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Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra)

ALL INDIA CO-ORDINATED RESEARCH PROJECT

ON

SUGARCANE AGRONOMY

ANNUAL REPORT

(2012-13)

COMPILED BY

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CENTRAL SUGARCANE RESEARCH STATION,

PADEGAON – 415 521 , Tal – Phaltan , Dist – Satara

(Maharashtra)

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SUGARCANE AGRONOMY

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INTRODUCTION

INTRODUCTION

Sugarcane is the most important cash crop in the state of Maharashtra. Sugar industry plays a pivotal role in the socio-economic and educational development in the rural areas of the state. In general, since last 3 years the rainfall situation in Maharashtra was satisfactory which resulted in the increase in area under sugarcane. Therefore, during 2010-11, the area of sugarcane is at the highest peak level in the state i.e. 10.22 lakh hectares with 802.15 lakh ton Sugarcane production and 78.48 t/ha average productivity and 11.31 % average sugar recovery. The sugar industry is facing the problem of crushing excess cane during 2010-11. Therefore, it is the need of hour to increase the production and decrease the area and cost of production.

The sugarcane productivity has declined from 83.3 t /ha during 2000-01 to 74.10 t /ha during 2008-09. However, it increases during the year 2009-10 (83.0 t/ha) and again slightly decreases during the year 2010-11 (78.48 t/ha). For higher returns from the sugarcane crop, the productivity as well as quality of the sugarcane needs to be improved with adoption of the advanced technologies *viz*., use of high yielding and high sugar varieties, improved planting methods, better water management, trash recycling, INM and IPM, use of improved management techniques and use of quality seed.

For providing the high yielding and high sugar varieties and new techniques for increasing yield, the Central Sugarcane Research Station, Padegaon is conducting research on varietal improvement along with development of new techniques especially planting systems, paired row planting, intercropping, ratoon management, IPM and INM, water management, drought and salinity management, sugarcane based farming system and cropping system. The need based future research strategies are development of extra early sugarcane varieties maturing at 10 –11 months, development of sugarcane varieties for better juice quality, identification of varieties for specific characteristics i.e. flood tolerance / drought and salt tolerance, woolly aphid tolerance/resistance, higher production of fiber for co-generation, higher percentage of brix in early age of crop for higher ethanol production. The efforts are also being made to develop non-flowering/ sparse flowering varieties with higher cane yield, CCS yield and sugar recovery. Similarly, the attention will be given for development of anti-inversion varieties to withstand the delayed crushing. Special emphasis will be given for varietal development considering the global warming and the climate change.

Table. 1.) In Maharashtra State, there are five major sub-ecological zones for sugarcane viz.

Sr.No.	Sub-ecological zone	Particulars/Remarks
1.	South Western Maharashtra State	Adequate resources-high recovery zone
2.	Central Western Maharashtra State	Adequate resources-medium recovery zone
3.	North Western Maharashtra State	Insufficient irrigation and other resources. low recovery zone
4.	East middle Maharashtra State	
5.	East Maharashtra State	

Table.2) : **The area, production, productivity, sugar production and sugarcane recovery in Maharashtra from 2001 to 2012.**

Year	Area ('000' ha)	Sugarcane production (Lakh ton)	Sugarcane productivity (t /ha)	Sugar production (Lakh ton)	Sugar recovery (%)
2000-01	595	495.89	83.3	67.05	11.64
2001-02	578	451.40	78.1	56.13	11.60
2002-03	599	370.15	61.8	65.19	11.66
2003-04	548	290.66	51.0	30.39	10.91
2004-05	320	204.00	63.0	22.62	11.45
2005-06	415	388.14	68.22	51.98	11.68
2006-07	840	626.00	76.00	90.95	11.40
2007-08	1046	735.69	70.33	87.63	11.91
2008-09	770	410	74.10	46.00	11.46
2009-10	756	641.59	83.00	70.66	11.54
2010-11	1022	802.15	78.48	90.52	11.31
2011-12*	1008	77.87	78.03	89.50	11.55

*** :** Estimated.

Season

and climate

Central Sugarcane Research Station, Padegaon.

SEASON & CLIMATE
(2010 - 2012)

The Central Sugarcane Research Station, Padegaon is located in sub tropical zone, geographically at an elevation of 556 m above mean sea level on 18o-12"N latitude and 74o-10"E longitude.

The total rainfall received during July, 2010 to March, 2012 (21 months) was 1002.4 mm in 69 rainy days as against the normal rainfall of 1087.0 mm (21 months) indicating that the rainfall received during the season was 7.8 % less than normal. The data on climatic parameters during the crop season (July, 2010 to March, 2012) along with averages based on last 79 years (1932-33 to 2010-11) recorded at the meteorological observatory located at this research station are presented in Table 1 and graphically shown in Fig.1. The effect of the season on sugarcane at various growth phases has been elucidated below.

1) Germination phase for Adsali crop (Jul. to Sept., 2010)

The rainfall received during germination phase was 320.6 mm in 24 rainy days as against the normal of 301.6 mm. The average maximum temperature during this period was 29.5 oC and minimum temperature was 21.7 oC. The average relative humidity (morning) during this phase was 98 % which was 11 % more than the normal.

Evenly distributed rainfall and high humidity resulted in good germination of Adsali crop of sugarcane.

2) Tillering phase (Oct-Dec., 2010) for *Adsali* and Germination phase for Preseason crop:

Total rainfall received during tillering phase was 240.1 mm which was 58 % more than the normal of last 79 years. The average maximum and minimum temperatures during this phase were 29.2 ^{o}C and 17.7 ^{o}C respectively. The morning humidity was 98 % as against the normal 86 %. High humidity and high rainfall was favourable for the tillering of *Adsali* sugarcane. High humidity was also favourable for good germination of preseasonal sugarcane.

3) Early growth for (Adsali) and Tillering phase for Preseason and Germination phase for Suru (Jan-Mar.2011)

During this phase the average maximum temperature was 31.5 ^{o}C which was slightly less than the normal i.e 32.4 ^{o}C .The average minimum temperature was 13.0 ^{o}C, which was more than the normal i.e 12.6 ^{o}C. These temperatures were favourable for Adsali crop growth. Due to higher humidity (97 %) than the average (78 %), tillering of preseasonal sugarcane and germination/tillering of Suru sugarcane was also satisfactory.

4) Desiccation phase (April to May, 2011)

The mean maximum temperature was lower (37.0 ^{o}C) than the normal (39.9^{o}C) while the mean minimum temperature (22.0 ^{o}C) was more than the normal (21.2^{o}C). The total rainfall received during this phase was 28.5 mm in 2 rainy days.

5) Grand growth for *Adsali* and Early growth phase for (Preseason and *Suru*)

(June to Sept., 2011)

During this phase, the average maximum and minimum temperatures were 29.9 ^{o}C and 22.9 ^{o}C respectively i.e. optimum for crop growth. The total rainfall received during this phase was 362.4 mm in 28 rainy days as against the normal rainfall of 371.9 mm. The grand growth of *Adsali*, preseasonal and *Suru* sugarcane was satisfactory due to good rains coupled with high humidity.

6) Flowering and Maturity for *Adsali* and Preseason /Grand growth phase for *Suru*

(Oct -Dec., 2011)

During this phase, the mean maximum and minimum temperatures were 31.5 ^{o}C and 16.3 ^{o}C respectively. Total rainfall received during this phase was 50.8 mm in 2 rainy days as against 165.5 mm average of last 79 years. The high humidity and optimum temperatures favoured early and profuse flowering for all season planted crop.

During Jan 2012 to March 2012, the mean maximum and minimum temperatures were 32.4 oC and 13.1 oC respectively. The high humidity and optimum temperatures favoured maturity of sugarcane crop.

At maturity of *Adsali*, preseasonal and *Suru* sugarcane, the minimum temperature was more (16.3 ^{o}C) than average (15.5 ^{o}C) which affected sugarcane productivity . The overall crop growth during this year was satisfactory due to favourable climate. However, due to temperature fluctuations there was effect on cane yield. However, due to more number of cooler days, the sugar recovery was satisfactory.

The incidence of pests and diseases, in general, was as under.

