VSI/CP/AGRO/ /2012-13 Date: 23/05/2012

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 (Agronomy) and Audit Utilization certificate 2011-12

Dear Sir,

The research work in Sugarcane Agronomy under AICRP program was conducted as per the technical programme during 2011-12. A report of research work done has been enclosed herewith for your information please. A copy of the same has also been sent through E-mail. Audit utilization certificate of the contingency grant for the year 2011-12 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 and softcopy (CD) of research work 2011-12
2) Audit Utilization Certificate. 2011-12

(D.B.Phonde)
Senior Scientist &
Head, Soil Science Section

Copy to:
Dr. V.P.Singh.
Principle Investigator (Crop production AICRP on sugarcane)
Director of Research
Rajendra Agriculture University,
Pusa - 848125, Dist - Samastipur.
Bihar.

RESEARCH RESULTS OF WORK DONE IN SUGARCANE AGRONOMY UNDER AICRP'S PROGRAM 2011-2012

Submitted by

Agronomy Section
Division of Crop Production

Compiled by

Mr.D.B.Phonde
Senior Scientist & Head, Soil Science Section

Conducted by
Dr. R.B.Doule, Scientist & Head, Agronomy.
Mr.A.S.Deshmukh.Senior scientist &Head,Water manegement
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HIGHLIGHTS OF RESEARCH WORK CONDUCTED DURING 2011-2012

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

Under the All India Coordinated Research Project on Sugarcane, three promising genotypes viz., CoVSI 03102, VSI 434 and CoVSI 9805 along with CoC 671 and Co 86032 as standard checks were evaluated in I plant crop under three levels of NPK fertilizers (75, 100 and 125% of recommended dose of NPK). Results indicate that cane yield of variety CoVSI 03102 was significantly higher (102.86 t/ha) over other genotypes but at par with Co86032. Cane yield was maximum (100.03t/ha) due to application of 125 % RDF. Similar effect was also noticed in sugar yield and quality parameters. Maximum Brix % (23.44) and Sucrose % (22.36) was noticed in genotype CoVSI 03102 and CoVSI 434 respectively. Maximum B:C ratio (2.15) was obtained in CoVSI 03102 genotype. However B:C ratio was increased significantly with increase levels of recommended dose of NPK. Final conclusion will be drawn after detail study of ratoon and two plant crops.

2. AS-62: Management of binding weeds in sugarcane. (Pooled results of three plant crops)

Field experiments were conducted during the year 2009-10, 2010-11 & 2011-12 for selection of suitable weed control method for control of binding weeds in sugar cane. Pooled data over three plant crops revealed that application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 days after planting was suitable for control of binding weeds and other weed flora with highest cane (104 t/ha) and CCS yield (14.70 t/ha) with maximum B:C ratio of 1:2.81 and maximum weed control efficiency (78.57 %).

3. AS-63: Plant geometry in relation to mechanization in sugarcane (1st plant crop)

An experiment on plant geometry in relation to mechanization in sugarcane was conducted for first plant cane during 2010-11at VSI experimental farm. The results of the experiment revealed that, 150 cm row spacing was found superior in terms of sugarcane yield (136.42 t/ha), sugar yield (21.78 t/ha), net monitory returns (Rs. 158914) and B: C ratio (1: 2.70). The performance of CoM0265 and CoVSI03102 was found superior in sugarcane yield, sugar yield, net monetary returns and B: C ratio as compared to Co86032 and CoVSI9805. The highest sugar yield of 23.27 t/ha was found in CoVSI03102.

1. Project No. : **AS-42 (AICRP'S)**

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

3. Objective : To work out agronomy of promising sugarcane genotypes.

4. Principal Investigator : Dr. R.B.Doule

5. Associates : P.V.Ghodke, S.B.Manepatil

6. Location : Vasantdada R & D farm

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

8. Sponsored by : AICRP

9. Year of commencement : 20011-12

10. Year of completion : 2012-13

11. Date of planting : 07/2/2011

12. Date of harvesting : 08/3/2012

13. Soil type : Medium black soil.

14. Treatment details

(1) Varieties : **Genotypes -** i. VSI 434
ii. CoVSI 9805
iii. CoVSI 03102
Checks iv. CoC 671
v. Co 86032

(2) Fertilizer Levels : 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)

15. Replication : Three

16. Design : Factorial R.B.D

17. Soil analysis :

Year	pH	EC dsm¹/cm	Organic carbon%	Av. N Kg/ha	Av.P205 Kg/ha	Av.K20 Kg/ha
2011-12	8.38	0.18	0.40	347.47	21.04	600

Results

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

Germination %

The differences in germination at 45 days after planting among the genotypes under study were not significant (Table 1). However, the genotypes viz., CoVSI 03102 (66.11%), CoVSI 9805 (65.08%) and Co 86032 (64.72%) 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.

Tillering (Lac/ha)

The differences in tillering at 90 and 120 days were significant among the genotypes under study. The variety Co 86032 produced maximum (1.46 and 1.94 Lac /ha) number of tillers at 90 and 120 days respectively which was significantly higher than the rest of the genotypes. The number of tillers differed significantly due to fertilizer levels being maximum at 90days (1.21 Lac /ha) and 120 days (1.58 Lac /ha) after planting due to application of 125 % recommended dose of NPK and significantly more than the rest of the levels of fertilizer. The interaction between the factors under study was not significant.

Number of millable canes (Lac /ha)

The data on number of millable cane (NMC) at harvest indicated that the variety Co86032, CoVSI03102 and CoC 671 produced maximum number of millable canes at harvest i.e. 0.98, 0.95 & 0.90 Lac/ha respectively. These three genotypes were significantly superior over the rest of the genotypes. The number of millable cane at harvest increased with increase in the level of NPK being maximum (0.98 Lac/ha) and at 125 % recommended dose of fertilizers, which was significantly superior than application of 75 % RDF (0.75Lac/ha) and 100 % RDF (0.86 Lac /ha). The interaction due to genotypes and fertilizer levels was significant Table 1 (a), the number of millable canes recorded significantly higher (1.11 Lac/ha) in Co86032 with application of 125% RDF followed by CoVSI 03102 with application of 125% RDF (1.10 Lac /ha) as compared to rest of treatments but at par each other.

