Dr D.B.Phonde.

Senior Scientist & Head, Soil Science, Agronomy & Agril Microbiology.

VSI/CP/Agro / /2016-17 June 15, 2016

To,
Dr O. K. Sinha,
Project Co-coordinator,
AICRP on Sugarcane,
Indian Institute of Sugarcane Research,
Rae Bareli Road, Post- Dilkusha,
Lucknow - 226 002 (Uttar Pradesh)

Sub.: Submission of annual research report of AICRP on sugarcane Crop Production and Audit Utilization certificate 2015-16.

Sir,

The research work in Sugarcane Crop Production under AICRP program was conducted as per the technical programme during 2015-16. A report on research work done has been enclosed herewith for inclusion in the proceedings. A copy of the same has also been sent through E-mail. Audit utilization certificate of the contingency grant for the year 2015-16 is also enclosed herewith. No front Line demonstrations and Breeder seed production program was allotted to this centre.

This is submitted for compilation and further need full please.

Thanking you,

Yours faithfully,

Encl.:1) One hard copy of research work 2015-16
2) Audit Utilization Certificate. 2015-16

(Dr D.B.Phonde)

Copy to:
Dr T.K.Srivastava.
Principal Scientist & P.I. (Crop production)
ICAR Indian Institute of Sugarcane Research,
Lucknow 226 002.
Uttar Pradesh.

RESEARCH RESULTS OF WORK DONE IN SUGARCANE CROP PRODUCTION UNDER AICRP'S PROGRAM 2015-2016

Submitted to

Project Co-ordinator,
AICRP on Sugarcane.
Indian Institute of Sugarcane Research,
Lucknow.

Submitted by
Dr. D. B. Phonde.
Senior Scientist & Head, Soil Science Section
Mr. P. V. Ghodke,
Scientist, Agronomy.
Division of Crop Production

VASANTDADA SUGAR INSTITUTE,
Manjari (Bk.), Tal. Haveli, Dist. Pune, Pin: 412 307
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HIGHLIGHTS OF RESEARCH WORK CONDUCTED DURING 2015-2016

1. AS-42: Agronomic evaluation of promising sugarcane genotypes (Ist plant crop)

The experiment on plant crop was conducted on agronomic evaluation of promising sugarcane genotypes viz., Co10001, VSI08005 along with VSI434, CoC 671 and Co 86032 as standard checks. These genotypes were tested for their response to fertilizer levels viz., 75, 100 and 125% of recommended dose of NPK. Among the genotypes significantly higher cane yield (128.24 t/ha), NMC (0.84 lac/ha),B:C ratio (1:2.29) with CCS(13.89 %) was recorded in genotype VSI08005.Whereas significantly more tillering at 120DAP (1.03 L/ha), single cane weight (2.01 kg) and cane girth (11.01cm) was obtained in genotype Co 10001..Application of 125% of recommended fertilizer dose of NPK to suru sugarcane produced significantly higher cane yield (110.29 t/ha),CCS yield (14.09 t/ha) &B:C ratio (1:1.94).

2. AS69 Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane (Ist plant crop)

The field trial was conducted to assess the effect of Plant Growth Regulators for enhanced yield and quality of sugarcane with Planting of setts (ver. CoVSI9805) after overnight soaking in 50 & 100 ppm Ethrel solution and spraying of Gibberlic acid (35ppm) at 90,120 and 150 DAP and compared with conventional planting, Planting of setts after overnight soaking in water and a biostimulator. The results indicated that, maximum germination (63.66%) at 30 DAP, tillering (1.04 lac/ha) at 120 DAP, NMC (0.73 lac/ha),cane girth (12.08 cm),single cane weight (1.76 kg),CCS (13.75 %), cane yield (137.50 t/ha) and B:C ratio (1:2.44) was recorded when the setts were overnight soaked in 100 ppm Ethrel before planting and foliar spraying of Gibberlic acid 35ppm at 90,120 &150 DAP followed by cane yield of 127.50 t/ha in overnight soaking of setts in 50ppm Ethrel and spraying of G.A.(35ppm), 126.50 t/ha in overnight soaking of setts in normal water and spraying of G.A. and 116.00 t/ha overnight soaking of setts in a bio-stimulator (100ppm) and spraying (50ppm) at 90,120,& 150 DAP. Lowest cane yield (80.50 t/ha) was recorded in conventional practice.