1) Incidence of insect pests on sugarcane during 2011-12

Sr.No.	Name of pest	Extent of incidence (%)
1	Early shoot borer	16 to 18
2	Internode borer	18 to 20
3	Top shoot borer	0 to 2
4	Mealy bugs	20 to 30
5	Wooly aphids	Traces to Low
6	Scale insect	0 to 2
7	White fly	1 to 2.5

2) Incidence of diseases on sugarcane during 2011-12

Sr.No.	Name of disease	Extent of incidence (%)
1	Rust	1.0 to 30.0
2	G.S.D	1.0 to 12.00
3	Smut	1.0 to 48.00
4	Ring spot	4.0 to 15.0
5	Pokka boeng	1.0 to 18.0
6	Eye spot	2.0

Table 3. Average weather parameters at CSRS, Padegaon during June 10 to March 12

Sr. No.	Temperature (ºC)		Humidity (%)		Sunshine Hrs.	Rainfall (mm)	Rainy days
	Max.	Min.	Mor.	Eve.			
June 10	32.5	22.8	97	75	06.1	222.3	8
1. Germination phase for *Adsali* crop (Jul. to Sept., 2010)							
July 10	28.8	22.2	98	89	02.9	093.9	9
Aug 10	29.6	21.7	98	90	03.6	077.0	8
Sept 10	30.1	21.3	98	88	05.3	149.7	7
Average	**29.5**	**21.7**	**98**	**89**	**03.9**	**320.6**	**24**
Last 79 yrs avg	**29.2**	**21.8**	**88**	**64**	**4.9**	**301.6**	**--**
2. Tillering phase (Oct-Dec., 2010) for *Adsali*/Germination phase for Preseason crop							
Oct 10	30.7	20.2	98	83	07.1	193.0	7
Nov 10	29.5	19.9	98	74	06.4	047.1	5
Dec 10	27.5	12.9	97	60	07.8	--	--
Average	**29.2**	**17.7**	**98**	**72**	**07.1**	**240.1**	**12**
Last 79 yrs avg	**31.6**	**15.5**	**86**	**40**	**09.6**	**151.8**	**--**
3. Early growth (*Adsali*)/Tillering (Preseason) and Germination phase (*Suru*) (Jan-Mar.2011)							
Jan 11	28.7	10.3	96	62	07.9	--	--
Feb 11	30.7	12.6	97	74	08.9	--	--
Mar 11	35.2	16.2	98	65	08.3	--	--
Average	**31.5**	**13.0**	**97**	**67**	**08.4**	**--**	**--**
Last 79 yrs avg	**32.4**	**12.6**	**78**	**28**	**10.0**	**13.1**	**--**
4. Desiccation phase (April to May, 2011)							
April 11	36.9	21.0	94	51	07.3	--	--
May 11	37.1	22.9	93	59	07.9	028.5	3
Average	**37.0**	**22.0**	**94**	**55**	**07.6**	**28.5**	**3**
Last 79 yrs avg	**39.9**	**21.2**	**69**	**26**	**11.6**	**69.9**	**--**
5. Grand growth (*Adsali*)/Early growth phase (Preseason and *Suru*) (June to Sept., 2011)							
June 11	30.6	24.2	95	85	07.5	106.6	7
July 11	29.6	23.4	97	89	03.3	098.3	8
Aug 11	29.3	22.8	97	80	03.0	040.2	7
Sept 11	30.0	21.0	98	77	05.2	117.3	6
Average	**29.9**	**22.9**	**97**	**83**	**04.8**	**362.4**	**28**
Last 79 yrs avg	**30.9**	**22.0**	**87**	**61**	**05.3**	**371.9**	**--**
6. Flowering and Maturity (*Adsali* and Preseason)/Grand growth phase (*Suru*) (Oct-Dec., 2011)							
Oct 11	31.1	20.9	98	72	06.3	050.8	2
Nov 11	30.3	15.8	98	74	08.0	--	--
Dec 11	33.0	12.1	98	75	08.1	--	--
Average	**31.5**	**16.3**	**98**	**74**	**07.5**	**050.8**	**2**
Last 79 yrs avg	**31.6**	**15.5**	**86**	**40**	**09.6**	**165.5**	**--**
Jan 12	29.1	11.1	97	85	08.5	--	--
Feb 12	32.5	12.9	97	51	08.6	--	--
Mar 12	35.6	15.2	93	51	07.4	--	--
Average	**32.4**	**13.1**	**96**	**62**	**08.2**	**--**	**--**
Last 80 yrs avg	**32.4**	**12.6**	**78**	**28**	**10.0**	**12.9**	**--**

Central Sugarcane Research Station, Padegaon.

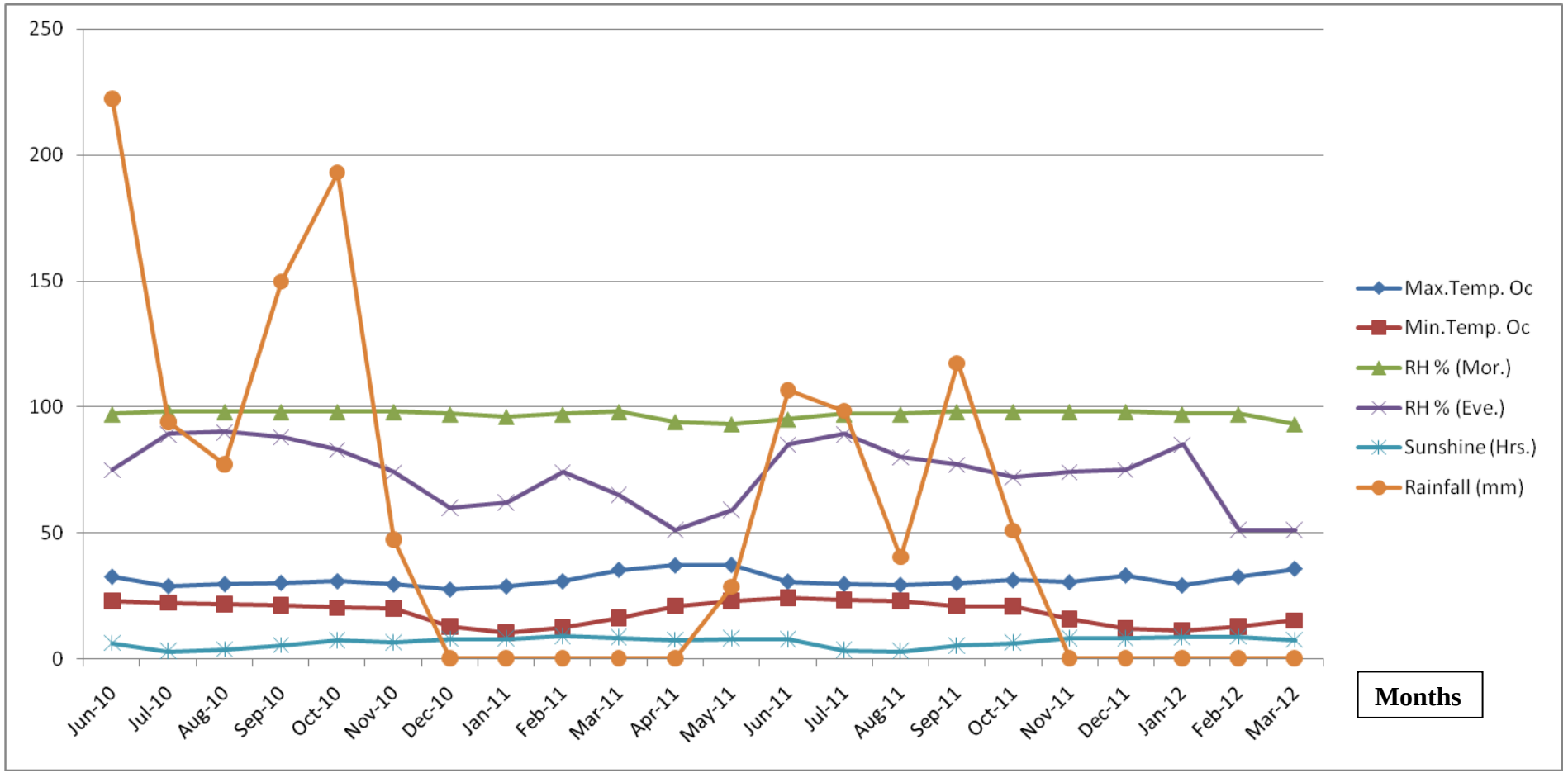

Figure 1: Weather parameters 2010 - 2012

Staff Position

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON SUGARCANE

CENTRAL SUGARCANE RESEARCH STATION, PADEGAON

DR. SURESH M. PAWAR

Sugarcane Specialist

Staff Position: 2012-13

A) AICRP(S) Scheme

Sr. No.	Name	Designation
Sugarcane Agronomist		
1	Prof. R.M.Dixit	Sugarcane Agronomist
Technical Assitant (02)		
1	Shri. D.D. Gaikwad	Technical Assistant
2	Shri. S.U.Deshmukh	---,,---

Research Highlights

RESEARCH HIGHLIGHTS

AICRP (S) PROGRAMME

(2012-13)

A) On going experiment

Title 1: Agronomic evaluation of promising new sugarcane genotypes (Autumn planting)

The genotypes CoM 05082 and CoSnk 5104 recorded significantly higher cane and CCS yields than the other genotypes. The application of 125 percent recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen

Title 2 : Agronomic evaluation of promising new sugarcane genotypes (Spring Planting)

The genotype CoM 05082 was the most superior for cane and CCS yields in ratoon crop than the other genotypes followed by CoSnk 5104. The application of 125 % recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen

Title 3: Plant geometry in relation to mechanization in sugarcane.

The row spacing of 120 cm recorded the highest cane (122.13 t ha^{-1}) and CCS yield (17.03 t ha^{-1}). However, it was at par with the row spacing of 150 cm for both cane (119.45 t ha^{-1}) and CCS yield (16.48 t ha^{-1}). Significantly highest cane (136.74 t ha^{-1}) and CCS (18.87 t ha^{-1}) yields were recorded in the genotype CoM 0265 followed by Co 86032 (121.22 and 16.80 t ha^{-1}). CoC 671 was found to be the most superior with respect to juice quality.

Title 4: Priming of cane node for accelerating germination.

The priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio for 15 minutes recorded significantly highest cane and CCS yields (132.78 and 18.94 t ha^{-1}), treating cane node in hot water for 50%c and urea solution (3%) for two hours was the next superior.

B) Completed experiment

Title 1: Agronomic evaluation of promising new sugarcane genotypes

(Autumn Pooled)

The genotypes CoM 05082 recorded significantly higher cane and CCS yields than the other genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield

The application of 125 percent recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen.