Number of internodes

The differences in number of internodes were significant among the genotypes under study. The genotype CoVSI 03102 produced maximum (22.85) number of internodes per cane, which was significantly higher than the check variety Co 86032 (21.18) and rest of the genotypes. In case of fertilizer levels the number of internodes did not differ significantly due to levels of fertilizers. Interaction was also not significant.

Cane girth (cm)

The differences in cane girth among the genotypes under study were significant. The genotype CoVSI 9805 showed maximum (11.01cm) cane girth at harvest which was significantly higher than the check variety Co86032 (8.83cm) and rest of genotypes. In case of levels of fertilizers the girth of cane increased with increase in the level of fertilizer being maximum (10.05cm) due to application of 125 % recommended dose of fertilizer which was significantly higher than application of 75 % RDF (8.79cm) and was at par with 100 % RDF (9.35cm). The girth of cane was non significant due to interaction between genotypes and fertilizer levels.

Cane height (cm)

The genotype CoVSI 03102 showed maximum total height (284.78cm) and millable height (250.00cm) at harvest which was significantly higher than the check variety Co86032 (total height 266.44cm and millable height 229.56cm) and rest of the genotypes. 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.

Single cane weight (kg)

The weight per cane was maximum in CoVSI 9805 (1.72 Kg) and was significantly higher than the check variety Co86032 (1.45kg) and rest of genotypes. In case of fertilizer levels the single cane weight did not differ significantly due to levels of fertilizers. Interaction was also not significant.

Cane yield (t/ha)

The data regarding cane yield t/ha presented in Table 1 revealed that the variety CoVSI 03102 yielded maximum of 102.86 t/ha which was significantly superior over the rest of the genotypes but at par with Co 86032 (102.16 t/ha). The cane yield differences due to fertilizer levels were significant. The cane yield increased with increase in levels of fertilizers being maximum (100.03 t/ha) due to application of 125 % recommended dose of NPK which was significantly

superior than application of 75 % RDF (81.11t/ha) and 100 % RDF (88.29t/ha). The interaction due to genotypes and fertilizer levels was not significant.

Juice Quality Parameter

The juice quality parameter measured in terms of Brix %, Sucrose % and CCS t/ha was differed significantly due to different genotypes. However, differences in CCS% and Purity % due to different genotypes did not influence significantly. Maximum Brix % (23.44) and Sucrose % (22.36) was noticed in genotype CoVSI 03102 and CoVSI 434 respectively. The maximum CCS t/ha was recorded in CoVSI 03102 which was significantly higher (16.08 t/ha) than genotype CoVSI 9805 (11.78t/ha) and Co 434 (11.49t/ha) and at par with check varieties Co86032 (15.13t/ha) and CoC671 (15.38t/ha). In case of quality parameter CCS t/ha increased with increase levels of NPK being maximum of 15.01 due to application of 125 % RDF of NPK which was significantly superior than application of 75 % RDF (12.86t/ha) and at par with 100 % RDF (14.04t/ha). The interactions were not significant.

B: C ratio

The B:C ratio differed significantly due to genotypes and levels of nitrogen fertilizer. The maximum (2.15) B:C ratio was obtained in CoVSI 03102. However, the B:C ratio increased significantly with increased levels of NPK being maximum 1.99 due to application of 125 % RDF of NPK which was significantly superior than application of 75 % RDF (1.71t/ha) and 100 % RDF (1.83t/ha). The interaction effect due to factors under study was not significant.

Conclusion

Cane yield of variety CoVSI 03102 was significantly higher (102.86 t/ha) over other genotypes but at par with Co86032. Cane yield was maximum (100.03t/ha) due to application of 125 % RDF. Similar effect was also noticed in sugar yield and quality parameters. Maximum Brix % (23.44) and Sucrose % (22.36) was noticed in genotype CoVSI 03102 and CoVSI 434 respectively. Maximum B:C ratio (2.15) was obtained in CoVSI 03102 genotype. However B:C ratio was increased significantly with increase levels of recommended dose of NPK. Final conclusion could be drawn after having ratoon and two plant crop studies in detail.

Table 1: Data on growth, yield and quality contribution characters at harvest (12month)

Treatments	Germination % 45 days	Tillering 90 days (Lac/ha)	Tillering 120 days (Lac/ha)	Total height of cane (cm)	Millable height of cane (cm)	Single cane weight (kg)	Girth of Cane (cm)	No. of internodes per cane
A. Genotype								
1.VSI 434	51.56	0.81	1.13	237.44	207.00	1.30	8.99	20.70
2.CoVSI 9805	65.08	1.00	1.22	217.33	184.67	1.72	11.01	17.25
3. CoVSI 03102	66.11	1.07	1.55	284.78	250.00	1.50	9.31	22.85
4. CoC671	60.06	1.06	1.37	220.44	187.56	1.46	8.83	20.18
5. Co86032	64.72	1.46	1.94	266.44	229.56	1.45	8.83	21.18
SE±	4.70	0.10	0.15	8.05	8.78	0.12	0.51	1.10
CD at 5%	10.95	0.23	0.35	18.57	20.28	0.25	1.18	2.53
B. Fertilizer level								
1.75%RDF	60.55	0.93	1.33	240.13	208.40	1.40	8.79	19.93
2.100%RDF	61.67	1.10	1.42	247.07	210.47	1.50	9.35	20.68
3.125%RDF	62.30	1.21	1.58	248.67	216.40	1.56	10.05	20.69
SE±	2.52	0.05	0.07	10.97	10.41	0.08	0.36	0.83
CD at 5%	NS	0.10	0.15	NS	NS	NS	0.76	NS
A x B Interaction (Genotype x fertilizer levels)								
SE±	5.6	0.11	0.16	24.54	23.18	0.19	0.81	1.86
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS
CV%	11.25	13.28	13.87	12.25	13.46	15.65	10.61	11.95