3. AS- 68: Impact of Integrated Application of Organics and Inorganics in Improving Soil Health and Sugarcane Productivity.

The field experiment was conducted to study the impact of integrated application of organics and inorganics in improving soil health and sugarcane productivity**.** The maximum cane yield 150.16 tha-1 was obtained in the treatment of compost @ 20 tha^{-1} with 100% RDF through inorganic fertilizer followed by 149.20 tha^{-1} in the treatment of compost @ 20 tha^{-1} with inorganic fertilizers based on soil test. However the treatments of compost @ 10 tha^{-1} biofertilizers (Acetobacter & PSB) alongwith 50% RDF (142.12 tha^{-1}), 100% RDF (143.61 tha^{-1}) and fertilizers based on soil test (140.96 tha^{-1}) found at par. All the treatments of inorganic fertilizers along with compost showed significant results over the treatments having without organic manure.

Project No. AS-42 (AICRP'S)

Title of the experiment: Agronomic evaluation of promising sugarcane genotypes (I plant crop)

Objective : To work out agronomy of promising sugarcane Genotypes from Advanced Varietal Trial

Location : Vasantdada R & D farm

Time Frame: Three crop seasons (2 plants + 1 ratoon)

Year of commencement : 2014-15 Year of completion: 2016-17

Date of planting: 17/02/2015 Date of harvesting :24/02/2016

Treatment details

(1) Varieties: Genotypes- VI. Co10001 V2. VSI08005
Checks V3. VSI434 V4. CoC671 V5. Co86032

(2) Fertilizer Level : i. 75% of the recommended dose of NPK
ii. 100% of the recommended dose of NPK
iii. 125% of the recommended dose of NPK
(RDF for suru sugarcane 250:115:115 kg NPK/ha)

Replication: Three Design: Factorial R.B.D

Plot size : Gross-7.0 m X 6.00 m = 42.00 sqm Net -6.5m X 4.80 m = 31.20 sqm

Width of furrow 1.20 mt.

Soil type & soil status : Medium black soil.

pH	EC dsm¹/cm	Organic carbon%	Av. N Kg/ha	Av.P205 Kg/ha	Av.K20 Kg/ha
8.30	0.25	0.76	351.58	67.05	630.12

Results

The field experiment was conducted to develop the Agronomy for new promising sugarcane genotypes received from AVT. Data regarding growth, yield and quality contributing characters at harvest of 1st plant crop are presented in Table 1.

Cane and sugar yield (t/ha)

The data regarding cane yield t/ha presented in Table 1, revealed that the genotype VSI08005 gave maximum cane yield of 128.24 t/ha which was significantly superior over the rest of the genotypes but at par with Co10001 (120.28 t/ha). The cane yield differences due to fertilizer levels were found non significant. The cane yield increased with increased levels of fertilizers Maximum cane yield was 110.29 t/ha due to application of 125 % recommended dose of NPK followed by 100 % RDF (107.79 t/ha) and 75 % RDF (106.56 t/ha).

The differences in CCS t/ha due to different genotypes did not influence significantly. The maximum CCS t/ha (15.03 t/ha) was recorded in genotype VSI08005 which was followed by Co10001 (14.62 t/ha). The CCS t/ha was increased with increased levels of NPK being maximum of 14.09 t/ha due to application of 125 % RDF of NPK. The interaction due to genotypes and fertilizer levels was not significant.

Single cane weight (kg)

The weight per cane was maximum in Co10001 (2.01 Kg) than the genotype VSI08005 (1.88 kg) and rest of genotypes. The single cane weight did not differ significantly due to levels of fertilizers. Interaction was also not significant.

Number of millable canes.

The data on number of millable cane (NMC) at harvest was significantly affected due to various genotypes. The genotype VSI08005 produced maximum number of millable canes (0.84 Lac/ha) at harvest followed by check variety Co 86032 (0.83 lac/ha) Numerically more millable canes (0.79 lac/ha) at harvest recorded at 125 % NPK of recommended dose of fertilizers, than application of 75 % and 100 % RDF (0.77 Lac/ha) The interaction due to genotypes and fertilizer levels was non significant (Table 1).

Germination % and **Tillering (Lac/ha)**

The differences in germination percentage at 45 days after planting among the genotypes under study were non significant (Table 1). The genotype VSI08005 (63.83%) recorded maximum germination as compared to other genotypes. In case of fertilizer levels the germination did not differ significantly due to levels of fertilizers. Interaction was also not significant.