Title 2: Agronomic evaluation of promising new sugarcane genotypes

(Spring Pooled)

During spring season the genotype CoM 05082 recorded significantly higher cane and CCS yields than the other genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield

The application of 125 percent recommended dose of nitrogen to spring sugarcane produced significantly higher cane and CCS yields , followed by 100 % recommended dose of nitrogen .

Research report

on

AICRP(S) Agronomy

Project No. AS – 42

Title 1: Agronomic evaluation of promising new sugarcane genotypes (Autumn planting)

Objective: To work out Agronomy of sugarcane genotypes from advanced varietal trial (AVT)

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Experimental Details :

Place	: CSRS, Padegaon,
Design	: Split plot,
Replication	: 3
Plot Size : Gross	: 10 x 6 m^2,
Net	: 08 x 4 m^2,
Fertilizer dose	: 340:170:170 kg N, P_2O_5, K_2O ha^{-1},
Date of planting	: 11/11/2011,
Date of harvesting	:16/02/2013,
Soil Status	: Irrigated, Medium black soil.

Treatment details :

A) Main plot treatments –Genotypes -5

V_1	CoSnk 5103
V_2	CoM 05082
V_3	CoSnk 5104
V_4	Co 99004
V_5	CoC 671

B) Sub plot treatments – N levels – 3

F_1	75% RD of N
F_2	100% RD of N
F_3	125% RD of N

Results:

The results of the second year of the experiment on cane and CCS yields, growth observations and quality parameters are presented in Table 1 to 3.

Effect of genotypes:

Data presented in Table 1 revealed that the genotype CoM 05082 recorded the highest cane (134.40 t ha^{-1}) and CCS yield (18.33 t ha^{-1}). However, it was at par with CoSnk 5104 in respect of CCS yield (18.16 t ha^{-1}).

Effect of nitrogen levels:

The N levels had a significant effect on both cane and CCS yields. The highest cane (133.82 t ha^{-1}) and CCS (18.31 t ha^{-1}) yields were recorded with application of 125% recommended dose of N. However, it was at par with 100% recommanded dose of N in respect of CCS yield (17.65 t ha^{-1}).

Effect of interactions:

The interactions between genotypes and fertilizer levels were found to be non significant for both cane and CCS yields.

Growth and yield attributes:

The data regarding growth and yield attributes are presented in Table 2.

Effect of genotypes:

The data presented in Table 2 revealed that the effect of genotypes was significant for all the parameters except no. of millable canes and average cane weight. The genotype, CoM 05082 recorded the highest germination (70.58 %), tillering ratio (1.83), millable height (296 cm), cane girth (9.6 cm), no. of internodes per cane (24), millable canes per hectare (96750 ha^{-1}) and weight per cane (1.39 kg). However, it was at par with CoSnk 5104 in respect of germination and cane girth .

Effect of nitrogen levels:

Effect of N levels was significant for the millable height, no. of internodes per cane and average cane weight. Application of 125% recommended dose of nitrogen recorded the highest millable height (288 cm), no. of internodes per cane (25.0) and the average cane weight (1.39 kg) and was significantly superior to other levels. It was closely followed by 100 % recommended dose of nitrogen for all these parameters.

Effect of interactions:

The interactions between genotypes and nitrogen levels in respect of all the parameter were found to be non significant.

Quality parameters:

The genotypes, N levels and their interactions did not have significant influence on juice quality parameters (Table 3).

Conclusion:

The genotypes CoM 05082 and CoSnk 5104 recorded significantly higher cane and CCS yields than the other genotypes. The application of 125 percent recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen .

Table 1. Cane and CCS yield of sugarcane genotypes at varying N levels (Autumn Planting)

Treatments	Cane yield ($t\ ha^{-1}$)	CCS yield ($t\ ha^{-1}$)
A) Genotypes		
V_1– CoSnk 5103	128.63	17.55
V_2 – CoM 05082	134.40	18.33
V_3– CoSnk 5104	130.32	18.16
V_4 – Co 99004	123.60	17.29
V_5 – CoC 671	122.36	17.01
SE±	**0.39**	**0.18**
C.D. at 5%	**1.24**	**0.56**
B) N levels		
F_1 - 75% N	122.24	16.98
F_2 - 100% N	127.51	17.65
F_3 – 125 % N	133.82	18.31
SE±	**2.14**	**0.29**
C.D. at 5%	**6.00**	**0.88**
C) Interactions		
SE±	**4.34**	**0.38**
C.D. at 5%	**NS**	**NS**
C.V. %	**6.98**	**6.74**
General Mean	**127.86**	**17.64**

Table 2. Growth and yield attributes of sugarcane genotypes at varying N levels

Treatments	Germination %	Tillering ratio	Height (cm)	Girth (cm)	No of internodes $cane^{-1}$	Millable canes ($000\ ha^{-1}$)	Avg. cane wt. (kg)
A) Genotypes							
V_1– CoSnk 5103	66.86	1.69	283	9.3	23	94.14	1.34
V_2 – CoM 05082	70.58	1.83	296	9.6	24	96.75	1.39
V_3– CoSnk 5104	70.57	1.74	285	9.4	23	95.02	1.39
V_4 – Co 99004	66.60	1.63	279	9.1	22	94.04	1.29
V_5 – CoC 671	64.52	1.54	267	9.0	22	92.71	1.24
SE±	**0.80**	**0.03**	**1.02**	**0.08**	**0.11**	**1.40**	**0.04**
C.D. at 5%	**2.68**	**0.08**	**3.09**	**0.22**	**0.32**	**NS**	**NS**
B) N levels							
F_1 - 75% N	65.62	1.64	275	9.0	21	93.52	1.28
F_2 - 100% N	67.85	1.69	282	9.3	23	93.60	1.32
F_3 – 125 % N	70.03	1.73	288	9.6	25	96.47	1.39
SE±	**2.02**	**0.04**	**2.22**	**0.24**	**0.18**	**1.86**	**0.03**
C.D. at 5%	**NS**	**NS**	**6.50**	**NS**	**0.60**	**NS**	**0.08**
C) Interactions							
SE±	**4.60**	**0.06**	**5.02**	**0.54**	**0.58**	**4.16**	**0.03**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General Mean	**67.83**	**1.69**	**282**	**9.3**	**23**	**94.53**	**1.33**

Table 3. Quality parameters of sugarcane genotypes at varying N levels

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– CoSnk 5103	21.46	19.66	92.23	13.90
V_2 – CoM 05082	22.12	19.78	92.79	13.93
V_3– CoSnk 5104	21.68	19.73	92.71	13.65
V_4 – Co 99004	21.28	19.58	90.49	13.90
V_5 – CoC 671	21.12	19.55	90.29	13.63
SE±	**0.38**	**0.18**	**1.06**	**0.14**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
B) N levels				
F_1 - 75% N	21.23	19.62	90.43	13.69
F_2 - 100% N	21.40	19.62	91.97	13.83
F_3 – 125 % N	21.97	19.73	92.70	13.88
SE±	**0.34**	**0.12**	**0.88**	**0.07**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
C) Interactions				
SE±	**0.54**	**0.24**	**0.98**	**0.16**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**21.53**	**19.65**	**91.70**	**13.80**

Table 4. Soil properties at harvest in different genotypes at varying N levels

Treatments	pH	EC (dsm^{-1})	O.C.%	Available nutrient status (kg ha^{-1})		
				N	P_2O_5	K_2O
A) Genotypes						
V_1– CoSnk 5103	8.10	0.36	0.60	186	17.3	263
V_2 – CoM 05082	8.11	0.36	0.58	182	16.1	245
V_3– CoSnk 5104	8.07	0.35	0.61	183	16.9	255
V_4 – Co 99004	8.08	0.38	0.56	188	17.9	269
V_5 – CoC 671	8.08	0.40	0.57	194	19.0	277
B) N levels						
F_1 - 75% N	8.07	0.36	0.59	182	18.3	270
F_2 - 100% N	8.08	0.36	0.59	186	17.4	264
F_3 – 125 % N	8.11	0.38	0.57	194	16.5	252
General Mean	**8.09**	**0.37**	**0.58**	**187**	**17.4**	**262**
Initial	**8.13**	**0.38**	**0.66**	**266**	**17.8**	**306**

Project No. AS – 42

Title 2 : Agronomic evaluation of promising new sugarcane genotypes (Spring planting)

Objective: To work out Agronomy of sugarcane genotypes from advanced varietal trial (AVT)

Experimental Details :

Place	: CSRS, Padegaon,
Design	: Split plot,
Replication	: 3
Plot Size : Gross	: 10 x 6 m^2,
Net	: 08 x 4 m^2,
Fertilizer dose	: 250:115:115 kg N, P_2O_5, K_2O ha^{-1},
Date of planting	: 05/01/2012
Date of harvesting	:17/02/2013
Soil Status	: Irrigated, Medium black soil.

Treatment details :

B) Main plot treatments –Genotypes -5

V_1	CoSnk 5103
V_2	CoM 05082
V_3	CoSnk 5104
V_4	Co 99004
V_5	CoC 671

B) Sub plot treatments – N levels – 3

F_1	75% RD of N
F_2	100% RD of N
F_3	125% RD of N

Results:

The data on second year trial cane and CCS yields, growth observations and quality parameters are presented in Table 1 to 3.

