.80	15.05	9.75	20.75	16.79	11.25
M-2	20.55	15.48	10.05	21.27	17.07	11.50
S.Em±	0.067	0.10	0.081	0.099	0.151	0.102
CD at 5 %	0.43	NS	NS	NS	NS	NS
Time of fertilizer application (T)						
T-1	20.21	15.18	9.72	20.83	16.44	10.98
T-2	20.22	15.62	10.19	21.18	16.86	11.21
T-3	20.83	15.54	10.15	21.25	17.38	11.80
T-4	20.01	14.73	9.50	20.80	17.04	11.49
S.Em ±	0.177	0.11	0.19	0.093	0.109	0.14
C D at 5 %	NS	0.36	NS	0.228	0.340	0.437

CV %	4.03	3.27	2.18	2.38	3.25	2.54
Interaction (M× T)						
NS	NS	NS	NS	NS	NS	NS

8. POWARKHEDA

Band placement method (160.26), recorded significantly higher numbers of tillers (000'/ha) than broadcasting method (131.49). Application of RDN +RDK in seven splits recorded significantly higher number of tillers (148.61) over conventional schedule of nutrient applications (147.06) and the number of tillers recorded with RDN +RDK in five splits (141.70). Band placement method (148.87) recorded significantly higher numbers of millable cane(000'/ha) than broadcasting method (120.30). Application of RDN +RDK in seven splits produced significantly higher number of millable canes(137.65) over conventional RD (135.72) and that with RDN +RDK in five splits (130.20). Band placement method (316.82) recorded significantly higher plant height than broadcasting method (259.83). Application of RDN +RDK in seven splits brought about significantly higher plant height (296.83) over conventional RD (291.83) and that recorded with RDN +RDK in five splits (279.33). Band placement method recorded significantly higher cane yield(147.69 t/ha)than broadcasting method (119.59 t/ha). Application of RDN +RDK in seven splits produced significantly higher cane yield (136.53 t/ha) over conventional RD (134.21) and that with RDN +RDK in five splits (129.20 t/ha).

Table AS 75.8.1:Effect of different treatments on cane growth and yield at Powarkheda

Treatment	Germination (%)	Tillers (000'/ha)	NMC (000'/ha)	Plant height (cm)	Brix (%)	Cane Yield (t/ha)
Main Plots:- Method of application						
Broadcasting	65.33	131.49	120.30	259.83	21.23	119.59
Band placement	64.44	160.26	148.87	316.82	21.22	147.69
S Em +	1.67	1.80	1.81	2.61	0.008	1.78
CD at 5%	NS	5.24	5.26	7.60	NS	5.18
Sub Plots:- Method of application						
RDN +RDK in five splits	65.85	141.70	130.20	279.33	21.23	129.2
RDN +RDK in six splits	65.00	146.13	134.79	285.33	21.22	134.21
RDN +RDK in seven splits	66.12	148.61	137.65	296.83	21.23	136.53
RD and schedule of nutrient applications	64.77	147.06	135.72	291.83	21.23	134.64
S Em +	1.67	1.80	1.81	2.61	0.008	1.78
CD at 5%	NS	5.24	5.26	7.60	NS	5.18

EAST COAST ZONE

9. NAYAGARH

The experiment was laid out in split plot design with two method of nutrient application as main plot and four schedule of nutrient application as sub plot. From the results, it was found that there is significant difference between method of nutrient application as well as among schedule of nutrient application. For all the parameters like shoot count, length of cane, girth of cane, weight of cane, Net Millable Cane count, band placement of fertilizers found to be efficient than broadcasting method of fertilizer application which ultimately resulted in higher yield. Among schedule of nutrient applications, higher NMC (91.22'000/ha) and cane yield (102.41 t/ha) were recorded with application of RDN +RDK in six splits which is at par with application of RDN + RDK in five splits (NMC 88.37'000/ha and cane yield 100.67 t/ha). This suggests, the crop responds better to split application of RDN+RDK up to 150 days after planting with slowly releasing the nutrients for growth of cane.

Table AS 75.9.1:Effect of different treatments on cane growth and yield at Nayagarh

Treatments	Brix %	NMC ('000/ha)	Cane yield (t/ha)	CCS %	CCS (t/ha)
Method of application (Main Plot)					
Broadcasting	21.85	85.23	95.99	12.05	11.42
Band Placement	20.85	87.49	99.23	12.03	12.11
Sem±	0.476	0.361	0.484	0.071	0.060
CD at 5 %	NS	2.198	2.948	NS	0.367
Schedule of nutrient application (Sub Plot)					
RDN + RDK in five splits (Basal 10% remaining at 45, 75, 90 and 120 DAP in equal splits)	20.90	88.37	100.67	12.15	12.10
RDN + RDK in six splits (Basal 10% remaining at 45, 75, 90,120 and 150 DAP in equal splits)	20.81	91.22	102.41	12.14	12.27
RDN + RDK in seven split (Basal 10% remaining at 45, 75, 90,120,150 and 180 DAP in equal splits)	21.98	83.88	94.90	12.05	11.43
Recommended dose and schedule of nutrient applications (full dose of P & K at planting and N at 35, 65 and 95 DAP in equal dose)	21.71	81.98	92.46	11.84	11.28
SEm±	0.489	0.804	0.766	0.223	0.212
CD at 5 %	NS	2.476	2.359	NS	0.654