The differences in tillering at 90 and 120 days were significant among the genotypes under study. The genotype Co10001 produced maximum (1.29 and 1.03 Lac /ha) number of tillers at 90 and 120 days respectively which was at par with the genotype VSI 08005 (1.17 lac/ha at 90 DAP The differences due to levels of fertilizers were non significant. Maximum tillers at 90days (1.12 Lac /ha) and 120 days (0.92 Lac /ha) after planting were obtained due to application of 125 % recommended dose of NPK. The interaction between the factors under study was not significant.

Number of internodes, cane girth and cane height.

The differences in number of internodes at harvest were non significant among the genotypes under study. The genotype VSI08005 produced more (22.44) number of internodes per cane, but it was less than the check varieties VSI434 (23.55) and Co 86032 (.23.14) In case of fertilizer levels the number of internodes did not differ significantly due to levels of fertilizers. Interaction was also not significant.

The cane girth among the genotypes under study was statistically significant. The genotype Co10001 showed maximum (11.01 cm) cane girth followed by genotype VSI08005 (10.68 cm) at harvest than the check variety CoC 671 (10.36 cm) and rest of genotypes. The girth of cane increased significantly with increase in the level of fertilizer being maximum (10.53 cm) due to application of 125 % recommended dose of fertilizer followed by application of 100 % RDF (10.45 cm) The girth of cane was non significant due to interaction between genotypes and fertilizer levels.

The genotype VSI08005 showed maximum total height (255 cm) and millable height (215 cm) at harvest which was significantly higher than the other genotypes Co 10001 (total height 236 cm and millable height 204 cm) and check varieties. The differences in total and millable height of cane at harvest did not influence significantly due to levels of NPK. The interaction was also not significant.

Juice Quality Parameters

The juice quality parameters measured in terms of Brix %, Sucrose % and CCS % were differed significantly due to different genotypes. However, differences in Purity % due to different genotypes were not significant. Maximum Brix % (22.05), CCS % (14.00) and Sucrose

% (20.78) was noticed in check variety VSI434 followed by genotype VSI08005 i.e. (20.46), (13.89) and (19.71) respectively.

B: C ratio

The B: C ratio differed significantly due to different genotypes. The maximum (1:2.29) B:C ratio was obtained in genotype VSI08005 followed by genotype Co10001 (1:2.27). The B:C ratio was found maximum 1:1.94 due to application of 125 % RDF of NPK which was followed by application of 100 % RDF (1:1.87) and 75 % RDF (1:1.64). The interaction effect due to factors under study was not significant.

Conclusion

Among the genotypes evaluated, significantly higher cane yield (128.24 t/ha), NMC (0.84 lac/ha),B:C ratio (1:2.29) with CCS(13.89 %) was recorded in genotype VSI08005.Whereas significantly more tillering at 120DAP (1.03 L/ha), single cane weight (2.01 kg) and cane girth (11.01cm) was obtained in genotype Co 10001..Application of 125% of recommended fertilizer dose of NPK to suru sugarcane produced significantly higher cane yield (110.29 t/ha),CCS yield (14.09 t/ha) &B:C ratio (1:1.94). Final conclusion could be drawn after having ratoon and second plant crop studies.

Table 1: Data on Growth and Yield attributes as affected by various genotypes and levels of fertilizers.