Effect of genotypes:

Data presented in Table 1 revealed that the genotype CoM 05082 recorded the highest cane (119.97 t ha^{-1}) and CCS yield (15.85 t ha^{-1}) and was significantly superior to all other genotypes. It was followed by CoSnk 5104 (113.30 t ha^{-1} cane and 15.35 t ha^{-1} CCS).

Effect of nitrogen levels:

The nitrogen levels had a significant effect on both cane and CCS yields. Significantly highest cane (121.77 t ha^{-1}) and CCS (16.44 t ha^{-1}) yields were recorded with application of 125% recommended dose of dose of nitrogen . It was followed by 100 % recommended dose of nitrogen (112.35 and 15.07 t ha^{-1}).

Effect of interactions:

The interactions between genotypes and fertilizer levels were found to be non significant for both cane and CCS yields.

Growth and yield attributes:

The data regarding growth and yield attributes are presented in Table 2.

Effect of genotypes:

The data presented in Table 2 revealed that the effect of genotypes was significant for all the parameters except germination % and millable cane height. The genotype, CoM 05082 recorded the highest germination (70.47 %), tillering ratio (1.63), cane girth (9.4 cm), no. of internodes per cane (23), millable canes per hectare (1,03,000 ha^{-1}) and weight per cane (1.17 kg). However, it was at par with CoSnk 5104 in respect of cane girth, and average weight per cane.

Effect of nitrogen levels:

Effect of N levels was significant for the tillering ratio, no. of internodes per cane, NMC and average cane weight. Application of 125% recommended dose of nitrogen recorded the highest tillering ratio (1.63), no. of internodes per cane (22), NMC (1,03,080 ha^{-1}) and average cane weight (1.20 kg $cane^{-1}$). The 100 % recommended N was at par with 125 % N in respect of tillering ratio.

Effect of interactions:

The interactions between genotypes and N levels in respect of all the parameter were found to be non significant.

Quality parameters:

The genotypes, N levels and their interactions did not have any significant influence on juice quality parameters (Table 3).

Conclusion:

The genotype CoM 05082 was the most superior for cane and CCS yields in ratoon crop than the other genotypes followed by CoSnk 5104. The application of 125 % recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen .

Table 1. Cane and CCS yield of sugarcane genotypes at varying N levels (Spring planting)

Treatments	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Genotypes		
V_1– CoSnk 5103	111.14	14.81
V_2 – CoM 05082	119.97	15.85
V_3– CoSnk 5104	113.30	15.35
V_4 – Co 99004	108.61	14.74
V_5 – CoC 671	105.94	14.23
SE±	**0.52**	**0.27**
C.D. at 5%	**1.48**	**0.78**
B) N levels		
F_1 - 75% N	101.27	13.48
F_2 - 100% N	112.35	15.07
F_3 – 125 % N	121.77	16.44
SE±	**2.11**	**0.48**
C.D. at 5%	**5.84**	**1.02**
C) Interactions		
SE±	**4.18**	**0.73**
C.D. at 5%	**NS**	**NS**
C.V.%	**6.62**	**7.14**
General Mean	**111.79**	**15.00**

Table 2. Growth and yield attributes of sugarcane genotypes at varying N levels

Treatments	Germination (%)	Tillering ratio	Height (cm)	Girth (cm)	No of internodes cane^{-1}	Millable canes (000 ha^{-1})	Avg. cane wt. (kg)
A) Genotypes							
V_1– CoSnk 5103	65.67	1.59	271	9.2	22	97.97	1.13
V_2 – CoM 05082	70.47	1.63	281	9.4	23	103.00	1.17
V_3– CoSnk 5104	69.20	1.59	278	9.3	22	98.66	1.16
V_4 – Co 99004	65.27	1.56	267	9.1	22	97.04	1.12
V_5 – CoC 671	65.30	1.55	261	8.7	20	94.66	1.12
SE±	**1.85**	**0.006**	**8.12**	**0.06**	**0.12**	**0.54**	**0.003**
C.D. at 5%	**NS**	**0.015**	**NS**	**0.20**	**0.34**	**1.63**	**0.010**
B) N levels							
F_1 - 75% N	64.72	1.53	258	8.9	19	93.05	1.09
F_2 - 100% N	67.96	1.58	270	9.2	21	98.68	1.16
F_3 – 125 % N	68.86	1.63	286	9.3	22	103.08	1.20
SE±	**2.03**	**0.02**	**9.75**	**0.20**	**0.24**	**0.98**	**0.012**
C.D. at 5%	**NS**	**0.05**	**NS**	**NS**	**0.68**	**2.69**	**0.035**
C) Interactions							
SE±	**4.70**	**0.08**	**4.76**	**0.54**	**0.53**	**2.36**	**0.05**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General Mean	**67.18**	**1.58**	**271**	**9.2**	**21**	**98.27**	**1.13**

Table 3. Quality parameters of sugarcane genotypes at varying N levels

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– CoSnk 5103	23.09	19.62	86.97	13.44
V_2 – CoM 05082	23.37	19.60	89.05	13.56
V_3– CoSnk 5104	21.97	19.54	87.25	13.55
V_4 – Co 99004	22.69	19.75	85.06	13.31
V_5 – CoC 671	22.54	19.59	84.03	13.21
SE±	**1.38**	**0.88**	**1.93**	**0.30**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
B) N levels				
F_1 - 75% N	23.02	19.61	85.29	13.32
F_2 - 100% N	22.69	19.62	86.70	13.42
F_3 – 125 % N	22.59	19.63	87.42	13.50
SE±	**0.36**	**0.15**	**1.04**	**0.10**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
C) Interactions				
SE±	**0.74**	**0.31**	**0.86**	**0.24**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**22.73**	**19.61**	**86.47**	**13.41**

Table 4. Soil properties at harvest in different genotypes at varying N levels

Treatments	pH	EC (dsm^{-1})	O.C.%	Available nutrient status (kg ha^{-1})		
				N	P_2O_5	K_2O
A) Genotypes						
V_1– CoSnk 5103	8.05	0.32	0.58	181	15.6	240
V_2 – CoM 05082	8.06	0.32	0.56	177	14.9	240
V_3– CoSnk 5104	8.03	0.31	0.59	178	15.4	248
V_4 – Co 99004	8.03	0.34	0.54	183	17.1	262
V_5 – CoC 671	8.01	0.36	0.55	189	18.2	272
B) N levels						
F_1 - 75% N	8.01	0.32	0.56	177	17.7	265
F_2 - 100% N	8.03	0.32	0.56	181	15.6	257
F_3 – 125 % N	8.07	0.34	0.54	189	15.4	247
General Mean	**8.04**	**0.33**	**0.55**	**182**	**16.2**	**256**
Initial	**8.10**	**0.37**	**0.68**	**256**	**17.9**	**314**

Project No. AS – 63

Title 5: Plant geometry in relation to mechanization in sugarcane.

Objectives: 1. To workout optimum plant geometry for use of farm machinery.
2. To study varietal response to different planting geometry.

Experimental Details:

Place	: CSRS, Padegaon,
Design	: Split plot,
Replication	: 3
Plot Size : Gross	: 10 x 6 m^2,
Net	: 08 x 4 m^2,
Fertilizer dose	: 250:115:115 kg N, P_2O_5, K_2O ha^{-1},
Date of planting	: 25.02.2012
Date of harvesting	:07.03.2013
Soil Status	: Irrigated, Medium black soil.

Treatment details :

A) Main plot treatments –-5 inter-row spacings

P_1	100 cm row distance
P_2	120 cm row distance
P_3	150 cm row distance
P_4	30 x 150 cm row distance

B) Sub plot treatments – Genotypes -4

V_1	CoM 0265
V_2	Co 86032
V_3	Co 94012
V_4	CoC 671

Results:

The data on second year trial on cane and CCS yields, growth observations and quality parameters are presented in Table 1 to 3.

Effect of planting geometry:

Data presented in Table 1 revealed that the row spacing of 120 cm recorded significantly highest cane (122.13 t ha^{-1}) and CCS yield (17.03 t ha^{-1}). However, it was at par with the row spacing of 150 cm for both cane (119.45 t ha^{-1}) and CCS yields (16.48 t ha^{-1}) respectively.

Effect of genotypes:

Significantly highest cane (136.74 t ha^{-1}) and CCS (18.87 t ha^{-1}) yields were recorded with the variety, CoM 0265. It was followed by Co 86032 (121.22 and 16.80 t ha^{-1}).

Effect of interactions:

The interactions between planting geometry and the genotypes in respect of cane and CCS yields were found to be non significant.

Growth and yield attributes:

The data regarding growth and yield attributes are presented in Table 2.

Effect of planting geometry:

The effect of row spacing was significant for the millable height, cane girth and no. of millable canes .The row spacing of 120 cm recorded the highest millable height (299 cm) but it was at par with 150 cm row spacing. A similar trend was noticed for the cane girth (10.7 cm) and no of millable canes ha^{-1}. (89030 ha^{-1}.)

Effect of Genotypes:

The effect of genotypes was significant on all the growth parameters except germination percentage and no.of internodes. The genotype CoM 0265 registered significantly higher tillering ratio(1.75), millable height (310 cm), cane girth (11.0 cm), NMC (94250 ha^{-1}) and the average cane weight (1.45 kg $cane^{-1}$). Co 86032 was the next superior genotype in respect of all the growth attributes.