Contd…**Table** 1. **Data on growth, yield and quality contribution characters at harvest (12month)**

Treatments	NMC (Lac/ha)	Cane yield (t/ha)	CCS (t/ha)	Brix %	Sucrose %	CCS %	Purity %	B:C Ratio
A. Genotype								
1.VSI 434	0.77	73.18	11.49	23.44	22.36	15.96	94.89	1.43
2.CoVSI 9805	0.72	75.51	11.78	22.15	21.82	15.60	94.62	1.54
3. CoVSI 03102	0. 95	102.86	16.08	23.44	22.36	16.16	93.98	2.15
4. CoC671	0. 90	95.35	15.38	23.15	21.77	15.75	94.63	1.95
5. Co86032	0.98	102.16	15.13	22.22	20.88	14.79	93.58	2.09
SE±	0.04	5.30	0.54	0.23	0.38	0.56	0.99	0.09
CD at 5%	0.09	12.34	1.25	0.54	0.87	NS	NS	0.22
B. Fertilizer level								
1.75%RDF	0.75	81.11	12.86	23.20	21.89	15.90	94.22	1.71
2.100%RDF	0.86	88.29	14.04	23.13	22.04	15.99	95.19	1.83
3.125%RDF	0.98	100.03	1501	23.91	21.58	15.07	93.61	1.99
SE±	0.03	3.70	0.68	0.22	0.23	0.43	0.68	0.06
CD at 5%	0.07	7.73	1.42	NS	NS	NS	NS	0.14
A x B Interaction (Genotype x fertilizer levels)								
SE±	0.07	8.28	1.15	0.51	0.51	0.98	1.52	0.15
CD at 5%	0.15	NS	NS	NS	NS	NS	NS	NS
CV%	10.89	11.30	13.34	2.72	2.91	7.69	1.98	10.22

Table 1(a): Interaction between genotype x fertilizer level on number of millable canes (lac/ha) at harvest

Genotype	Fertilizer level			Mean
	75% RDF	100% RDF	125% RDF	
VSI 434	0.78	0.71	0.83	0.77
CoVSI 9805	0.55	0.74	0.88	0.72
CoVSI 03102	0.77	0.84	1.10	0.90
CoC671	0.92	0.93	1.01	0.95
Co86032	0.75	1.08	1.11	0.98
Mean	0.75	0.86	0.98	0.86

SE ±: 0.07 CD at 5%: 0.15

1. Project No. **: AS 62**

2. Name of experiment **: Management of binding weeds in sugarcane.**
(Three plant crops: 2009-10, 2010-11& 2011-12)

3. Objective : To control binding weeds/ creepers in sugarcane.
4. Principal investigator : Dr. R.B.Doule
5. Associates : P.V.Ghodke, S.B.Manepatil
6. Location. : Vasantdada R & D farm.
7. Sponsored by : AICRP'S.
8. Time Frame. : Three crop season
9. Year of commencement : 2009-10
10. Year of completion **:** 2011-12
11. Date of planting : Ist Plant- 30.01.2009 IInd Plant- 14.02.2010
IIIrd Plant- 23.02.2011
12. Date of harvest : Ist Plant- 13.03.2010 IInd Plant- 26.03.2011
IIIrd Plant- 13.03.2012
13. Variety : Co86032
14. Treatment Details:

T_1- Control (weedy check)
T_2- Hoeing at 30, 60 and 90 DAP(Day After Planting).
T_3- Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP
T_4- Atrazine @ 2kg. a.i. /ha. After 1st irrigation and hoeing followed by 2, 4-D @ 1 kg a.i. /ha. at 75 DAP.
T_5- Metribuzine @ 1.25 kg a.i /ha. (PE) followed by 2,4-D @ 1kg. a.i./ha. at 75 DAP.
T_6- Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix* 20g. /ha. at 75 DAP
T_7- Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g. /ha. at 75 DAP
T_8- Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i./ha at 75 DAP.
T_9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i. / ha.at 75 DAP.
T_{10}- Metribuzine @ 1.25 kg a.i./ha. (PE) + Dicamba 350g. a.i./ha. at 75 DAP.

* Almix is a mixture of chlorimuron ethyl and metsulfuron methyl

15. Design : R.B.D.
16. Replication : Three.
17. Plot size. : Gross 7.5 m. Length X 7.20m.width (6rows)
: Net 6.70 m. X 4.80 m. (4rows): Width of furrow - 1.20 m
18. Soil type : Medium black soil.
19. Soil analysis :

Year	pH	EC mmhos/cm	Organic Carbon%	Av. N Kg/ha	Av.P_2O_5 Kg/ha	Av.K_2O Kg/ha
2009-10	7.90	0.23	0.7	305.21	25.20	540.64
2010-11	7.92	1.93	0.99	213.71	28.63	422.80
2011-12	8.43	0.16	0.52	361.26	24.59	432.00

Results:

The field experiments were conducted during the year 2009-10, 2010-11 and 2011-12 (three plant crops) with various weed control methods along with herbicides to evaluate their efficacy against binding weeds in sugarcane.

The data pooled over three crop seasons (2009-10, 2010-11 and 2011-12) were statistically analyzed. The pooled mean data on growth, yield and quality parameters are presented in Table1.

Growth Parameters

The average pooled mean revealed that maximum germination (76.67%) was recorded due to application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5) which was significantly superior over control treatment T1 i.e. weedy check (57.60%) and T2 i.e. hoeing at 30, 60 and 90 DAP (62.12%) but at par with rest of the treatments.

The data on mean tillering at 120 days revealed that the character was significant due to different weed control treatments. Maximum tillering (1.17 Lac/ha) at 120 days after planting was noticed in treatment T5 i.e. application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP; T7 i.e. Metribuzin @ 1.25 kg a.i./ha (PE) + Almix 20 gm/ha at 75 DAP (1.14 Lac/ha) and T4 i.e. Atrazine @ 2kg. a.i. /ha after 1st irrigation and hoeing followed by 2, 4-D @ 1 kg a.i. /ha at 75 DAP (1.12 Lac/ha) as compared to rest of treatments.