NORTH CENTRAL ZONE

10. PUSA

Band placement of N and K fertilizer recorded higher plant population (1, 67, 900/ ha), millable canes (1, 18,000/ ha) and cane yield (86.7 t/ha). Similarly significantly higher N, P and K uptake by sugarcane was noticed due to the band placement of nitrogen and potassic fertilizers. Higher millable canes (1, 14,900/ ha), cane yield (85.2 t/ha), sucrose content (18.41%) and sugar yield (10.9 t/ ha) was noticed due to RDN + RDK in seven splits which was at par to RDN + RDK in five splits and RDN + RDK in six splits. Significantly higher N (298 kg/ ha) and K uptake (306.5 kg/ ha) was noticed due to RDN + RDK in seven splits which was followed by RDN + RDK in six splits and RDN + RDK in five splits. Significantly higher available N and K were noticed due to RDN + RDK in seven splits which was statistically similar to RDN + RDK in six splits.

Table AS 75.10.1: Effect of different treatments on cane growth and yield at Pusa

Treatment	Millable canes ($\times 10^3$ /ha)	Cane yield (t/ha)	Juice recovery (%)	Sucrose (%)	CCS (%)	Sugar yield (t/ha)
Method of N & K application (Main plot)						
Broadcasting	97.3	73.9	60.8	18.18	12.58	9.3
Band placement	118.0	86.7	62.7	18.30	12.62	10.9
SEm (\pm)	3.37	2.07	0.75	0.13	0.17	0.29
CD (P=0.05)	20.5	12.6	NS	NS	NS	NS
CV (%)	10.8	9.0	4.2	2.53	4.76	9.9
Splitting of N & K fertilizer (Sub-plot)						
RDN + RDK in five splits (Basal 10% remaining at 45, 75, 90 and 120 DAP in equal splits)	109.3	80.6	60.7	18.21	12.57	10.1
RDN + RDK in six splits (Basal 10% remaining at 45, 75, 90, 120 and 150 DAP in equal splits)	113.7	83.8	62.0	18.30	12.62	10.6
RDN + RDK in seven splits (Basal 10% remaining at 45, 75, 90, 120 and 150 DAP in equal splits)	114.9	85.2	64.3	18.41	12.72	10.9
Half of total N and full dose of P & K at planting and rest of N at 45 and 120 DAP in equal quantity	92.7	71.6	59.9	18.04	12.49	8.9
SEm (\pm)	4.72	2.83	0.57	0.19	0.20	0.40
CD (P=0.05)	14.5	8.7	1.8	NS	NS	1.2
CV (%)	10.7	8.6	2.3	2.51	3.97	9.6

11. SEORAH

The experimental field was medium in organic carbon, low in available phosphorus and potash with pH 8.19. Sugarcane crop was planted on 17.02.2020 and harvested on 28.02.2021. Results revealed that band placement method of fertilizer application produced significantly higher shoot population (168.65 thousand per ha), NMC (106.64 thousand per ha) and cane yield (104.66 t/ha) against broadcasting method of fertilizer application. Five, six and seven splits application of fertilizer (96.83, 97.67 and 102.20 t/ha, respectively) produced significantly higher cane yield over RDF and scheduling of nutrient application. NMC was recorded significantly higher in six and seven split doses of N + K (104.76 and 110.12 thousand per ha, respectively) against RDF and scheduling of nutrient applications. No significant effect on germination and sucrose percent was found by method of fertilizer application and split doses

Table AS 75.11.1: Effect of different treatments on cane growth and yield at Seorahi

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane Yield (t/ha)	Sucrose (%)
Method of application					
Broadcasting	54.17	122.88	96.23	85.81	18.36
Band placement	54.27	168.65	106.64	104.66	18.38
SEm±	1.52	2.35	1.37	2.56	0.23
CD(P=0.05)	NS	15.38	8.97	16.78	NS
C.V.	9.58	5.89	4.87	9.31	2.19
Sub Plots					
RDN + RDK in five splits	57.14	152.20	100.79	96.83	18.56
RDN + RDK in six splits	54.56	142.65	104.76	97.62	18.54
RDN + RDK in seven splits	50.60	156.94	110.12	102.20	17.95
RDF and schedule of nutrient applications	54.56	131.15	90.07	84.32	18.43
SEm±	2.78	6.02	4.43	3.77	0.27
CD(P=0.05)	NS	18.52	13.81	11.76	NS
C.V.	12.56	10.15	10.70	9.70	3.61

IMPORTANT OBSERVATIONS:

- Post emergence band placement of nitrogen and potassium resulted in higher cane yield and CCS (t/ha) as compared to that with broadcasting at most of the centres across the zones.
- In subtropical region comprising north central and north western zones split application of nitrogen and potassium up to 150 days after planting brought about significant improvement in cane yield.
- For the centres located in peninsular and east coast zones split application of nitrogen and potassium up to 180 days after planting resulted in higher cane yield over conventional splitting up to 95 days after planting.