Effect of interactions:

The interactions between the planting geometry and genotypes was found to be non significant for all the growth parameters.

Quality parameters:

The data pertaining to juice quality parameters are presented in Table 3.

Effect of planting geometry:

The effect of planting geometry on juice quality parameters was found to be not significant.

Effect of Genotypes:

The genotype CoC 671 recorded significantly higher brix (21.94), sucrose (19.95%) and CCS (14.42%) than the other genotypes.

Effect of interactions:

There were no significant interactions among the planting geometries and the genotypes for different juice quality parameters.

Conclusion:

The row spacing of 120 cm recorded the highest cane (122.13 t ha^{-1}) and CCS yield (17.03 t ha^{-1}). However, it was at par with the row spacing of 150 cm for both cane (119.45 t ha^{-1}) and CCS yields (16.48 t ha^{-1}). Significantly highest cane (136.74 t ha^{-1})

and CCS (18.87 t ha^{-1}) yields were recorded by the variety CoM 0265 followed by Co 86032 (121.22 and 16.80 t ha^{-1}). The sugarcane variety CoC 671 was found to be the most superior with respect to juice quality.

Table. 1. Mean cane and CCS yield as affected by various treatments

Treatments	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})
A) Planting geometry		
P_1 100 cm row distance	112.09	15.69
P_2 120 cm row distance	122.13	17.03
P_3 150 cm row distance	119.45	16.48
P_4 30 x 150 cm row distance	107.52	14.81
SE±	**1.64**	**0.42**
C.D at 5%	**4.78**	**1.14**
B) Genotypes		
V_1 CoM 0265	136.74	18.87
V_2 Co 86032	121.22	16.80
V_3 Co 94012	104.12	14.42
V_4 CoC 671	99.18	13.90
SE±	**2.64**	**0.65**
C.D at 5%	**7.18**	**1.78**
C) Interaction		
SE±	**5.02**	**0.85**
C.D at 5%	**NS**	**NS**
General mean	**115.30**	**16.00**

Table 2. Growth and yield attributes as affected by various treatments.

Treatments	Germ. (%)	Tillering ratio	Height (cm)	Girth (cm)	No. of internodes cane^{-1}	Millable canes (000ha^{-1})	Wt. cane^{-1} (kg)
A) Planting geometry							
P_1 100 cm row distance	73.69	1.54	295	10.3	27	82.34	1.36
P_2 120 cm row distance	75.32	1.69	299	10.7	28	89.03	1.39
P_3 150 cm row distance	75.02	1.64	297	10.4	28	86.94	1.37
P_4 30 x 150 cm row distance	72.27	1.55	281	9.8	25	80.52	1.31
S.E.+	**1.03**	**0.05**	**1.04**	**0.12**	**1.68**	**1.36**	**0.02**
C.D. at 5%	**NS**	**NS**	**3.20**	**0.35**	**NS**	**3.75**	**NS**
B) Genotypes							
V_1 CoM 0265	75.96	1.75	310	11.0	30	94.25	1.45
V_2 Co 86032	75.18	1.66	300	10.6	28	86.70	1.39
V_3 Co 94012	73.57	1.56	286	10.1	26	80.33	1.31
V_4 CoC 671	71.51	1.46	276	9.6	25	77.55	1.28
S.E.+	**1.98**	**0.06**	**2.18**	**0.15**	**1.88**	**1.68**	**0.03**
C.D. at 5%	**NS**	**0.15**	**5.68**	**0.42**	**NS**	**4.72**	**0.10**
C) Interaction							
S.E.+	**4.01**	**0.08**	**4.72**	**0.52**	**2.56**	**4.34**	**0.05**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General mean	**74.07**	**1.61**	**293**	**10.3**	**27**	**84.71**	**1.36**

Table 3. Quality parameters as affected by various treatments.

Treatments	Brix(c)	Sucrose (%)	Purity(%)	CCS (%)
A) Planting geometry				
P_1 100 cm row distance	21.47	19.80	92.76	14.00
P_2 120 cm row distance	21.17	19.73	92.77	13.95
P_3 150 cm row distance	21.26	19.61	91.89	13.80
P_4 30 x 150 cm row distance	21.22	19.49	92.64	13.78
S.E.+	**0.14**	**0.12**	**0.78**	**0.28**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
B) Genotypes				
V_1 CoM 0265	21.09	19.54	92.52	13.80
V_2 Co 86032	21.55	19.62	92.70	13.86
V_3 Co 94012	20.53	19.52	91.79	13.45
V_4 CoC 671	21.94	19.95	93.04	14.42
S.E.+	**0.12**	**0.08**	**0.62**	**0.16**
C.D. at 5%	**0.34**	**0.24**	**NS**	**0.50**
C) Interaction				
S.E.+	**0.35**	**0.26**	**0.85**	**0.33**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General mean	**21.27**	**19.65**	**92.51**	**13.88**

Project No. : AS 66

Title : Priming of cane node for accelerating germination.

Objective :

1) To find out suitable cane node priming technique.

2) To assess the effect of cane node on acceleration of germination

Experimental details:

Place	: CSRS, Padegaon,
Design	: Randomized Block Design
Replication	: 4
Plot Size : Gross	: 10 x 6 m^2,
Net	: 08 x 4 m^2,
Variety	: Phule 265
Date of planting	: 25.02.2012
Date of harvesting	:07.03.2013
Soil Status	: Irrigated, Medium black soil.

Treatments: 6

T_1 : Un-primed cane node.

T_2 :Treating cane node in hot water in 50^{o}c for 2 hours.

T_3 : Treating cane node in hot water in 50^{o}c and urea solution (3%) for 2hours

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

T_5 : Conventional 3 bud setts planting.

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

(put the single cane node in the slurry of cattle dung, cattle urine and water for 15 minutes. take out the buds and put in decomposedFYM and covered it with sugarcane trash for 4-5 days for sprouting.)

Results :

The data of first year trial on cane and CCS yields, growth bservations and quality parameters of different treatments are presented in Table 1 & 2.

Effect of cane and CCS yields:

The data on cane and CCS yields presented in Table 1 revealed that the treatment T_4 i.e. Priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio recorded significantly highest cane and CCS yield (132.78 and 18.94 t/ha). However, it was at par with the treatment T_3 i.e. Treating cane node in hot water in 50^{o}c and urea solution (3%) for 2 hours with respect to cane and ccs yield (129.97 and 18.44 t/ha),T_2 i.e.Treating cane node in hot water in 50^{o}c for 2 hours. (127.36 and 17.26 t/ha) and T_5 i.e. Conventional 3 bud setts planting. (122.78 and 17.35 t/ha).

Growth and yield attributes:

The data regarding growth and yield attributes are presented in Table 2 .The data revealed that Priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio recorded significantly higher germination (73.80 %), tillering ratio (1.72), millable height (299 cm), cane girth (11.0 cm), internodes (25) ,millable canes (116140/ha) and weight per cane (1.17 kg).

Quality parameters:

The data regarding juice quality parameters are presented in Table 2 revealed that the treatment T_4 i.e. Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio recorded the significantly highest brix (22.23), sucrose (20.31 %), and CCS (14.27 %).While purity(92.12%) was recorded significantly highest by the treatment T_5 i e. Conventional 3 bud setts planting.

Conclusion:

The Priming cane node with cattle dung plus cattle urine and water in 1:2:5 ratio for 15 minutes recorded significantly highest cane and CCS yields (132.78 and 18.94 t/ha), treating cane node in hot water for 50^{o}c and urea solution (3%) for 2 hours was the next superior.

Table 1. Mean cane and CCS yields as affected by various treatments

Treatment	Cane yield (t/ha)	CCS yield (t/ha))
T_1 : Un-primed cane node.	115.26	15.71
T_2 :Treating cane node in hot water in 50^{o}c for 2 hours.	127.36	17.26
T_3 : Treating cane node in hot water in 50^{o}c urea solution (3%) for 2hours	129.97	18.44
T_4 : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	132.78	18.94
T_5 : Conventional 3 bud setts planting.	122.78	17.35
T_6 Primed and sprouted cane node (Incubated for four days after priming)	118.00	16.28
SE+	**4.06**	**0.58**
C.D at 5%	**12.23**	**1.73**
CV%	**10.53**	**11.64**
General Mean	**124.36**	**17.33**

Table : 2 Growth and juice quality attributes as affected by various treatments

Treatments	Germ. (%)	Tillering ratio	Height (cm)	Girth (cm)	No. of internodes	Millable canes (000 ha)	Av. cane wt. (kg)	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
T_1 : Un-primed cane node.	62.55	1.48	275	9.0	21	107909	1.09	20.73	19.27	93.00	13.64
T_2 :Treating cane node in hot water in 50^{o}c for 2 hours.	69.30	1.58	281	9.5	23	113011	1.13	20.35	19.09	93.90	13.57
T_3 : Treating cane node in hot water in 50^{o}c urea solution (3%) for 2hours	71.90	1.61	289	10.0	25	114824	1.13	21.23	19.95	94.01	14.19
T_4 : Priming cane node with cattle dung, cattle urine and water in 1:2:5 ratio	73.80	1.72	299	11.0	25	116140	1.14	22.23	20.31	91.41	14.27
T_5 : Conventional 3 bud setts planting.	67.53	1.32	265	9.5	21	111329	1.11	20.10	19.56	97.37	14.12
T_6 Primed and sprouted cane node (Incubated for four days after priming)	64.08	1.27	261	9.2	19	107175	1.10	20.23	19.28	95.35	13.80
SE+	**3.34**	**0.03**	**3.20**	**0.35**	**2.88**	**3889**	**0.05**	**0.21**	**0.03**	**1.02**	**0.08**
C.D at 5%	**10.07**	**0.09**	**9.64**	**1.05**	**8.68**	**11722**	**0.16**	**0.63**	**0.08**	**3.08**	**0.24**
General Mean	**68.19**	**1.50**	**278**	**9.7**	**22**	**111731**	**1.12**	**20.81**	**19.58**	**94.17**	**13.93**

SOIL SCIENCE

1. Title of expt : Response of Sugarcane crop to different plant nutrients in varied agro-ecological situations.

2. Objectives:

To study the differential response of Sugarcane crop to different nutrients.