The millable height of cane (cm) and girth of cane (cm) at harvest were not influenced by different treatments of weed control. Application of Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i. / ha.at 75 DAP (T9) and application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5) recorded maximum millable height of cane (236.32cm) and girth of cane (9.79cm) as compared to control treatment T1 i.e. weedy check (162.22cm, 8.86cm) respectively.

The pooled mean revealed that maximum number of internodes (23.71) was recorded due to application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5) which was significantly superior over control treatment T1 i.e. weedy check (16.43) but at par with rest of the treatments.

The mean data on single cane weight (kg) differ significantly due to different weed control treatments. Maximum single cane weight (1.41kg) was recorded due to application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5) which was significantly superior over control treatment T1 i.e. weedy check (1.00kg) and treatment T2 i.e. hoeing at 30,

60 and 90 DAP (1.01kg) but at par with (T7) Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g. /ha. at 75 DAP (1.34kg) and treatment T4 i.e. Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @ 1 kg a.i. /ha. at 75 DAP (1.28kg).

The pooled mean revealed that maximum number of millable canes (0.91Lac/ha) was recorded due to application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5) which was significantly superior over control treatment T1 i.e. weedy check (0.65 Lac/ha) and rest of the treatments.

Cane yield

The pooled mean data regarding cane yield (t/ha) presented in Table 1 revealed that the character was significant due to different weed control treatments. Maximum cane yield (104 t/ha) was recorded due to application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (T_5); application of (T_4) Atrazine @ 2kg. a.i. /ha after 1st irrigation and hoeing followed by 2, 4-D @ 1 kg a.i. /ha. at 75 DAP (102.96 t/ha) and application of (T_7) Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g. /ha. at 75 DAP (102.63t/ha) which were significantly superior over control treatment T_1 i.e. weedy check (73.18 t/ha) but at par with treatment T_2 i.e. hoeing at 30, 60 and 90 DAP (95.12 t/ha) and rest of the treatments.

B: C ratio

The pooled mean (Table1.a) revealed that benefit cost ratio (1:2.81) was significantly highest in treatment T5 i.e. application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP, followed by T_7 (1:2.65) i.e. Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g. /ha. at 75 DAP as compared to control treatment T_1 i.e. weedy check (1:1.99) but at par with T_2 (1:2.36) i.e. hoeing at 30, 60 and 90 DAP and rest of the treatments.

Quality Parameters

The pooled mean data over three crop seasons (2009-10, 2010-11 and 2011-12) were statistically analyzed on quality parameters at harvest and are presented in Table 1. The brix%, sucrose% and CCS% did not differ significantly due to different weed control treatments. The treatment T5 i.e. application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP recorded highest brix (21.52 %), sucrose(19.57%) and CCS (14.15%) as compared to control treatment T_1(brix 19.71%, sucrose 17.90 % and CCS 12.79 %) and rest of the treatments.

The pooled mean revealed that CCS (14.91 t/ha) was significantly highest in treatment T_7 i.e. Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g./ha. at 75 DAP, followed by T_5 i.e. application

of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP (14.70 t/ha) as compared to control treatment T1 i.e. weedy check (9.40 t/ha) but at par with T2 (12.90 t/ha) i.e. hoeing at 30, 60 and 90 DAP and rest of the treatments.

Weed flora and weed control efficiency

The pooled mean data over three crop seasons (2009-10, 2010-11 and 2011-12) regarding dry weed weight (g/m^2) and weed control efficiency (%) as affected by various treatments are presented in Table 2. The major weeds observed in experimental plots were Cyprus rotundus, Cynodan dictylon, Commelina bengalensis, Parthemium hysterophorus, Panicum isachani, Amaranthus viridis etc. The binding weeds observed in experimental plot were Convolvulus arvensis and Ipomea aquifica at Vasantdada R&D farm, VSI. The minimum weed intensity and dry weight of weed in 1 m^2 at 60 DAP (13.11/m^2 and 5.35gm./m^2) and at120 DAP (16.22/m^2 and 6.69gm./m^2) were observed respectively in treatment T5 i.e. application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 DAP as compared to control (T1) i.e. weedy check (at 60DAP-weed intensity 205/m^2 & dry weight 35.11gm./m^2 and at 120 DAP- weed intensity 109.44/m^2 & dry weight 95.87gm./m^2). This treatment also recorded significantly maximum weed control efficiency (%) at all the days of observations. i.e. 60 DAP (77.62%), and 120 DAP (78.57%) followed by T7 i.e. Metribuzine @ 1.25 kg a.i./ ha. (PE) + Almix 20g./ha. at 75 DAP at 60 DAP (73.84%) and 120 DAP (77.52%).

Conclusion

The results indicated that application of Metribuzin @ 1.25 kg a.i./ha (PE) followed by 2-4-D @ 1 kg a.i./ha at 75 days after planting found to be suitable for control of binding weeds and other weed flora with of highest cane (104 t/ha)and CCS yield (14.70 t/ha) with maximum B:C ratio of 1:2.81 and maximum weed control efficiency (78.57 %).

Table 1: Growth, yield and quality parameters of sugarcane as influenced by different herbicides (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032