Treatment	Germ. %	Tiller 90 DAP Lac/ha.	Tiller 120 DAP Lac/ha.	NMC lac/ha.	Wt/ cane (Kg)	Girth (cm)	Total Height (cm)	Millable Height (cm)	inter nodes / cane
Genotype									
Co 10001	61.46	**1.29**	**1.03**	0.78	**2.01**	**11.01**	236	204	21.47
VSI08005	63.83	1.17	0.96	**0.84**	1.88	10.68	**255**	**215**	22.44
VSI434	61.14	0.86	0.86	0.71	1.45	10.31	211	184	**23.55**
CoC 671	**67.97**	0.94	0.88	0.71	1.67	10.36	217	185	23.14
Co 86032	64.51	1.19	0.98	0.83	1.47	9.68	223	181	19.71
S.E. ±	5.48	0.18	0.07	0.06	0.13	0.39	17.08	16.30	1.51
C.D. at 5 %	NS	0.30	0.15	0.10	0.32	0.65	27.87	26.60	2.46
Fertilizer Level									
75 %	61.72	1.04	0.88	0.77	1.58	10.20	228	182	22.31
100 %	64.27	1.11	0.90	0.77	1.63	10.45	222	193	21.46
125 %	**63.56**	**1.12**	**0.92**	**0.79**	**1.73**	**10.53**	**238**	**194**	**22.41**
S.E. ±	3.50	0.14	0.04	0.05	0.14	0.39	13.65	12.52	0.96
C.D. at 5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction									
S.E. ±	8.44	0.32	0.11	0.11	0.32	0.83	30.24	28.09	2.31
CD.at 5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	12.81	26.63	11.55	12.61	17.2	7.51	11.73	12.85	8.52
General Mean	63.18	1.09	0.80	0.78	1.61	10.39	226	189	22.06

Table 2: Data on Growth and Yield attributes as affected by various genotypes and levels of fertilizers.

Treatment	Cane yield t/ha	B:C Ratio	Brix % 10M	Brix % 12M	Pol % 10M	Pol % 12M	CCS % 12M	CCS T/ha
Genotype								
Co 10001	120.28	2.27	17.35	19.14	16.82	17.52	12.77	14.62
VSI08005	**128.24**	**2.29**	19.31	20.46	18.04	19.71	13.89	**15.03**
VSI434	89.85	1.50	**21.33**	**22.05**	**19.38**	**20.78**	**14.00**	13.34
CoC 671	94.49	1.55	20.30	22.04	18.57	18.81	13.48	13.22
Co 86032	108.21	1.83	18.82	19.61	17.38	18.49	13.25	13.44
S.E. ±	9.82	0.24	0.35	0.45	0.83	0.73	0.62	2.75
C.D. at 5 %	16.03	0.39	0.59	0.74	1.37	1.21	1.02	NS
Fertilizer Level								
75 %	106.56	1.64	19.49	20.53	17.20	18.51	13.35	13.19
100 %	107.79	1.87	**19.75**	**20.90**	**18.35**	**18.88**	**13.46**	13.25
125 %	**110.29**	**1.94**	19.03	20.56	18.27	18.80	13.04	**14.09**
S.E. ±	10.11	0.25	0.82	0.36	1.06	0.79	0.83	2.77
C.D. at 5 %	NS	NS	NS	NS	NS	NS	NS	NS
Interaction GXF								
S.E. ±	20.91	0.52	1.54	0.80	2.12	1.62	1.66	11.04
CD. at 5 %	NS	NS	NS	NS	NS	NS	NS	NS
CV%	18.10	26.66	8.20	3.48	11.46	8.12	12.05	57.58
General Mean	108.21	1.85	19.42	20.66	18.04	19.06	13.62	16.11

Project No. AS-69 (AICRP'S)

Title of the experiment: Use of plant growth regulators (PGRs) for enhanced yield and quality of sugarcane. (I plant crop)

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

Location :Vasantdada R & D farm Time Frame: Three crop seasons (3 plants)
Year of commencement: 2015-16 Year of completion:2017-18

Date of planting:14/02/2015 Date of harvesting:28/02/2016

Treatment details

T1 – Conventional planting/ Farmers practice (2 bud setts)

T2 – Planting of setts after overnight soaking in water.

T3 – Planting of setts after overnight soaking in 50 ppm Ethrel solution.

T4 - Planting of setts after overnight soaking in 100 ppm Ethrel solution

T5 – T1 + GA_3 spray (35ppm) at 90,120 and 150 DAP.

T6 – T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP.

T7 – T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP.

T8 – T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP.

Variety : CoVSI 9805 Replication: Three Design: Randomized Block Design

Plot size : Gross-7.0 m X 6.00 m = 42.00 sqm Net - 6.5m X 4.80 m = 31.20 sqm
Width of furrow 1.20 mt.

Soil type & soil status : Medium black soil.

pH	EC dsm¹/cm	Organic carbon%	Av. N Kg/ha	Av.P205 Kg/ha	Av.K20 Kg/ha
8.05	0.41	0.75	351.59	65.47	628.96

Results

The field trial was conducted to assess the effect of Plant Growth Regulators for enhanced yield and quality of sugarcane with Planting of setts (ver. CoVSI9805) after overnight soaking in 50 & 100 ppm Ethrel solution and spraying of Gibberlic acid (35ppm) at 90,120 and 150 DAP and compared with conventional planting, Data regarding growth, yield, quality contributing characters at harvest and physiological observations of 1st plant crop are presented in Table 1, 2 & 3.