SUMMARY OF THE ACHIEVEMENTS FOR THE YEAR 2019-20

A look on advancements in sugarcane research, its production scenario and the transfer of technology to the stake holders during the recent past evinces encouraging trends and new challenges. On the research front development of new high yielding high sugar varieties supported with suitable production and protection technologies made sugar sector viable on one hand and left ample scope for diversification on the other. During the year 2020-21 as per the latest estimates sugar production is expected to be around 31 million tonnes with sugarcane production of more than 400 million tonnes produced from 5.22 million hectares. The largest sugarcane and sugar producing state of Uttar Pradesh is estimated to produce over 11 million tonnes of sugar by crushing comparatively less cane with a high recovery of 10.76%. The increased production and sugar recovery have provided scope for diverting sugarcane juice, B-heavy molasses and other substrates for the production of ethanol to be used as bio-fuel for automobiles. With the development of high biomass producing sugarcane cultivars it is required to develop suitable production technologies for enough anchorage to roots to hold the crop from lodging, enhanced water and nutrient use efficiency in view of price escalation of these resources, technologies for bringing in resilience against adverse impacts of climate change and micro and macro level crop and product diversification to enhance the income of sugarcane growers. For the year 2020-21 the trials under Crop Production discipline of AICRP on Sugarcane were designed and carried out to develop recommendations for addressing these issues. These were concentrated on aspects such as agronomic evaluation of promising genotypes for their performance potential under wide row spacing at enhanced fertility level, extended nutrient management schedule for sugarcane production system to ensure soil health and crop productivity, and also to assess the water productivity and drought tolerance potential of newly released varieties of sugarcane. Most of the centres carried out these trials in the true research spirit and reported the results as per the prescribed format. A summary table showing no. of centres allotted, conducted and not conducted the stipulated experiments during 2020-21 is given in Appendix I.

The experiment wise summary of the results are presented below:

AS-72: Agronomic performance of elite sugarcane genotypes

The trial was initiated during 2016-17 and was allotted to all the centres. During the year (2020-21) 13centres reported the results. Centre wise summary of findings for the year are given below:

NORTH WEST ZONE

1. FARIDKOT

For early maturing genotypes although interaction between fertilizer levels and genotypes was non-significant but yield of all the genotypes were better at 125% RDF over that of RDF. The highest cane yield was of Co 15024 (117.8 t/ha) followed by Co 15027 (115.7 t/ha) and CoPb 15212 (110.4 t/ha). The number of millable canes and number of tillers were significantly better at 90 cm spacing than 120 cm. The application of 125% of recommended N gave significantly better millable canes than 100% N. Among mid-

late genotypes the highest cane yield was of CoS 15233 (102.4 t/ha) followed by CoS 15232 (101.3 t/ha). The number of millable canes and number of tillers were significantly better at 90 cm spacing than 120 cm but single cane weight was higher at 120 cm row spacing. The application of 125% of recommended N gave significantly better millable canes than 100% N.

2. KOTA

Among early genotypes Co 15027 recorded significantly higher germination, tillers count and cane yield (95.7 t/ha). The genotype recorded higher brix (22.37), sucrose (20.0 %), CCS (13.83 %) and CCS yield (13.34 t/ha) over rest of the genotypes. Among mid-late genotypes CoLk 15209 recorded significantly higher germination, tiller count and cane yield (94.55 t/ha). The genotype recorded higher brix, sucrose and CCS yield (12.99 t/ha) over rest of the genotypes. There was no significant difference in the performance of the genotypes with regard to fertilizer doses.

3. LUCKNOW

A field experiment was initiated to evaluate the performance of different elite genotypes of sugarcane (early and mid-late) at different fertility levels (RDF and 125 % RDF of NPK) and at wider spacing. Experiments were planted on 26th February 2020. The crop germination was good but during complete lockdown period, the weeding and irrigation could not be met as per crop requirement. The crop was also damaged by blue bulls leaving very thin plant population. Thus the experiment was vitiated.

4. SHAHJAHANPUR

In early group, standard Co 0238 produced significantly higher cane yield (105.10 t/ha) followed by genotype Co 15023 (98.30 t/ha). In mid – late group genotypes Co 15026 produced significantly higher cane yield (86.20 t/ha) followed by genotype CoLk 15206 (84.0 t/ha). Regarding fertility levels significantly higher cane yield was obtained with 125% recommended dose of NPK than that of 100% RDF of NPK in both early and mid-late genotype.). CCS% in cane at harvest was found significantly higher in genotype Co 15023 than that of 15027 and CoPb 15212 genotypes in early group. CCS% in cane at harvest was observed significantly superior in genotype CoLk 15207 over other genotypes except genotype CoPb 15213 in mid-late group.