Treatments	Germination % at 45 day				Tillering at 120 days (Lac/ha)				Millable height of cane (cm)			
	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean
T1-Control(weedy check)	50.57	64.33	57.00	57.60	0.97	0.58	0.55	0.70	156.67	185.00	145.00	162.22
T2-Hoeing at 30, 60 and 90 DAP.	63.32	61.67	61.36	61.12	1.08	0.68	1.02	0.93	156.67	175.67	176.33	169.56
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	71.32	75.67	72.33	73.11	1.10	1.16	1.08	1.11	161.00	220.67	237.67	206.45
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	73.3	74.33	70.66	72.76	1.14	1.11	1.11	1.12	182.00	148.33	237.33	189.22
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	74.67	80.67	74.67	76.67	1.12	1.16	1.23	1.17	193.67	253.00	255.33	234.00
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	72.81	70.33	69.07	70.74	0.99	1.14	1.11	1.08	182.00	195.00	227.67	201.56
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	70.23	77.33	70.64	72.73	1.06	1.20	1.15	1.14	188.00	237.33	253.33	226.22
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	68.67	75.67	72.79	72.38	0.97	1.03	0.97	0.99	188.00	237.33	253.33	226.22
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	65.25	75.67	70.48	70.47	0.95	0.98	1.00	0.98	288.00	153.33	267.64	236.32
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	64.23	77.00	73.50	71.57	1.02	0.95	0.93	0.96	156.00	201.67	255.67	204.44
S.E. ±	0.71	3.25	1.15	1.75	0.03	0.14	0.02	0.06	2.37	17.51	1.86	19.84
C.D at 5%	2.11	9.68	3.44	5.22	0.07	0.44	0.07	0.19	7.04	52.04	5.52	NS
C.V%	1.78	7.73	2.91	4.36	5.36	6.89	4.11	11.17	2.31	13.71	1.41	16.70

Contd…**Table 1. Growth, yield and quality parameters of sugarcane as influenced by different herbicides (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032**

Treatments	Girth of cane (cm)				No. of internodes per cane				Single cane weight (kg)			
	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean
T1-Control (weedy check)	9.5	9.36	7.72	8.86	20.00	15.00	14.28	16.43	1.03	1.00	0.96	1.00
T2-Hoeing at 30, 60 and 90 DAP.	9.4	9.12	8.22	8.91	21.00	19.67	17.34	19.34	1.21	0.90	0.92	1.01
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	10.1	8.89	8.22	9.07	23.00	20.33	21.57	21.63	1.22	1.03	0.99	1.08
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	9.9	9.62	8.33	9.28	22.00	20.27	22.35	21.54	1.26	1.33	1.24	1.28
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	10.3	10.24	8.83	9.79	24.00	23.00	24.12	23.71	1.23	1.43	1.58	1.41
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	9.9	9.19	7.61	8.90	23.00	19.00	20.69	20.90	1.16	1.23	1.26	1.22
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	10.1	10.03	7.89	9.34	23.00	21.00	22.50	22.17	1.21	1.48	1.34	1.34
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	8.9	9.64	8.33	8.96	21.00	20.00	20.59	20.53	1.04	0.97	0.94	0.98
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	8.5	9.83	8.28	8.87	21.00	19.67	19.27	19.98	1.07	1.11	1.09	1.09
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	8.3	9.71	8.27	8.76	20.00	16.00	18.67	18.22	1.20	1.30	1.27	1.25
S.E. ±	0.22	0.38	0.33	0.29	0.60	1.43	0.46	0.65	0.03	0.10	0.01	0.06
C.D at 5%	0.67	1.14	NS	NS	1.79	4.25	1.37	1.95	0.06	0.31	0.03	0.18
C.V%	4.07	6.95	7.05	5.52	4.76	12.87	3.94	5.51	3.12	16.23	1.88	9.33

Contd…**Table 1. Growth, yield and quality parameters of sugarcane as influenced by different herbicides (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032**

Treatments	Number of Millable Canes (Lac/ha)				Cane yield t/ha				CCS (t/ha)			
	IP	**IIP**	**IIIP**	**Mean**	**IP**	**IIP**	**IIIP**	**Mean**	**IP**	**IIP**	**IIIP**	**Mean**
T1-Control(weedy check)	0.67	0.66	0.62	0.65	78.11	71.34	70.10	73.18	8.81	9.74	9.64	9.40
T2-Hoeing at 30, 60 and 90 DAP.	0.87	0.76	0.85	0.83	107.50	88.49	89.36	95.12	12.76	13.44	12.49	12.90
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	0.88	0.82	0.84	0.85	108.58	89.33	76.65	91.52	14.08	14.09	10.67	12.95
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	0.91	0.84	0.85	0.87	112.86	107.53	88.50	102.96	14.76	13.60	12.27	13.54
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	0.90	0.88	0.94	0.91	110.41	108.09	93.56	104.02	14.17	16.47	13.46	14.70
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	0.80	0.86	0.78	0.81	98.57	106.71	85.75	97.01	11.01	15.64	10.57	12.41
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	0.84	0.89	0.85	0.86	105.08	110.38	92.42	102.63	13.15	18.44	13.13	14.91
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	0.71	0.79	0.82	0.77	96.08	101.11	76.48	91.22	11.08	15.99	10.22	12.43
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	0.79	0.83	0.71	0.78	98.68	93.66	80.72	91.02	10.55	15.45	11.01	12.34
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	0.83	0.87	0.86	0.85	99.43	107.12	85.97	97.50	11.63	13.54	11.31	12.16
S.E. ±	0.58	0.04	0.01	0.02	0.88	11.05	1.15	3.48	1.71	1.79	0.42	0.78
C.D at 5%	1.23	0.13	0.04	0.07	1.85	32.84	3.41	10.35	3.60	NS	1.27	2.33
C.V%	5.14	9.72	3.05	5.35	7.18	22.05	2.37	6.40	3.16	21.02	6.46	10.59

Contd…**Table 1. Growth, yield and quality parameters of sugarcane as influenced by different herbicides (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032**