Cane and sugar yield (t/ha)

The data regarding cane yield t/ha presented in Table 1 was significantly affected due to various treatments. Maximum cane yield (137.50 t/ha) was obtained in planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting. This was followed by (127.50 t/ha) planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting. Minimum cane yield of 74.50 t/ha was obtained in conventional practice where no Ethrel and GA was treated.

Sugar yield t/ha was also significantly more (17.68 t/ha) was obtained in planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting, followed by (14.21 t/ha) planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting. Minimum sugar yield of 10.13 t/ha was obtained in conventional practice where no Ethrel and GA was treated.

Benefit cost ratio was significantly affected due to various treatments. It was maximum (1:2.44) when setts were planted after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting. This was followed by (1:2.26) planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting.

Growth attributing characters

Maximum germination (63.66 %),tillering at 120DAP (1.04 lac/ha),number of millable canes (0.73 lac/ha),single cane weight (1.97 kg), cane girth (12.08 cm),number of internodes on cane (21.83) and total plant height (229 cm) were obtained in the treatment, planting of setts after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting,

Juice Quality Parameter

The juice quality parameters measured in terms of Brix %, Sucrose % and CCS % were differed significantly due to different treatments. Maximum Brix % (20.52), CCS % (13.75) and Sucrose % (19.14) was noticed when setts were planted after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting. followed by planting of setts after overnight soaking in 50 ppm Ethrel solution and spraying of GA_3 35ppm at

90,120 and 150 days of planting.i.e. 20.02 %,13.23 % and 18.68 % of brix, CCS and sucrose content respectively.

Physiological characters

The observations on leaf area, biomass accumulation and root dry weight were recorded, statistically analyzed and differences due to various treatments were found significant. Maximum leaf area (1484 cm2/m2 and 2565 cm2/m2 at 60 and 120 days after planting respectively, maximum biomass accumulation 10.19 gm/m2 and maximum root dry weight (13.12 gm/m2) were recorded in the treatment when setts were planted after overnight soaking in 100 ppm Ethrel solution and spraying of GA_3 35ppm at 90,120 and 150 days of planting.

Conclusion

The results of the first plant crop indicated that, maximum germination (63.66%) at 30 DAP, tillering (1.04 lac/ha) at 120 DAP, NMC (0.73 lac/ha),cane girth (12.08 cm),single cane weight (1.76 kg),CCS (13.75 %), cane yield (137.50 t/ha) and B:C ratio (1:2.44) was recorded when the setts were overnight soaked in 100 ppm Ethrel before planting and foliar spraying of Gibberlic acid 35ppm at 90,120 &150 DAP followed by cane yield of 127.50 t/ha in overnight soaking of setts in 50ppm Ethrel and spraying of G.A.(35ppm), Final conclusion could be drawn after having next two plant crop studies.

Table1 Data regarding to Effect of PGRs on different growth and yield contributing characters.

Tr No	Treatment Details	Ger % 30DAP	Tiller (lac/ha) 120DAP	NMC (lac/ha)	Cane Yield (t/ha)	B:C Ratio	Cane wt (kg)	Cane Girth (cm)
T1	Conventional planting/ Farmers practice (2 bud setts)	51.33	0.53	0.52	74.50	1.32	1.25	10.83
T2	Planting of setts after overnight soaking in water.	54.44	0.67	0.57	84.00	1.68	1.51	10.99
T3	Planting of setts after overnight soaking in 50 ppm Ethrel solution.	54.00	0.58	0.57	80.50	1.48	1.29	10.99
T4	Planting of setts after overnight soaking in 100 ppm Ethrel solution	55.04	0.75	0.63	108.0	1.92	1.68	11.74
T5	T1 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	54.67	0.74	0.62	94.50	1.68	1.55	11.33
T6	T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	57.55	0.83	0.66	126.5	2.25	1.75	11.91
T7	T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	58.22	0.95	0.69	127.5	2.26	1.76	12.08
T8	T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	63.66	1.04	0.73	137.5	2.44	1.97	12.08
S.E.		3.25	0.14	0.04	3.85	0.10	0.07	0.18
C.D.at 5 %		NS	0.36	0.11S	11.46	0.31	0.21	0.54

Table 2 Data regarding to Effect of PGRs on different growth, yield and quality contributing characters.