3. Experimental details :

Design **:** RBD

Replications **:** 3

Treatments **:** 13

Plot size **:** 6 X 8 m^2

Season **:** Suru

Variety **:** Phule 265

Date of planting: 21.1.2012

Date of harvesting:15.3.2013

4. Treatment details:

Tr.No	Treatments
1.	Control (No fertilizers)
2.	N
3.	NP
4.	NPK
5.	NPK+S
6.	NPK+Zn
7.	NPK+Fe
8.	NPK+Mn
9.	NPK+S+Zn
10.	NPK+S+Zn+Fe
11.	NPK+S+Zn+Fe+Mn
12.	As per soil Test
13.	Only FYM application

5. Results:

(a) Yield parameters:

The data in respect of yield and yield parameters presented in Table 1(a) indicated that, the treatment No T_{11} i.e. NPK + Zn + S+ Fe+ Mn gave significantly highest cane yield , CCS yield and CCS % (136.26 t ha^{-1}, 20.91 t ha^{-1} and 15.34 % respectively). As regards the average cane weight significantly higher (1.34 kg) was observed in T_{10}. However, it was at par with T_{11} i.e. application of NPK+S+Zn+Fe+Mn (1.33 kg). The

results on the number of millable canes indicated that the treatment T_6 was the most superior.

(b) Soil chemical properties :

All the chemical properties of soil were significantly influenced by the treatments (Table1(b)). The least pH of 7.30 was recorded in $T_{13.}$ The lowest EC of 1.51 dSm^{-1} was recorded in T_1. As regards the soil O.C. content, T_{11} and T_{12} (1.03 % each) were the superior. The available N status of soil was the highest in case of T_9 (207.05 kg ha^{-1}) whereas T_{12} (27.07 kg ha^{-1}) was superior in respect of available P status of soil. The treatment T_{12} recorded the highest available K (249.71 kg ha^{-1}) in soil.

(c) Nutrient uptake :

Data presented in Table 1(c) indicated that significantly higher uptake of NPK was noticed when NPK fertilizer with micronutrients was applied through (T_{12}) which was superior to all other treatments. In general, 1.72 to 3.04 Kg N, 0.24 to 0.41 Kg P and 2.00 to 3.06 Kg K were required to produce one ton of cane yield.

(d) Conclusion:

Considering the higher yields of cane , commercial cane sugar and CCS %, the application of recommended dose of NPK along with ferrous sulphate, Zinc sulphate, Manganese Sulphate and Sulphur found to be superior than other treatments.

Table 1(a). Effect of different treatments on yield and yield parameters of sugarcane.

Treat.	Yield (t ha^{-1})	CCS (t ha^{-1})	ACW (kg)	NMC (000 ha^{-1})	CCS %
T_1	66.30	9.52	0.99	67.35	14.35
T_2	88.45	12.46	1.01	87.50	14.09
T_3	98.30	14.14	1.07	92.93	14.38
T_4	108.70	15.49	1.05	103.65	14.25
T_5	115.40	17.04	1.08	107.68	14.77
T_6	120.45	16.98	1.08	**112.09**	14.10
T_7	114.13	16.67	1.12	101.94	14.60
T_8	110.52	16.44	1.06	104.29	14.87
T_9	119.40	17.90	1.27	94.12	14.99
T_{10}	128.96	19.47	**1.34**	96.55	15.10
T_{11}	**136.26**	**20.91**	1.33	102.90	**15.34**
T_{12}	112.91	16.87	1.26	90.53	14.94
T_{13}	74.56	10.78	1.02	73.04	14.46
SE+	3.28	0.52	0.028	2.85	0.075
CD at 5%	9.58	1.51	0.081	8.33	0.21
CV	5.30	5.71	4.30	5.20	0.89

Table 1(b). Effect of different treatments on soil chemical properties at harvest

Treat.	pH	EC (dS m^{-1})	Org. C. (%)	Av. Nutrients (kg ha^{-1})		
				N	P	K
Initial	**7.28**	**1.61**	**0.87**	**176**	**22**	**182**
T_1	7.51	1.51	0.86	167.76	20.82	173.79
T_2	7.43	1.59	0.91	195.51	21.70	204.43
T_3	7.50	1.65	0.91	201.64	23.09	212.02
T_4	7.40	1.66	0.99	201.09	23.84	228.19
T_5	7.46	1.56	0.91	202.14	22.36	235.78
T_6	7.36	1.64	1.00	196.71	24.23	236.30
T_7	7.33	1.62	0.94	198.70	23.60	239.65
T_8	7.41	1.63	0.93	199.63	24.73	242.18
T_9	7.40	1.54	0.96	207.05	25.63	236.38
T_{10}	7.44	1.61	1.01	200.52	25.62	240.71
T_{11}	7.40	1.65	1.03	200.48	26.05	244.08
T_{12}	7.49	1.68	1.03	203.68	27.07	249.71
T_{13}	7.30	1.53	0.89	187.56	22.32	179.95
SE±	0.01	0.01	0.03	1.46	0.34	0.84
CD at 5%	0.03	0.03	0.08	4.25	1.01	2.44

Table 1(c). Effect of different treatments on nutrient uptake by sugarcane

Treat.	kg ha^{-1}			kg t^{-1}		
	N	P	K	N	P	K
T_1	200.97	27.20	202.40	3.04	0.41	3.06
T_2	228.72	28.08	233.04	2.59	0.32	2.64
T_3	234.85	29.47	240.63	2.39	0.30	2.45
T_4	234.30	30.22	256.80	2.16	0.28	2.36
T_5	235.35	28.74	264.39	2.04	0.25	2.29
T_6	229.92	30.61	264.91	1.91	0.25	2.20
T_7	231.91	29.98	268.26	2.03	0.26	2.35
T_8	232.84	31.11	270.79	2.11	0.28	2.45
T_9	240.26	32.01	264.99	2.01	0.27	2.22
T_{10}	233.73	32.00	269.32	1.81	0.25	2.09
T_{11}	233.69	32.43	272.69	1.72	0.24	2.00
T_{12}	236.89	33.45	278.32	2.10	0.30	2.47
T_{13}	220.77	28.70	208.56	2.97	0.39	2.80
SE±	1.45	0.34	0.83	--	--	--
CD at 5%	4.25	1.01	2.43	--	--	--

Table 2 (a). Cost of different inputs (Rs./ha)

Treat	Cost of FYM (Rs.)	Nutrient applied (kg ha^{-1})			Fert. cost (Rs)	Cost of Cultivation (Rs)	Production Cost (Rs)
		N	P	K			
T_1	0	0	0	0	0	79850	79850
T_2	50000	250	0	0	53054	79850	132904
T_3	50000	250	115	0	58804	79850	138654
T_4	50000	250	115	115	62192	79850	142042
T_5	50000	250	115	115	62472	79850	142322
T_6	50000	250	115	115	62255	79850	142105
T_7	50000	250	115	115	62237	79850	142087
T_8	50000	250	115	115	62237	79850	142087
T_9	50000	250	115	115	62535	79850	142385
T_{10}	50000	250	115	115	62580	79850	142430
T_{11}	50000	250	115	115	62624	79850	142474
T_{12}	25000	313	115	115	38206	79850	118056
T_{13}	50000	0	0	0	50000	79850	129850

Table 2(b). Economics of different treatments

Treat.	Yield (t ha^{-1})	Gross monetary returns (Rs. ha^{-1})	Prod. cost (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B : C Ratio
T_1	66.30	----	79850	65790	0.82
T_2	88.45	194597	132904	61693	0.46
T_3	98.30	216260	138654	77606	0.56
T_4	108.70	239140	142042	97098	0.68
T_5	115.40	253880	142322	111558	0.78
T_6	120.45	264983	142105	122877	0.86
T_7	114.13	251093	142087	109197	0.77
T_8	110.52	243144	142087	101057	0.71
T_9	119.40	262687	142385	120295	0.84
T_{10}	128.96	283705	142430	141275	0.99
T_{11}	**136.26**	**299779**	142474	**157305**	**1.10**
T_{12}	112.91	248395	118056	130339	1.10
T_{13}	74.56	164039	129850	34189	0.26
SE $\pm$	1.96	4315.578	----	4315.578	0.12
CD at 5 %	5.72	12596.16	----	12596.16	0.36

Rates of fertilizers:

Urea = Rs. 5.63 kg $^{-1}$ SSP = Rs.8.00 kg $^{-1}$ MOP = Rs. 17.64 kg $^{-1}$
PMC = Rs.500/ ton Vermicompost = Rs. 5000/ ton FYM = Rs. 3700/ton
$FeSO_4$ = 8.90/kg $ZnSO_4$ = 31.70/ kg

Cost of cultivation: Rs.79,850 ha $^{-1}$ (Excluding cost of fertilizers)

Cane price: Rs. 2200 t $^{-1}$

Project No. AS – 42

Title 1: Agronomic evaluation of promising new sugarcane genotypes (Autumn Pooled)

Objective: To work out Agronomy of sugarcane genotypes selected from advanced varietal trial (AVT)

Experimental Details :

Place	: CSRS, Padegaon,
Design	: Split plot,
Main Plot	: 5
Sub Plot	: 3
Replication	: 3
Plot Size : Gross	: 10 x 6 m^2,
Net	: 08 x 4 m^2,
Fertilizer dose for Planting	: 340:170:170 kg N, P_2O_5, K_2O ha^{-1},
Date of planting	: 09.12.2010
Date of harvesting	:11.02.2012
Date of planting	: 11.11.2011
Date of harvesting	:16.02.2013
Soil Status	: Irrigated, Medium black soil.