Treatments	Brix % 12M				Sucrose % 12M				CCS % 12M			
	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean
T1-Control(weedy check)	18.65	19.87	20.62	19.71	15.88	18.66	19.17	17.90	11.08	13.57	13.71	12.79
T2-Hoeing at 30, 60 and 90 DAP.	18.76	21.37	20.30	20.14	17.49	18.60	18.42	18.17	12.14	15.43	13.99	13.85
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	20.21	19.23	21.04	20.16	18.02	20.33	19.47	19.27	12.56	14.33	13.94	13.61
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	20.55	19.60	20.23	20.13	19.26	19.85	19.16	19.42	13.60	14.43	13.86	13.96
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	21.46	21.60	21.51	21.52	18.27	20.40	20.04	19.57	12.84	15.23	14.39	14.15
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	20.17	20.40	20.16	20.24	16.20	20.34	17.84	18.13	11.23	14.80	12.33	12.79
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	20.65	22.16	20.96	21.26	17.57	20.33	19.49	19.13	12.23	15.83	14.19	14.08
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	18.87	21.07	19.86	19.93	15.99	19.93	18.57	18.16	10.98	14.90	13.35	13.08
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	18.54	20.80	20.36	19.90	16.22	20.25	18.99	18.49	11.29	14.53	13.64	13.15
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	18.72	21.43	20.98	20.37	16.91	20.17	19.69	18.92	11.82	15.23	13.16	13.40
S.E. ±	0.32	0.41	0.49	0.45	0.78	0.52	0.52	0.41	1.72	0.48	0.42	0.34
C.D at 5%	0.96	1.23	NS	NS	1.63	1.56	NS	NS	NS	NS	NS	NS
C.V%	2.85	3.46	4.18	3.90	3.78	4.59	4.80	3.86	2.98	5.63	5.37	4.37

Table 1(a): B:C ratio of sugarcane as influenced by different herbicides (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032

Treatments	B:C ratio			
	IP	**IIP**	**IIIP**	**Mean**
T1-Control(weedy check)	2.47	1.83	1.68	1.99
T2-Hoeing at 30, 60 and 90 DAP.	3.06	2.27	1.76	2.36
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	3.09	2.52	2.05	2.55
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	3.21	2.42	2.23	2.62
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	3.14	3.05	2.25	2.81
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	2.80	2.71	2.20	2.57
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	2.92	2.78	2.26	2.65
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	2.73	2.75	2.12	2.53
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	2.83	2.60	2.07	2.50
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	2.77	2.40	2.16	2.44
S.E. ±	0.03	0.29	0.08	0.10
C.D at 5%	0.05	NS	0.23	0.30
C.V%	4.36	19.86	6.70	7.06

Table 2. Weed intensity, dry weight of weed and weed control efficiency as affected by various treatments (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032

Treatments	Weed Count at 60DAP (m^2)				Dry Weight at 60DAP (g/m2)				WCE at 60DAP (%)			
	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean
T1-Control(weedy check)	74.00	284.0	257.00	205.00	57.00	0.33	48.00	35.11	00.00	00.00	00.00	00
T2-Hoeing at 30, 60 and 90 DAP.	29.00	120.00	83.00	77.33	16.00	0.21	22.00	12.74	61.19	51.26	73.47	61.97
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	28.00	4.00	21.00	17.67	15.00	0.05	17.00	10.68	71.20	87.06	75.57	77.94
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	19.00	7.67	39.00	21.89	11.00	0.08	15.00	8.69	68.78	79.48	73.17	73.81
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	28.00	3.33	8.00	13.11	14.00	0.04	02.00	5.35	64.65	88.42	79.80	77.62
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	37.00	6.67	25.00	22.89	28.00	0.05	17.00	15.02	53.03	80.72	63.87	65.87
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	27.00	2.33	16.00	15.11	17.00	0.04	10.00	9.01	59.39	90.93	71.19	73.84
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	39.00	4.67	20.00	21.22	29.00	0.02	16.00	15.01	50.42	90.99	57.32	66.24
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	38.00	8.00	30.00	25.33	28.00	0.06	12.00	13.35	51.33	86.25	64.79	67.46
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	33.00	13.00	30.00	25.33	24.00	0.04	09.00	11.01	57.78	89.93	65.85	71.18
S.E. ±	1.65	87.19	8.82	24.32	4.48	0.03	0.81	4.66	1.39	5.72	0.80	5.41
C.D at 5%	3.47	NS	11.35	72.27	9.42	0.09	NS	13.85	2.92	17.00	2.40	16.08
C.V%	23.11	30.79	11.93	90.37	38.42	58.96	8.02	58.18	21.11	13.59	2.25	14.94

Contd…**Table 2. Weed intensity, dry weight of weed and weed control efficiency as affected by various treatments (Pooled data for 2009-10, 2010-11 & 2011-12), Var.Co86032**

Treatments	Weed Count at 120DAP (m^2)				Dry Weight at 120DAP (g/m2)				WCE at 120DAP (%)			
	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean	IP	IIP	IIIP	Mean
T1-Control(weedy check)	81.00	136.33	111.00	109.44	75.00	0.62	212.00	95.87	00.00	00.00	00.00	0.00
T2-Hoeing at 30, 60 and 90 DAP.	39.00	38.67	41.00	39.56	28.00	0.41	8.00	12.14	61.12	56.86	73.04	63.67
T3-Atrazine @ 2 kg. a.i. /ha. (PE) followed by 2, 4-D (1 kg a.i. / ha.) at 60 DAP	33.00	10.67	39.67	27.78	26.00	0.10	33.00	19.70	65.58	84.73	59.62	69.98
T4-Atrazine @ 2kg. a.i. /ha. after 1st irrigation and hoeing followed by 2, 4-D @1 kg a.i. /ha. at 75 DAP.	28.00	22.00	50.00	33.33	19.00	0.12	27.00	15.37	74.38	77.98	70.23	74.20
T5-Metribuzine @ 1.25 kg a.i. /ha. (PE) followed by 2, 4-D @ 1kg.a.i. /ha. at 75 DAP.	31.00	3.33	14.33	16.22	26.00	0.06	3.0	9.69	63.58	88.89	83.25	78.57
T6-Atrazine @ 2.0 kg a.i. /ha. (PE)+Almix 20g. /ha. at 75 DAP	41.00	11.34	34.33	28.89	30.00	0.11	31.00	20.37	60.15	78.24	77.76	72.05
T7-Metribuzine @ 1.25 kg a.i. / ha. (PE) + Almix 20g. /ha. at 75 DAP	37.00	2.33	26.00	21.78	29.00	0.06	23.00	17.35	60.41	90.96	81.18	77.52
T8-Atrazine @ 2.0 kg a.i. /ha. (PE) + Ethoxysulfuron 50 g. a.i.at 75 DAP.	43.00	11.67	40.00	31.56	31.00	0.08	48.00	26.36	57.87	85.89	68.80	70.85
T9- Atrazine @ 2.0 kg a.i. /ha. (PE) + Dicamba 350g.a.i./ha.at 75 DAP.	41.00	33.00	43.00	39.00	30.00	0.10	36.00	22.03	58.43	81.16	68.80	69.46
T10- Metribuzine @ 1.25 kg a.i. /ha. (PE) + Dicamba 350g. a.i. /ha. at 75 DAP.	39.00	04.00	32.34	25.11	30.00	0.06	45.00	25.02	62.22	87.56	65.53	71.77
S.E. ±	2.90	1.38	2.90	8.36	2.65	0.06	1.80	18.01	2.34	5.88	2.38	4.68
C.D at 5%	6.09	4.12	8.61	24.86	5.56	0.20	5.35	53.51	4.91	17.44	7.09	13.91
C.V%	17.12	77.28	11.32	37.52	7.68	64.61	6.67	117.52	5.58	14.19	6.38	12.66