5. UCHANI

NMC (number of millable cane), cane yield and cane girth were significantly affected due to different spacing in both early and mid-late group. Wider row spacing (120 cm) recorded higher cane weight and cane girth but significantly lower cane yield in both mid late and early group. Higher fertility levels (125% RDF) resulted in significantly higher NMC in early maturing varieties, while no significant effect of fertility levels on NMC was recorded in mid late varieties. Cane yield was significantly higher in 125 % RDF in both early and mid-late genotypes. Among early genotypes, highest number of millable canes were recorded in variety CoLk 15205 (127.06 thousand/ha) which was significantly higher than other varieties. Significantly higher cane weight was recorded in variety Co 15027 (1.32 kg) followed by Co 0238 (1.20 kg). Lowest cane weight was observed in CoLk 15205 which was at par with CoPb

15212. Highest cane yield was recorded in standard check i.e. Co 0238 (103.73 t/ha) followed by Co 15027 (97.16 t/ha) but significantly higher than other varieties. While in mid late genotypes, CoS 15233 variety was found to be the best in terms of cane yield which was at par with CoS 767, but significantly higher than other varieties. Significant interaction for cane yield was observed in spacing and fertility levels with early genotypes. Significant interaction was observed between spacing and mid-late genotypes also. Highest cane yield was recorded in CoS 767 (102.90 t/ha) in 90 cm wide rows which was at par with CoS 15233 (102.33 t/ha) at 90 cm spacing but significantly higher than other varieties under different spacing arrangement.

PENINSULAR ZONE

6. PUNE

The field trial was conducted to assess the performance of various elite sugarcane genotypes under different fertilizer levels. The results of the plant crop indicated that, maximum cane yield (118.48 t/ha) and CCS yield (15.96 t/ha) secured by fertilizing the crop with 125% RDF. In the case of genotypic performance CoSnK 14102 recorded maximum germination (69.25%), whereas, CoSnK 14103 performed better in tillering (1.34 lakh/ha), as well as NMC count (0.97 lakh/ha), While cane yield (155.00 t/ha), CCS yield (18.75 t/ha) was higher in CoN 14073. Whereas, CoT 14367 showed superior juice quality.

7. KOLHAPUR

All the cultivars in respect of cane yield and yield parameters did not differ significantly with 100 or 125 % RDF. The interaction effect was found non- significant for all the characters. Within the variety results were found significant. The 125 % RDF was numerically superior to 100 % RDF in respect of cane yield and yield attributes. Among cultivars/ variety CoN 14073 was significantly superior in cane yield and CCS yield.

8. SANKESHWAR

CCS yield, Number of millable canes (NMC) and cane girth did not differ significantly due to fertilizer levels (100 and 125 % RDF). Whereas, application of 125 % RDF recorded significantly higher cane yield and single cane weight than application of 100% RDF. Among the cultivars CoN 14073 recorded significantly higher cane yield (136.5 t/ha) which was on par with the cultivars Co 14002 (133.7 t/ha) and Co Snk 14102 (132.9 t/ha). The NMC and single cane weight followed the same trend. Significantly higher cane girth was with cultivar Co14027 and CoT 14367. While significantly higher cane height was with CoTI 14111 (3.4 m) followed by CoN 14073 and MS14081 which were at par with each other.

9. COIMBATORE

Sugarcane cane yield was influenced significantly due to different genotypes wherein, Co 14016 (122.56 t/ha) and Co 14012 (117.98 t/ha) recorded significantly higher cane yield than CoC 671(77.50 t/ha). Data were recorded on growth, juice quality, cane yield and yield attributes. Cane yield and juice quality were not influenced significantly due to fertilizer levels. Juice Brix, Sucrose (%), Purity (%) and CCS (%) at harvest showed significant varietal differences. Among different entries, Co 14012 recorded significantly higher mean sucrose (%) of 21.16 than Co 86032. Amongst the genotypes Co 14012 was found more promising and

recorded significantly higher CCS yield of 18.26 t/ha than the check entries CoC 67 (12.28 t/ha) and Co 86032 (14.46 t/ha).

10. POWARKHEDA

Results revealed that among varieties Co 86032 (127.02), CoSnk 14102 (123.49), Co C 671 (122.57), Co 14016 (122.34), Co 14032 (120.31), CoSnk 05103 (119.15), Co 14002 (118.11), CoN 14073 (117.88), MS 14082 (116.66), Co 14012 (116.32) and CoVC 14062 (113.25) showed higher number of millable cane ('000/ha) than Co 14030 (92.94), Co 14027 (90.74), Co Snk 14103 (90.68), and MS 14081 (81.19). But the cane yield was recorded at par among varieties Co 86032 (127.02), CoSnk 14102 (123.49), CoC 671 (122.57) and Co 14016 (122.34). The cane yield was not influenced significantly due to fertility levels.