Tr No	Treatment Details	Total ht (cm)	Millable ht (cm)	Inter Nodes /cane	Brix %	Pol %	CCS %	CCS T/ha
T1	Conventional planting/ Farmers practice (2 bud setts)	181	142	14.83	18.12	16.38	11.78	9.83
T2	Planting of setts after overnight soaking in water.	203	154	16.83	19.65	17.66	12.57	10.40
T3	Planting of setts after overnight soaking in 50 ppm Ethrel solution.	188	146	15.16	19.14	17.61	12.45	10.29
T4	Planting of setts after overnight soaking in 100 ppm Ethrel solution	226	187	18.33	19.74	18.13	12.82	13.68
T5	T1 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	209	159	17.49	19.74	18.08	12.77	12.32
T6	T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	233	189	18.66	20.01	18.49	13.23	16.31
T7	T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	229	191	19.66	20.02	18.68	13.23	17.21
T8	T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	229	194	21.83	20.52	19.14	13.75	17.68
S.E.		7.78	6.62	0.70	0.64	0.24	0.18	0.57
C.D.at 5 %		23.12	19.68	2.09	0.70	0.71	0.54	1.70

Table 3 Data regarding to Effect of PGRs on different parameters of leaf area, and root dry matter.

Tr No	Treatment Details	Root fresh wt (gm/m2	Root dry weight (gm/m2)	Root net weight (gm/m2)	Leaf fresh weight (gm/m2)	Leaf dry weight (gm/m2)	Leaf net weight (gm/m2)	Leaf area 120 DAP (cm2/m2)
T1	Conventional planting/ Farmers practice (2 bud setts)	9.55	3.23	6.33	9.18	2.53	6.64	1746
T2	Planting of setts after overnight soaking in water.	12.30	3.98	8.31	9.53	2.30	6.80	1870
T3	Planting of setts after overnight soaking in 50 ppm Ethrel solution.	11.35	3.39	7.96	9.32	2.56	6.76	1836
T4	Planting of setts after overnight soaking in 100 ppm Ethrel solution	13.48	4.40	9.08	10.19	2.78	7.40	1937
T5	T1 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	12.56	3.87	8.69	9.44	2.54	6.88	1900
T6	T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	13.95	3.44	10.49	10.99	2.58	8.00	2065
T7	T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	18.23	5.99	12.24	13.91	3.86	10.01	2427
T8	T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP.	17.32	4.19	13.12	13.78	3.59	10.19	2565
S.E.		3.53	1.23	2.49	1.72	0.47	1.29	383
C.D.at 5 %		8.55	2.98	6.03	4.16	1.17	3.13	812

Project No. AS-68 (AICRP'S)

Title of the experiment:

Impact of Integrated Application of Organics and Inorganics in Improving Soil Health and Sugarcane Productivity. (Ist plant crop)

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

Year of start : 2015 -206 Year of completion : 2017 -2018 Planting season : Suru

Design : RBD Replication : Three Variety : Co 86032

Planting date: 16/02/2015 Date of harvest: 08/03/2016

Plot Size : Gross plot 6 m x 6 m

Treatment Details:

T1 – No organic + 50% RDF

T2 - No organic + 100% RDF

T3 – No organic + soil test based recommendation

T4 – Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)

T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)

T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)

T7– Application of FYM/compost @ 10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + 50% RDF

T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) +100% RDF

T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis

Results

The field experiment was conducted to develop nutrient management strategy for sustaining soil health and sugarcane production. The data regarding cane yield, sugar yield, growth and biometric parameters are reported in Table 2 to 4.

Cane yield

The maximum cane yield 150.16 tha-1 was obtained in the treatment of compost @ 20 tha^{-1} with 100% RDF through inorganic fertilizer followed by 149.20 tha^{-1} in the treatment of compost @ 20tha^{-1} with inorganic fertilizers based on soil test. However the treatments of compost @ 10 tha^{-1} biofertilizers (Acetobacter & PSB) along with 50% RDF (142.12 tha^{-1}), 100% RDF (143.61 tha^{-1}) and fertilizers based on soil test (140.96 tha^{-1}) found at par. All the treatments of inorganic fertilizers along with compost showed significant results over the treatments having without organic manure.