Treatment details :

B) Main plot treatments –Genotypes -5

V_1	CoSnk 5103
V_2	CoM 05082
V_3	CoSnk 5104
V_4	Co 99004
V_5	CoC 671

B) Sub plot treatments – N levels – 3

F_1	75% RD of N
F_2	100% RD of N
F_3	125% RD of N

Results:

The pooled data pertaining to cane and CCS yield, growth observation and quality parameters are presented in table 1 to 3.

Effect of genotypes:

Pooled data presented in Table 1 revealed that the genotype CoM 05082 produced significantly highest cane and CCS yields (135.70 and 18.35 t ha^{-1},respectively) than rest of the genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield (17.99 t ha^{-1}).

Effect of nitrogen levels:

The application of 125% of recommended fertilizer dose of nitrogen to autumn sugarcane produced significantly higher cane and CCS yield (135.23 and 18.40 t ha^{-}

^{1},respectively) than rest of the nitrogen levels.However, it was at par with 100% of recommanded fertilizer dose of nitrogen in respect of CCS yield (17.70 t ha^{-1}).

Effect of interactions: The interactions between genotypes and fertilizer levels for the pooled cane and CCS yields were found to be non significant.

Growth and yield attributes: The pooled mean data regarding growth and yield attributes are presented in Table 2.

Effect of genotypes:

The pooled mean data revealed that the genotype CoM 05082 recorded significantly highest germination (71.76%), tillaring ratio (1.84), millible height (298 cm), cane girth (9.8 cm), no of internodes per cane (25) . However, it was at par with CoSnk 5104 in respect of germination, milliable height and no of internodes per cane. The effect between genotypes were found to be non significant regarding millable canes and avarage cane weight.

Effect of nitrogen levels:

Application of 125% of recommended dose of nitrogen to autumn sugarcane recorded significantly highest millable height (288 cm), cane girth (9.7 cm), no. of internodes per cane (26) and the average cane weight (1.40 kg) than other levels. It was followed by 100 % recommended dose of nitrogen in all these parameters.

Effect of interactions:

In pooled results, interaction effect between the genotypes and nitrogen levels were non significant in all these parameters.

Quality parameters:

The genotypes ,nitrogen levels and their interactions did not have significant influence on juice quality parameters (Table. 3)

Conclusion:

The genotypes CoM 05082 recorded significantly higher cane and CCS yields than the other genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield

The application of 125 percent recommended dose of nitrogen produced significantly higher cane and CCS yields followed by 100 % recommended dose of nitrogen.

Table :-1; Mean cane and CCS Yields (t/ha) as affected by various treatments (Autumn Planting) Pooled

Treatment	Cane Yield (t/ha)			CCS Yeild (t/ha)		
	2011-12	2012-13	Pooled Mean	2011-12	2012-13	Pooled Mean
A) Genotypes						
V_1– CoSnk 5103	131.13	128.63	**129.88**	17.46	17.55	**17.50**
V_2 – CoM 05082	137.01	134.40	**135.70**	18.38	18.33	**18.35**
V_3– CoSnk 5104	132.10	130.32	**131.21**	17.82	18.16	**17.99**
V_4 – Co 99004	128.27	123.60	**125.93**	17.39	17.29	**17.34**
V_5 – CoC 671	124.53	122.60	**123.56**	17.07	17.01	**17.04**
SE±	0.43	0.39	**0.78**	0.23	0.18	**0.25**
C.D. at 5%	1.43	1.24	**2.26**	0.75	0.56	**0.78**
B) N levels						
F_1 - 75% N	123.92	122.24	**123.08**	16.64	16.98	**16.81**
F_2 - 100% N	131.26	127.51	**129.38**	17.76	17.65	**17.70**
F_3 – 125 % N	136.65	133.82	**135.23**	18.50	18.31	**18.40**
SE±	2.02	2.14	**2.33**	0.32	0.29	**0.27**
C.D. at 5%	5.97	6.00	**6.48**	0.95	0.88	**0.82**
C) Interactions						
SE±	4.52	4.34	**4.42**	0.32	0.38	**0.56**
C.D. at 5%	NS	NS	**NS**	NS	NS	**NS**
CV %	6.00	6.98	**6.84**	7.06	6.74	**7.18**
G.M.	**130.61**	**127.86**	**129.25**	**17.63**	**17.64**	**17.64**

Table 2. Growth and yield attributes of sugarcane genotypes at varying N levels

Treatments	Germination	Tillering ratio	Height (cm)	Girth (cm)	No of internodes cane^{-1}	Millable canes (000 ha^{-1})	Avg. cane wt. (kg)
A) Genotypes							
V_1– CoSnk 5103	68.10	1.69	280	9.4	24	93.66	1.38
V_2 – CoM 05082	71.76	1.84	298	9.8	25	94.05	1.40
V_3– CoSnk 5104	71.43	1.75	267	9.4	25	95.87	1.35
V_4 – Co 99004	67.46	1.67	294	9.3	23	95.96	1.39
V_5 – CoC 671	65.76	1.56	271	9.3	21	95.36	1.31
SE±	**0.77**	**0.02**	**1.10**	**0.09**	**0.14**	**1.36**	**0.05**
C.D. at 5%	**2.56**	**0.05**	**3.18**	**0.24**	**0.35**	**NS**	**NS**
B) N levels							
F_1 - 75% N	66.70	1.67	275	9.2	22	93.65	1.31
F_2 - 100% N	68.98	1.70	283	9.3	25	94.46	1.37
F_3 – 125 % N	71.04	1.74	288	9.7	26	96.81	1.40
SE±	**2.14**	**0.06**	**2.34**	**0.28**	**0.28**	**1.90**	**0.02**
C.D. at 5%	**NS**	**NS**	**6.43**	**NS**	**0.87**	**NS**	**0.07**
C) Interactions							
SE±	**4.58**	**0.08**	**4.94**	**0.48**	**0.62**	**3.18**	**0.04**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General Mean	**68.90**	**1.70**	**282**	**9.4**	**24**	**94.97**	**1.36**

Table 3.Quality parameters of sugarcane genotypes at varying N levels

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– CoSnk 5103	22.25	19.78	86.55	13.74
V_2 – CoM 05082	22.05	19.73	89.62	13.76
V_3– CoSnk 5104	21.73	19.66	91.43	13.81
V_4 – Co 99004	21.71	19.69	91.12	13.74
V_5 – CoC 671	21.49	19.68	91.55	13.89
SE±	**0.52**	**0.23**	**1.27**	**0.18**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
B) N levels				
F_1 - 75% N	21.83	19.71	90.75	13.78
F_2 - 100% N	21.63	19.69	91.38	13.90
F_3 – 125 % N	22.10	19.72	88.04	13.68
SE±	**0.68**	**0.27**	**1.30**	**0.09**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
C) Interactions				
SE±	**0.72**	**0.33**	**1.66**	**0.20**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**21.85**	**19.70**	**90.05**	**13.78**

Project No. AS – 42

Title 1: Agronomic evaluation of promising new sugarcane genotypes (Spring Pooled)

Objective: To work out Agronomy of sugarcane genotypes selected from advanced varietal trial (AVT)

Experimental Details :

Place : CSRS, Padegaon
Design : Split plot
Main Plot : 5
Sub Plot : 3
Replication : 3
Plot Size : Gross : 10 x 6 m^2,
Net : 08 x 4 m^2,
Fertilizer dose for Planting : 250:115:115 kg N, P_2O_5, K_2O ha^{-1},

Date of planting : 19.01.2011
Date of harvesting :13.02.2012

Date of planting : 05.01.2012
Date of harvesting :17.02.2013
Soil Status : Irrigated, Medium black soil.

Treatment details :

C) Main plot treatments –Genotypes -5

V_1	CoSnk 5103
V_2	CoM 05082
V_3	CoSnk 5104
V_4	Co 99004
V_5	CoC 671

B) Sub plot treatments – N levels – 3

F_1	75% RD of N
F_2	100% RD of N
F_3	125% RD of N

Results:

The pooled data pertaining to cane and CCS yield, growth observation and quality parameters of two plant and one ratoon are presented in table 1 to 3.

Effect of genotypes:

Pooled data presented in Table 1 revealed that the genotype CoM 05082 produced significantly highest cane and CCS yields (120.82 and 16.00 t ha^{-1},respectively) than rest of the genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield (15.41 t ha^{-1}).