1. Experiment No. **: AICRP AS- 63**

2. Title of the Experiment **: Plant geometry in relation to mechanization in sugarcane.**

3. Location : VSI Experimental Farm.

4. Principal Investigator : Mr. A.S. Deshmukh. (Agril. Engg.)

5. Associates : Mr. P.P.Shinde. (Agril. Engg.)
Mr. S. B. Manepatil. (Agronomy)

6. Objectives **:** 1) To work out optimum plant geometry for use of farm machinery.
2) To study varietal response to different planting geometry.

7. Time frame : Three crop seasons (Two plant + One ratoon)

8. Sponsored By : AICRP

9. Year of commencement **:** 2011-12

10. Year of completion **:** 2013-14

Date of planting : 25-02-2011

Date of harvesting : 10-03-2012

11. Soil : Medium deep black with pH = 8.5, EC= 0.34 mmhos / cm, Organic Carbon - 0.74%, Available N – 223.24 Kg/ha, Available P- 24.64 Kg/ha, Available K - 596 kg/ha.

12. Treatment Details

A. Plant Geometry

T1: 120 cm row distance
T2: 150 cm row distance
T3: 30 x150 cm row distance
T4: 100 cm row distance

B. Genotypes

V1: CoVSI 9805
V2: C0 86032
V3: CoM 0265
V4: CoVSI 03102

13. Design : Split plot design

14. Replications : Four

15. Plot Size : Gross –12 m X 15 m, Net plot – 9 m X 13 m

16. Results and Discussion

Germination

The germination percentage after 45 days of planting was recorded and it was in the range of 62.85 % to 69.37% in different furrow spacings. The data on germination percentage after 45 days of planting was at par (Table 1).

Among the different genotypes the significant differences in germination percentage were observed. The highest germination of 82.74% was observed with CoVSI03102 while the lowest germination of 55.29% was observed in CoM0265 (Table1).

Tiller ratio

The significant variation in tiller ratio after 120 days of planting was observed among the treatments of different furrow spacing. The highest tiller ratio of 1: 3.67 was observed under the 100.cm row spacing followed by 3.44 under furrow spacing of 150 cm. The lowest tiller ratio of 1: 2.08 was observed in 30 x150 cm row spacing.

Among the different genotypes the significant differences in tiller ratio were observed. The highest tiller ratio of 1: 3.93 was observed with CoM0265 followed by 1: 2.87 with CoVSI9805 (Table1).

The interaction of different furrow spacings and genotypes did not show significant differences in tiller ratio.

Cane yield

The significant variation in cane yield was observed among the treatments of different furrow spacing. The highest cane yield of 140.01 t/ha was observed under the 30 x 150 cm row spacing (T3) followed by 136.42 t/ha under furrow spacing of 150 cm (T2). The lowest yield of 122.57 t/ha was observed in 100 cm row spacing (T4). The yield obtained in treatments T3 and T2 was statistically significant as compared to control i.e. treatment T4. The increase in cane yield in treatments of 30 x 150 cm row spacing (T3) and 150 cm row spacing with drip irrigation (T2) were 14.23 and 11.30 % respectively as compared to 100 cm row spacing (T4). The yield obtained in 120 cm row spacing was 126.97 t/ha and which was on par with control (Table1).

Among the different genotypes the significant differences in cane yield were observed. The highest cane yield of 151.67 t/ha was observed with CoM0265 followed by 136.26 t/ha of CoVSI03102. The yield obtained with CoM0265 and CoVSI03102 were statistically significant as compared to yields of CoVSI9805 (118.75 t/ha) and Co86032 (119.30 t/ha). (Table1).

The interaction of different furrow spacings and genotypes did not show significant differences in cane yield.

C.C.S

The data on C.C.S. % and sugar yield t/ha recorded at harvest is presented in Table-1. The data on C.C.S. % at harvest in main treatments i.e. different row spacings was not significant. The highest C.C.S. % of 17.06 was recorded in variety CoVSI03102, which was significant to all

other varieties. The C.C.S. % in CoVSI9805 (15.96%) and Co86032 (15.55%) were significantly superior to variety COM0265 (14.96%).

The sugar yield in 30 x 150 cm row spacing was highest (21.90 t/ha) followed by 21.78 t/ha in row spacing of 150 cm and these were statistically significant to row spacings of 100 and 120 cm.

In sub-treatments, the highest sugar yield of 23.27 t/ha was observed in variety CoVSI03102 followed by CoM0265 (22.67 t/ha) and they were significantly superior to sugar yields in CoVSI9805 (18.92 t/ha) and Co86032 (18.54 t/ha).

The interaction of different row spacings and genotypes did not show significant differences in sugar yield

Millable cane population

The significant variation in millable cane population at harvest was observed in main and sub-treatments. The highest millable cane population of 97780 per ha was observed under furrow spacing of 30 x 150 cm, followed by 96729 per ha under furrow spacing of 150 cm and were statistically significant to remaining treatments (Table 1).