CCS Yield

In commercial cane sugar yield similar trend was observed with respect to cane yield. The Commercial Cane Sugar yield was found highest 22.17 t ha^{-1} in application of FYM/compost @ 20 t ha^{-1} along with 100 % RDF (inorganic source), followed by 20.45 t ha^{-1}in the treatment of application of FYM/compost @ 20 t ha^{-1} along with inorganic nutrient application based on soil test (rating chart), All the treatments of combination of Organic, inorganic and soil test based fertilizer recommendation are found at par with each other.

Plant population

The plant population presented in Table 2 showed that maximum significant plant population 99.21 thousand ha^{-1} was recorded in treatment where T9 of application of FYM/compost @ 20 t ha^{-1} along with inorganic nutrient application based on soil test (rating chart) was found significantly superior over RDF (100.64 t ha^{-1}). All the treatments of combination of Organic, inorganic and soil test based fertilizer recommendation. ere found at par with each other

Growth observation

The growth parameters viz. milliable cane height and girth of cane were numerically increased in all treatments but not significantly differed. The maximum milliable cane height (247.67cm) was found in treatment where application of FYM/compost @ 10 t ha^{-1}, biofertilizer (Acetobacter+ PSB) along with 100% RDF (inorganic source). Cane girth and numbers of internodes were remained more or less same in all the treatments.

Biometric observation

The germination at 30 and 45 days after planting varied from 59.00 – 68.33% and 62.67 – 68.67 %. The data of germination percentage was found to be statistically non significant. The tiller population 120 and 150 days after planting varied from 62.83 – 104.34 and 83.08 – 102.38 showed insignificant difference.

Juice quality

The juice quality parameters with respect to Brix, Pol, Purity and CCS percent are presented in Table. 4 indicated that the juice quality was not affected

Conclusion

The field experiment was conducted to study the impact of integrated application of organics and inorganics in improving soil health and sugarcane productivity**.** The maximum cane yield 150.16 tha-1 was obtained in the treatment of compost @ 20 tha^{-1} with 100% RDF through inorganic fertilizer followed by 149.20 tha^{-1} in the treatment of compost @ 20 tha^{-1} with inorganic fertilizers based on soil test. However the treatments of compost @ 10 tha^{-1} biofertilizers (Acetobacter & PSB) along with 50% RDF (142.12 tha^{-1}), 100% RDF (143.61 tha^{-1}) and fertilizers based on soil test (140.96 tha^{-1}) found at par. All the treatments of inorganic fertilizers along with compost showed significant results over the treatments having without organic manure.

Table 1 : Initial Soil characteristics under experimental plot

Soil characteristics	**Analytical Value Initial**
pH	8.35
Electrical Conductivity (dSm^{-1})	0.31
Organic carbon (%)	0.67
Available Nitrogen (kg ha^{-1})	301
Available Phosphate(kg ha^{-1})	32
Available Potash (kg ha^{-1})	665
Soil Texture	
DTPA extractable Cu (ppm)	5.6
DTPA extractable Fe (ppm)	3.2
DTPA extractable Mn (ppm)	7.8
DTPA extractable Zn (ppm)	1.12

Table 2: Impact of integrated application of organics and inorganics on Cane yield and CCS yield

Treatments	**Cane yield (t ha^{-1})**	**CCS yield (t ha^{-1})**
T1- No organic + 50% RDF	112..31	15.54
T2- No organic + 100% RDF	129.00	18.70
T3– No organic + soil test based recommendation	13404	19.38
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	145.10	19.81
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	150.16	22.17
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	149.20	20.45
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	142.12	18.65
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	143.61	19.50
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	140.96	20.29
SED CD at 5%	6.24 13.22	1.18 2.50

Table 3: Impact of integrated application of organics and inorganics on No. Milliable canes and Milliable cane height

Treatments	No. of milliable canes (000)ha	Milliable cane height (cm)
T1- No organic + 50% RDF	84.10	229.33
T2- No organic + 100% RDF	91.03	240.00
T3– No organic + soil test based recommendation	93.43	257.67
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	96.24	212.67
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	94.23	229.33
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	99.21	234.67
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	97.37	247.67
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	95.30	229.33
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	95.14	244.33
SED CD at 5%	3.20 6.80	23.82 NS