EAST COAST ZONE

11. NAYAGARH

The experiment was laid out in randomized block design with four genotypes from AVT viz: CoA 16321, CoC 16336, CoC 16337 and CoV16356 along with three standard check i.e. CoA 92081, CoC 01061 and CoOr 03151 on red laterite soil acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dS m⁻¹. Analysis of variance suggested that there was significant variation among the genotypes with respect to germination %, number of tillers at 180 days and number of millable canes. The genotype CoV 16356 with 120 cm spacing produced the highest average cane yield of 100.35 t/ha with application of 125 % RD of fertilizer which is at par with application of 100% RDF (98.05 t/ha).

NORTH CENTRAL ZONE

12. PUSA

Fertility level had significant impact on plant population, plant height, millable canes and cane yield. Higher shoot count (147400/ ha), plant height (301.8 cm), millable canes (113800/ha) and cane yield (82.3 t/ha) was obtained with 125% recommended dose of NPK. Though, fertility level did not cause significant impact on brix, pol and purity percentage. Among early genotypes CoP 15436 performed better at 90 cm row spacing and 125% fertility level followed by CoSe 15452 and CoLk 15466. For mid-late maturing genotypes CoSe 15454, CoP 15439 and CoSe 15453 performed better at 90 cm row spacing and 125% fertility level.

13. SEORAH

CoSe 15455, CoSe 15452 and CoLk 15466 early genotypes and CoLk 15468, CoLk 15469, CoSe 15453 and CoSe 15454 mid-late genotypes produced significantly higher cane yield over all the tested zonal checks. Sucrose per cent varied significantly among mid-late genotypes. CoLk 15469 recorded significantly higher sucrose per cent (18.24) over Bo 91 zonal check (17.06). Recommended dose of fertilizer 125 per cent application improved the shoot population, NMC and cane yield significantly but there was no significant improvement observed in germination and sucrose per cent.

IMPORTANT OBSERVATIONS:

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

Sl. No.	Zone	Early genotypes	Mid-late genotypes	RDF levels
1	North Western	Co15024, Co 15027, CoPb 15212, CoLk 15205	CoS15233, CoS15232, CoLk15209	Majority of the centres reported significant influence of higher RDF on sugarcane growth, yield and quality.
2	Peninsular	CoN14073, Co14016, CoSnk14102		Significant influence of higher RDF was not found.
3	East Coast	CoV16356	--	No influence of higher RDF
4	North Central	CoP15436, CoSe15455	CoSe15455, CoLk15468	Significant effect of higher RDF was noticed.

AS- 73: Assessment of climate change impact on sugarcane productivity

The trial was initiated during 2018-19 and was allotted to the centres equipped with meteorological observatory. Daily meteorological data from various centres have been received and compiled for long term trend analysis. A comprehensive trend analysis in weather parameters across the zones has to be done to correlate the weather variability with sugarcane growth and yield. DSSAT model is being calibrated for assessing the impact of weather variability on sugarcane growth and yield in different sugarcane producing zones of the country. The trial is proposed to be closed as the weather data from various centres have been received. Weather trend analyses and its correlation with sugarcane growth and yield for different zones will be done at Lucknow and will be reported subsequently.

AS – 74: Evaluation of sugarcane varieties for drought tolerance

The trial was initiated during 2018-19 and was allotted to all the willing centres. During the year only 11 centres reported. Centre wise summary of findings for the year are given below:

NORTH WEST ZONE

1. FARIDKOT

Adequate moisture regime (IW/ CPE ratio 1.0) crop gave significantly higher cane yield than water stressed crop (IW/CPE ratio 0.3). The yield reduction varied from 4.5 percent (CoPb 91) to 34.5 percent (Co118). During the crop season there was about 629 mm rainfall and 509 mm of it was from July to September. Overall mid-late maturing varieties proved more resilient to water stress as compared to early maturing varieties.

2. KOTA

CoPk 05191 variety was found better with respect to number of tillers, plant height, millable canes, cane yield, juice extraction (%), brix (%), CCS (%), CCS yield (t/ha) and purity (%) that resulted in significantly higher net return over rest of varieties under early maturing

group and CoH 9264 variety was found superior with respect to plant height, root dry weight & dry matter accumulation, cane diameter, cane length, and cane yield under mid-late maturing group. Irrigation scheduling at IW/CPE ratio 1.0 was found more profitable in sugarcane yield as compared to IW/CPE ratio 0.3.

3. LUCKNOW

Result revealed that, among the six varieties of sugarcane, CoPK 05191 produced highest production of tillers (90 DAP), NMC, sugarcane yield, juice extraction percentage and CCS t ha⁻¹, which may be due to production of higher root dry weight, LAI and average cane weight. Minimum reduction in sugarcane yield (11.89%) due to moisture stress (IS 0.30) was recorded with variety CoPk 05191 followed by variety CoLk 11206 which was at par with CoLk 94184 (16.8%).