Effect of nitrogen levels:

The application of 125% of recommended fertilizer dose of nitrogen to spring sugarcane produced significantly higher cane and CCS yield (122.66 and 16.50 t ha^{-}

[1],respectively) than rest of nitrogen levels. It was followed by 100% of recommanded dose of nitrogen.

Effect of interactions:

The interactions between genotypes and nitrogen levels for the pooled cane and CCS yields were found to be non significant.

Growth and yield attributes:

The pooled mean data regarding growth and yield attributes are presented in Table 2.

Effect of genotypes:

The pooled mean data revealed that the genotype CoM 05082 recorded significantly highest germination (71.36%), tillaring ratio (1.63), millible height (282 cm), cane girth (9.7 cm) and number of internodes per cane (23) . However, it was at par with CoSnk 5104 in respect of germination, tillering ratio , milliable height and cane girth . The effect between genotypes were found to be non significant regarding millable canes and avarage cane weight.

Effect of nitrogen levels:

Application of 125% of recommended dose of nitrogen to spring sugarcane recorded significantly highest millable height (285 cm), no. of internodes per cane (23) and the average cane weight (1.20 kg) than other levels. It was followed by 100 % recommended dose of nitrogen in all these parameters.

Effect of interactions:

In pooled results, interaction effect between the genotypes and nitrogen levels were non significant in all these parameters.

Quality parameters:

The genotypes ,nitrogen levels and their interactions did not have significant influence on juice quality parameters (Table 3)

Conclusion:

During spring season the genotype CoM 05082 recorded significantly higher cane and CCS yields than the other genotypes. However, it was at par with CoSnk 5104 in respect of CCS yield. The application of 125 % recommended dose of nitrogen to spring sugarcane produced significantly higher cane and CCS yields , followed by 100 % recommended dose of nitrogen .

Table :-1; Mean cane and CCS Yields (t/ha) as affected by various treatments (Spring pooled)

Treatment	Cane Yield (t/ha)			CCS Yeild (t/ha)		
A) Genotypes	2011-12	2012-13	**Pooled Mean**	2011-12	2012-13	**Pooled Mean**
V_1– CoSnk 5103	113.00	111.14	**112.07**	14.91	14.81	**14.86**
V_2 – CoM 05082	121.67	119.97	**120.82**	16.15	15.85	**16.00**
V_3– CoSnk 5104	115.67	113.30	**114.48**	15.47	15.35	**15.41**
V_4 – Co 99004	110.24	108.61	**109.42**	14.85	14.74	**14.79**
V_5 – CoC 671	107.54	105.94	**106.74**	14.50	14.23	**14.36**
SE±	0.37	0.52	**0.84**	0.13	0.27	**0.25**
C.D. at 5%	1.23	1.48	**2.36**	0.43	0.78	**0.72**
B) N levels						
F_1 - 75% N	103.25	101.27	**102.26**	13.77	13.48	**13.62**
F_2 - 100% N	114.02	112.35	**113.18**	15.19	15.07	**15.13**
F_3 – 125 % N	123.55	121.77	**122.66**	16.57	16.44	**16.50**
SE±	2.16	2.11	**2.28**	0.32	0.48	**0.38**
C.D. at 5%	6.39	5.84	**6.94**	0.94	1.02	**1.12**
C) Interactions						
SE±	4.84	4.18	**4.38**	0.71	0.73	**0.83**
C.D. at 5%	NS	NS	**NS**	NS	NS	**NS**
CV%	7.18	6.62	**6.42**	6.78	7.14	**7.15**
G.M.	113.61	111.79	**112.70**	15.18	15.00	**15.08**

Table 2. Growth and yield attributes of sugarcane genotypes at varying N levels

Treatments	Germination %	Tillering ratio	Height (cm)	Girth (cm)	No of internodes cane^{-1}	Millable canes (000 ha^{-1})	Avg. cane wt. (kg)
A) Genotypes							
V_1– CoSnk 5103	67.66	1.57	259	9.2	22	98.09	1.15
V_2 – CoM 05082	71.36	1.63	282	9.7	23	97.65	1.18
V_3– CoSnk 5104	69.90	1.60	274	9.6	22	96.27	1.16
V_4 – Co 99004	66.13	1.58	281	9.5	23	95.91	1.15
V_5 – CoC 671	66.06	1.55	262	8.8	20	93.97	1.17
SE±	**0.90**	**0.01**	**2.48**	**0.05**	**0.18**	**2.12**	**0.09**
C.D. at 5%	**2.48**	**0.03**	**7.18**	**0.14**	**0.47**	**NS**	**NS**
B) N levels							
F_1 - 75% N	65.68	1.53	258	8.9	20	89.13	1.13
F_2 - 100% N	68.78	1.58	271	9.4	23	98.29	1.15
F_3 – 125 % N	70.22	1.64	285	9.6	23	101.73	1.20
SE±	**2.14**	**0.24**	**2.62**	**0.26**	**0.36**	**3.87**	**0.015**
C.D. at 5%	**NS**	**NS**	**7.54**	**NS**	**1.06**	**NS**	**0.036**
C) Interactions							
SE±	**4.63**	**0.05**	**5.44**	**0.47**	**0.64**	**4.56**	**0.06**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General Mean	**68.22**	**1.58**	**271**	**9.3**	**22**	**96.38**	**1.16**

Table 3. Quality parameters of sugarcane genotypes at varying N levels

Treatments	Brix (c)	Sucrose (%)	Purity (%)	CCS (%)
A) Genotypes				
V_1– CoSnk 5103	22.68	19.69	86.98	13.49
V_2 – CoM 05082	22.73	19.67	86.93	13.47
V_3– CoSnk 5104	21.71	19.58	90.29	13.62
V_4 – Co 99004	22.13	19.67	89.25	13.64
V_5 – CoC 671	22.43	19.77	88.08	13.67
SE±	**1.24**	**0.07**	**1.63**	**0.24**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
B) N levels				
F_1 - 75% N	22.47	19.68	87.94	13.52
F_2 - 100% N	22.25	19.62	88.45	13.54
F_3 – 125 % N	22.29	19.75	88.53	13.68
SE±	**0.50**	**0.28**	**1.10**	**0.16**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
C) Interactions				
SE±	**0.62**	**0.35**	**1.33**	**0.38**
C.D. at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**22.34**	**19.68**	**88.30**	**13.58**

Technical Programme 2013-14

Approved Technical Programme
for the year
(2013 – 14)

Sugarcane Agronomy

All India Coordinated Research Project on Sugarcane (AICRP) 2012-13 :

1) AS 42:Agronomic evaluation of promising sugarcane genotypes .

   (Spring **Early** Planting)

2) AS 42:Agronomic evaluation of promising sugarcane genotypes .

   (Spring **Midlate** Planting)

3) AS 63 Plant geometry in relation to Mechanization of sugarcane

4) AS 63 Plant geometry in relation to Mechanization of sugarcane

   (Ratoon)

5) AS 66: Priming of cane node for accelerating germination

6) AS 66: Priming of cane node for accelerating germination (Ratoon)

7) AS 65: Enhancing sugarcane productivity and profitability under Wheat – Sugarcane cropping system.

Central Sugarcane Research Station,

Padegaon – 415 521, Tal- Phaltan, Dist- Satara

Phone No. (02169) 265337
(02169) 265334
E-mail ID : csrspadegaon@rediffmail.com (02169) 265335
Tele. Fax.(02169) 265333/37 (02169) 265336

No.CSRS/AGRO/Annual Report 2012-13/ /2013. Date:

To,

Dr.V.P.Singh
Director of Research & Principal Investigator,
(Crop Production)
Rajendra Agricultural University
Pusa – 848 125
Dist – Samastipur
Bihar

Subject: Annual Report on Sugarcane 2012-13.....

Reference: 1) F.No. 17-33/2013/PCS. Dated. 08th May, 2013.

Sir,

Apropos the above captioned letter, kindly find enclosed herewith the hard copy of the Annual Report of Crop Production (Agronomy) of A.I.C.R.P on Sugarcane 2012-13 of Central Sugarcane Research Station, Padegaon alongwith soft copy for your kind information and further needful please.

Thanking you,

Encl : As above.

Yours faithfully

Sugarcane Specialist
CSRS, Padegaon.

Copy submitted with respects for favour of information to:

1) Dr.O.K. Sinha , Project Co-ordinator, All India Co-ordinated Research Project on Sugarcane, Indian Institute of Sugarcane Research, Rae Bareli Road, Post: Dilkhusha,
Lucknow - 226 002 (U.P.)

No.CSRS/SB/Annual Report 2011-12/ /2012. Date:

To,

Director & Principal Investigator,
Crop Improvement AICRP (S)
Sugarcane Breeding Institute,
Coimbatore – 641 007
(TAMIL NADU)

Subject: Annual Report on Sugarcane 2011-12……

Reference: 1) F.No. 17-33/2012/PCS. Dated. 07th May, 2012.
2) D.O.No.1-11/2012-CI(Br.) dated. 30.04.2012

Sir,

Apropos the above captioned letter, kindly find enclosed herewith the hard copy of the Annual Report of A.I.C.R.P on Sugarcane 2011-12 of Central Sugarcane Research Station, Padegaon alongwith soft copy for your kind information and further needful please.

Thanking you,

Encl : As above. Yours faithfully

Sugarcane Specialist
CSRS, Padegaon.

Copy submitted with respects for favour of information to :

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