Table 4: Impact of integrated application of organics on Internode and Girth

Treatments	Internode	Girth (cm)
T1- No organic + 50% RDF	20.67	9.40
T2- No organic + 100% RDF	19.33	8.87
T3– No organic + soil test based recommendation	23.67	9.60
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	20.67	9.20
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	21.00	9.30
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	20.33	9.40
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	22.00	9.53
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	21.33	9.20
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	20.33	9.07
SED CD at 5%	1.63 NS	0.35 NS

Table 5: Impact of integrated application of organics and inorganics on germination 30DAP and germination 45 DAP

Treatments	Germination 30 DAP	Germination 45 DAP
T1- No organic + 50% RDF	64.67	68.67
T2- No organic + 100% RDF	63.00	66.67
T3– No organic + soil test based recommendation	58.67	63.00
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	63.67	65.00
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	61.00	65.67
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	59.00	64.33
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	68.33	68.67
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	65.00	67.00
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	60.00	62.67
SED CD at 5%	3.82 NS	3.20 NS

Table 6: Impact of integrated application of organics and inorganics on Tiller population 120DAP and 150DAP

Treatments	Tiller Population 120DAP	Tiller Population 150DAP
T1- No organic + 50% RDF	90.11	88.74
T2- No organic + 100% RDF	94.71	90.55
T3– No organic + soil test based recommendation	104.34	102.38
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	100.42	100.74
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	91.26	83.08
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	100.67	99.26
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	98.55	98.15
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	95.13	89.72
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	95.1	99.42
SED CD at 5%	18.59 NS	8.75 NS

Table 7: Impact of integrated application of organics and inorganics on Juice quality

Treatments	Brix %	Pol %
T1- No organic + 50% RDF	20.46	19.21
T2- No organic + 100% RDF	20.51	19.67
T3– No organic + soil test based recommendation	21.02	20.00
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	19.98	18.90
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	21.03	20.25
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	20.08	18.97
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	19.54	18.25
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	20.09	18.84
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	20.86	19.87
SED	0.39	0.46
CD at 5%	1.17	1.38

Table 8: Impact of integrated application of organics and inorganics on Juice quality

Treatments	Purity %	CCS%
T1- No organic + 50% RDF	93.86	13.84
T2- No organic + 100% RDF	95.92	14.50
T3– No organic + soil test based recommendation	95.13	14.46
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	94.59	13.67
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	96.30	14.75
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	94.43	13.71
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	93.36	13.11
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	93.77	13.57
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	95.25	14.41
SED	0.85	0.37
CD at 5%	2.56	1.12

Table 9: Impact of integrated application of organics and inorganics on B:C Ratio

Treatments	B:C Ratio
T1- No organic + 50% RDF	2.94
T2- No organic + 100% RDF	3.14
T3– No organic + soil test based recommendation	3.37
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	2.83
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	2.78
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	2.83
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	3.13
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	2.98
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	3.00
SED	0.14
CD at 5%	0.29

Table 10: Response of sugarcane crop to different nutrients on Cane yield, CCS yield and No. Milliable canes

Treatments	Net Monetary Returns	Gross Monetary Returns
T1- No organic + 50% RDF	170429.00	258313.00
T2- No organic + 100% RDF	202343.50	296700.00
T3– No organic + soil test based recommendation	216882.00	308292.00
T4- Application of FYM/compost @ 20 t ha^{-1} + 50% RDF (inorganic source)	215853.67	333737.67
T5 - Application of FYM/compost @ 20 t ha^{-1} + 100% RDF (inorganic source)	221003.83	345360.33
T6 – Application of FYM/compost @ 20 t ha^{-1} + inorganic nutrient application based on soil test (rating chart)	221742.33	343152.33
T7 – Application of FYM/compost @ 10 t ha^{-1} + biofertilizer Azotobacter/Acetobacter+PSB) + 50% RDF	222340.33	326868.33
T8 – Application of FYM/compost @10 t ha^{-1} + biofertilizer Azotobacterr/Acetobacter+PSB) +100% RDF	219271.83	330272.33
T9 – Application of FYM/compost @10 t ha^{-1} + biofertilizer (Azotobacter/Acetobacter+PSB) + soil test basis	216161.67	324215.67

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