4. SHAHJAHANPUR

Experimental data showed that variety CoLk 94184 recorded significantly higher cane yield (93.30 t/ha) followed by CoSe 11453 with cane yield of 89.20 t/ha. IW/CPE ratio 1.0 produced significantly higher cane yield of 86.20 t/ha over that of IW/CPE ratio 0.3 (78.20 t/ha). CCS% was not affected significantly with different varieties and IW/CPE ratio.

5. UCHANI

Variety CoH 167 (102.8t/ha) and Co 0238 (101.7 t/ha) being at par recorded the highest cane yield while variety Co 0118 (76.3 t/ha) recorded significantly lowest cane yield. Variety Co 05011 (108.4 thousand/ha) recorded significantly higher number of NMC which was at par with Co 0238, CoH 160 and CoH 167. Higher moisture regimes recorded significantly higher number of tillers, NMC, cane weight and cane yield. Based on one year study it is concluded that varieties CoH 167 (mid late) and Co 0238 (early) are the best choice under drought conditions with highest yield as well as higher water productivity (cane yield produced per 1000 litres of irrigation water). During post monsoon, 52.5 cm irrigation water was applied in both the irrigation levels. Total (pre+ post monsoon) irrigation water of 97.5 and 67.5 cm was applied at 1.0 and 0.3 IW/CPE irrigation schedule, respectively. Total (Irrigation+ rainfall) water was calculated as 200.3 and 170.3 at 1.0 and 0.3 IW/CPE irrigation schedule, respectively.

PENINSULAR ZONE

6. PUNE

On the basis of results obtained from present investigation it can be concluded that, for securing maximum cane yield (118.33 t/ha), CCS yield (17.05 t/ha) and high crop performance, irrigate the crop at 1.0 IW/CPE ratio. With respect to genotypes/ variety, CoVSI 18121 gained higher NMC (0.72 lakh/ha) and cane yield (130.61 t/ha) followed by CoM 0265, VSI 8005 and VSI 12003. Regarding juice quality VSI 434 was a good performer. Moisture regime and varietal performance did not interact significantly, however there was average 30% reduction in cane yield across the varieties owing to drought stress.

7. SANKESHWAR

Irrigation scheduling IW/CPE ratio 1.0 was significantly better for obtaining higher sugarcane yield compared to IW/CPE ratio 0.3. Among the cultivars mid-late cultivar CoSnk 09227 and early cultivar SNK 088789 performed better as compared to other cultivars. The higher cane yield was obtained with interaction of mid-late cultivar CoSnk 09227 with IW/CPE ratio 1.0. At IW/CPE ratio 0.3, cultivars viz., CoSnk09227 (mid-late) and SNK 088789 (early) performed better than rest of the cultivars.

8. KOLHAPUR

Irrigation scheduling at IW/CPE ratio 1.0 was significantly better for obtaining higher sugarcane yield compared to IW/CPE ratio 0.3. Among the mid late cultivars Co 86032 performed better over other cultivars. Irrigation scheduling at IW/CPE ratio 0.3 with mid late cultivar Co 86032 recorded significantly higher cane yield of (103.83 t/ha). The data on sugarcane juice quality indicated that IW/CPE ratio 1.0 recorded significantly superior quality parameters viz., brix, sucrose %, CCS % and CCS yield (11.50 t/ha) as compared to irrigation scheduling at IW/CPE ratio 0.3. Among early maturing varieties CoC 671 showed highest drought tolerance with highest mean cane yield (82.17 t/ha) over different moisture regimes.

9. POWARKHEDA

The findings at the centre reveal no significant difference in cane growth and yield due to different moisture regimes across the varieties. However, Co 85004 in early group and CoJn 86-600 among mid-late varieties performed best under both wet and dry moisture regimes. Irrigation scheduling for wet and dry moisture regimes exerted no influence over juice quality parameters of different sugarcane varieties of early and mid-late maturity groups.

NORTH CENTRAL ZONE

10. PUSA

Irrigation regimes had non-significant impact on all the growth and cane yield parameters as the location received adequate and well distributed rainfall during the year. As per IW: CPE ratio none of the irrigation was scheduled at 1.00 and 0.30 IW: CPE ratio. The evaporation and rainfall during the cropping period were 701.9 and 1647 cm, respectively. The rainfall was also well distributed in 58 rainy days needs no extra irrigation to any treatment. However, CoP 2061, CoP 16437 and CoP 9437 gave higher productivity and sugar yield under Bihar condition.

EAST COAST ZONE

11. NAYAGARH

There was significant difference between two irrigation regimes i.e IW/CPE ratio 1.0 and IW/CPE ratio 0.3. The crop recorded higher NMC and cane yield with IW/CPE ratio 1.0 due to uniform availability of water and nutrients to the crop throughout the crop cycle. However with IW/CPE ratio 0.3, with very limited water supply, among early maturing varieties, CoOr 12346 recorded significantly higher growth and yield parameters compared to other varieties viz., CoA 92081 and CoC 15336. Similarly among mid-late maturing varieties, CoOr 15346 with IW/CPE ratio 0.3 recorded significantly higher growth and yield parameters

compared to other varieties CoOr 13346 and CoV 92102. So this is possibly due to better drought tolerant capacity of these two varieties compared to other varieties.

IMPORTANT OBSERVATIONS:

- Moisture stress during pre-monsoon growth phase brought about significant reduction in cane yield across all the zones. The loss in yield ranged within 20 to 35 % in different sugarcane growing zones.
- Sugarcane varieties found resilient against moisture stress in different sugarcane growing zones are:

Zone	Early maturing	Mid-late maturing
North West	CoPb 91, CoPk 05191, CoLk 94184, CoH 9264, CoH 167	Co 05011, CoSe 11453
Peninsular	CoVSI 18121, CoSNK 088789, CoC 671, Co 85004	Co 86032, CoSnk 09227, CoJn 86-600
North central	CoP 16437	CoP 2061, CoP 9437
East coast	CoOr 12346	CoOr 15346

AS – 75: Precision nutrient management through rescheduling time of application for widely spaced sugarcane plant - ratoon system

The trial was initiated during 2020-21 and was allotted to all the centres. During the year (2020-21) 11 centres reported the results. Centre wise summary of findings for the year are given below:

NORTH WEST ZONE

1. FARIDKOT

Although band placement of N and K was numerically better than broadcasting but statistically results were at par for cane yield, growth and yield contributing characters. Cane yield with five split applications of N and K at par with three splits was significantly better than six and seven splits. There was non-significant influence of band placement and broadcasting of nutrients as well as application in more number of splits over juice quality indicators.

2. KOTA

Application of fertilizers by band placement method gave maximum higher tillers at 180 DAP (141.55, 000/ha), cane length (236.65 cm), millable cane (92.0, 000/ha), cane weight (1010 g), cane yield (93.65 t/ha), quality parameters viz. brix (21.85 %), sucrose (19.47 %), CCS (13.46 %) and CCS yield (12.65 t/ha) over application of fertilizer by broadcasting method. Application of RDN + RDK in seven splits (basal 10 % remaining at 45, 75, 90,120,150 and 180 DAP in equal split) gave significantly higher tillers at 180 DAP (139.6, 000/ha), cane length (219.83 cm), millable cane (89.13, 000/ha), cane weight (998.3 g), cane

yield (93.83 t/ha), quality parameters viz. brix (21.83 %), sucrose (19.35 %), CCS (13.45 %) and CCS yield (12.97 t/ha) over application of RDN + RDK in five splits (basal 10 % remaining at 45, 75, 90 and 120 DAP in equal split) and Recommended dose and schedule of nutrient application.

3. LUCKNOW

Band placement of N and K recorded significantly higher cane yield (100.9 t/ha) and commercial cane sugar (CCS) in plant (12.08 t/ha) as compared to broadcasting method. This method maintained similar order of performance in terms of other yield attributes with the result that band placement produced the highest cane diameter (2.6 cm), cane length (287 cm), and single cane weight (1.35 kg). Significantly higher NMC, single cane weight resulted higher cane and sugar yield under band placement. Six Splitting of N and K produced higher cane yield (100.6 t/ha) being at par with five (S1), seven (S3) and two splitting (S4). Splitting of N and K did not affect significantly yield and other attributes. Significantly highest sucrose % was recorded with two (S4) and five (S1) splitting as compared to six(S2) and seven(S3) splitting of N and K.

4. SHAHJAHNPUR

Band placement of fertilizer produced significantly higher cane yield of 106.10 t/ha than that of broadcasting with cane yield of 91.60 t/ha. In case of time of fertilizer application significantly higher cane yield (108.30 t/ha) was obtained with RDN + RDK in seven splits (basal 10% remaining at 45,75,90,120,150 and 180 DAP in equal splits) and it was at par with RDN + RDK in six splits(10%Basal Basal 10% remaining at 45,75,90,120 and 150 DAP in equal splits with cane yield of 105.0 t\ha). CCS% was similar under different methods and time of fertilizer application.

5. UCHANI

Band placement of fertilizer was found to be superior over broadcasting of fertilizer whereas split application improved yield and growth parameters. Significantly higher number of tillers (129.61 thousand/ha) and NMC (109.3 thousand/ha) were recorded in band placement of fertilizers as compared to broadcasting. Potassium when applied in seven splits along with RDN resulted in significantly higher tillers (130.4 thousand/ha) and NMC (111 thousand/ha) which was at par with six splits. Cane yield (85.3 t/ha) and cane girth (2.542 cm) was significantly higher under band placement. Similarly, cane yield (86.33 t/ha), cane height (229.9 cm) and cane girth (2.573 cm) was highest when fertilizer (N & K) were applied in seven splits, which was statistically at par with six splits application of fertilizer (N& K).

PENINSULAR ZONE

6. SANKESHWAR

Higher cane yield was recorded for interactions. Among the interaction M2S2 i.e., band application of RDN+RDK at six splits (134.9 t/ha) recorded significantly higher cane yield as compared to other interactions. This was due to higher NMC and single cane weight in this interaction. The next best interaction was M1S2 (131.8 t/ha) which was at par with each other. Significantly lower cane yield was with M1S4 (107.2 t/ha). The quality parameters viz., brix, pol and purity did not differ significantly due to interaction effects. However, CCS yield (t/ha) differed significantly among the interaction effects which followed same trend as that of cane yield.

7. KOLHAPUR

The band placement method of fertilizer application was significantly superior over broadcasting method of fertilizer application for growth and yield attributing characters. However, as far time of fertilizer application (T), application in seven equal splits (basal 10 % remaining at 45, 75, 90, 120, 150 and 180 DAP) recorded significantly higher cane, CCS yield and more B: C ratio than rest of the treatments.

8. POWARKHEDA

Results revealed that band placement of nutrients recorded significantly higher cane yield (147.69 t/ha) over broadcasting method (119.59 t/ha). Among schedules of application, splitting of RDN + RDK in seven splits produced significantly higher cane yield (136.53 t/ha) as compared to five splitting (129.21t/ha) but was at par with conventional four splits. Juice quality was not found to be influenced with the methods or number of splits of nutrient application.

NORTH CENTRAL ZONE

9. PUSA

Band placement of N and K fertilizer recorded higher plant population (1, 67, 900/ ha), millable canes (1, 18,000/ ha) and cane yield (86.7 t/ha). Cane yield obtained under broadcasting was 73.9 t/ha. Similarly, significantly higher N, P and K uptake by sugarcane was noticed due to the band placement of nitrogen and potassic fertilizers. There was no influence of treatments on the juice quality parameters.

10. SEORAH

Significantly higher cane yield (104.66 t/ha) was observed with band placement fertilizer application method over broadcasting method of fertilizer application. Split doses of N + K produced significantly higher cane yield over RDF and scheduling of nutrient applications. Sucrose percent was not affected significantly by different methods of fertilizer application.

EAST COAST ZONE

11. NAYAGARH

There was significant difference between method of nutrient application as well as among schedule of nutrient application. For all the growth and yield attributes band placement of fertilizers was found to be significantly better than broadcasting method of fertilizer application which ultimately resulted in higher yield. Among schedule of nutrient applications, higher NMC (91.22'000/ha) and cane yield (102.41 t/ha) were recorded with application of RDN +RDK in six splits which is at par with application of RDN + RDK in five splits (NMC 88.37'000/ha and cane yield 100.67 t/ha).

IMPORTANT OBSERVATIONS:

- Post emergence band placement of nitrogen and potassium resulted in higher cane yield and CCS (t/ha) as compared to that with broadcasting at most of the centres across the zones.
- In subtropical region comprising north central and north western zones split application of nitrogen and potassium up to 150 days after planting brought about significant improvement in cane yield.
- For the centres located in peninsular and east coast zones split application of nitrogen and potassium up to 180 days after planting resulted in higher cane yield over conventional splitting up to 95 days after planting.

GENERAL 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.
- Elite genotypes belonging to early and mid-late maturity groups were found to perform well at wider spacing of 120 cm in sub-tropical region and at 150 cm in peninsular and east-coast zones. Response to higher (125%) recommended dose of fertilizers was conspicuous across the zones.
- Long term weather data indicated continuous reduction in rainfall in the north- west zone combined with conspicuous rise in minimum temperature.
- Water efficient varieties belonging to early and mid-late maturity groups were identified for different zones.
- All the centres are requested to give meaningful summary of different trials by making it more informative and true representative of the findings.

SUGGESTIONS

- 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.
- Still many centres are not reporting CV of their data, it is requested that CV must be reported for all the characters in all the trials.

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 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.

Details of Experiments allotted to and conducted by different Centres during 2020-21

Sl. No.	Centre	Trial allotted				Trial reported			
		AS72	AS73	AS74	AS75	AS72	Centres have submitted the weather data and trend analyses is to be done.	AS74	AS75
1	Faridkot*	AS72	AS73	AS74	AS75	AS72		AS74	AS75
2	Kota*	AS72	AS73	AS74	AS75	AS72		AS74	AS75
3	Lucknow	AS72	AS73	AS74	AS75	AS72		AS74	AS75
4	Shahjahanpur	AS72	AS73	AS74	AS75	AS72		AS74	AS75
5	Uchani	AS72	AS73	AS74	AS75	AS72		AS74	AS75
6	Coimbatore	AS72	AS73	AS74	AS75	AS72		-	-
7	Kolhapur	AS72	AS73	AS74	AS75	AS72		-	AS75
8	Pune	AS72	AS73	AS74	AS75	AS72		AS74	-
9	Sankeshwar	AS72	AS73	AS74	AS75	AS72		AS74	AS75
10	Nayagarh	AS72	AS73	AS74	AS75	AS72		AS74	AS75
11	Pusa	AS72	AS73	AS74	AS75	AS72		AS74	AS75
12	Seorahi	AS72	AS73	AS74	AS75	AS72		AS74	AS75
13	Powarkheda	AS72	AS73	AS74	AS75	AS72	AS74	AS75	