As regards the genotypes, there was significant difference in millable cane population. The highest cane population of 112573 per ha was observed in CoM0265 followed by 98016 in CoVSI03102, 90774 in Co86032 and 72105 in CoVSI9805. The millable cane population in CoM0265 was significantly higher than all other genotypes. (Table1).

The interaction of different row spacings and genotypes did not show significant differences in plant population at harvest.

Growth observations at harvest

The growth observations like millable cane height; cane girth and number of internodes were recorded at the time of harvest. As regards to main treatments, the millable cane height (277.33 cm) and number of internodes (23.25) were highest in furrow spacing of 150 cm. However, the data on millable cane height and number of internodes at harvest was at par in all the treatments. The cane girth in furrow spacing of 150 cm was 10.94 cm and was statistically significant to 100 cm row spacing.

As regards the genotypes, the highest millable cane height of 289.92 cm was recorded in CoM0265 followed by 278.02 cm in CoVSI03102, 268.22 cm in Co86032 and 258.43 cm in CoVSI9805. The millable cane height in CoM0265, CoVSI03102 and CoVSI9805 were

significantly superior to CoVSI9805. The highest numbers of internodes (24.13) were observed in CoM0265 followed by 24 in CoVSI03102 and were significantly superior as compared to Co86032 (21.69) and CoVSI9805 (21.06). The cane girth in CoM0265, CoVSI03102 and CoVSI9805 was 11.47 cm, 11.29 cm and 11.26 cm respectively and was significantly superior to Co86032 (8.91 cm).

The interaction of different row spacings and genotypes did not show significant differences in growth observations at harvest.

Economics

The highest monetary returns of Rs. 259019 were obtained in furrow spacing of 30 x 150 cm followed by Rs. 252377 in furrow spacing of 150 cm and they were statistically significant to furrow spacing of 120 cm (Rs. 234895) and 100 cm row spacing (Rs. 226755). The highest net monetary returns of Rs. 158914 were obtained in furrow spacing of 150 cm, while lowest net monetary returns of Rs. 132473 were obtained in 100 cm row spacing. The highest B:C ratio of 1: 2.70 was observed in furrow spacing of 150 cm and it was significant as compared to all remaining main treatments (Table 2).

As regards to different varieties, the highest monetary returns of Rs. 183957 were obtained in CoM0265 followed by Rs. 155448 in CoVSI03102. The highest B: C ratio of 1:2.90 was observed in CoM0265 followed by 1: 2.61 in CoVSI03102 (Table 2).

The data on net monetary returns and B:C ratio with different furrow spacings and genotypes was not significant.

17. Conclusions:

1. 150 cm row spacing was found superior in terms of sugarcane yield, sugar yield, net monitory returns and B: C ratio.
2. The performance of CoM0265 and CoVSI03102 was found superior in sugarcane yield, sugar yield, net monetary returns and B: C ratio as compared to Co86032 and CoVSI9805. The highest sugar yield of 23.27 t/ha was found in CoVSI03102.
3. 150 cm row spacing was found appropriate for use of farm machinery like mechanical sugarcane planter and earthing up equipment. The use of planter and earthing up equipment was found beneficial in sugarcane cultivation.

Table- 1: Cane and sugar yield contributing characters

Treatments	Germination %	Tiller ratio 120 DAP	Cane Yield t/ha	Sugar Yield t/ha	NMC/ ha	Millable height cm	No. of Internodes	Girth cm	C.C.S. % at harvest
Furrow Spacing									
T1: 120 cm row distance	69.37	3.03*	126.97	20.20	87474	273.23	22.63	10.80	15.93
T2: 150 cm row distance	62.85	3.44*	136.42*	21.78*	96729*	277.33	23.25	10.94*	16.01
T3: 30 x150 cm row distance	63.72	2.08	140.01*	21.90*	97780*	269.79	22.63	10.86	15.63
T4: 100 cm row distance - Control	67.93	3.67*	122.57	19.52	91487	274.24	22.38	10.33	15.96
S. E ±	2.76	0.11	1.92	0.33	1623	3.23	0.25	0.19	0.11
C.D. at 5%	N.S.	0.36	6.11	1.07	5176	N.S.	N.S.	0.61	N.S.
Varieties									
V1: CoVSI 9805	63.87	2.87	118.75	18.92	72105	258.43	21.06	11.26*	15.96*
V2: Co 86032	61.97	2.80	119.30	18.54	90774*	268.22*	21.69	8.91	15.55*
V3: CoM 0265	55.29	3.93*	151.67*	22.67*	112573*	289.92*	24.13*	11.47*	14.96
V4: CoVSI 03102	82.74*	2.62	136.26*	23.27*	98016*	278.02*	24.00*	11.29*	17.06*
S. E ±	1.85	0.13	2.73	0.45	1809	2.74	0.25	0.13	0.11
C.D. at 5%	5.32	0.37	7.82	1.30	5175	7.82	0.69	0.37	0.31
Interaction	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
S. E ±	4.24	0.26	5.11	0.85	3529	5.73	0.48	0.30	0.22
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

Table-2: Economics of Mechanized farming and varieties

Treatments	Cost of cultivation including drip system (Rs. /ha)	Cane Yield (t/ha)	Monitory returns (Rs./ha) @ Rs. 1850/ t	Net Monitory returns (Rs./ha)	B: C Ratio
Furrow Spacing					
T1: 120 cm row distance	95551	126.97	234895	139344	2.46
T2: 150 cm row distance	93463	136.42*	252377*	158914*	2.70*
T3: 30 x150 cm row distance	103236	140.01*	259019*	155783*	2.51
T4: 100 cm row distance - Control	94282	122.57	226755	132473	2.41
S. E ± C.D. at 5%	--------	1.92 6.11	3543 11303	3543 11303	0.036 0.11
Varieties					
V1: CoVSI 9805	96633	118.75	219688	123055	2.27
V2: Co 86032	96633	119.30	220705	124072	2.28
V3: CoM 0265	96633	151.67*	280590	183957*	2.90*
V4: CoVSI 03102	96633	136.26*	252081	155448*	2.61*
S. E ± C.D. at 5%	----------	2.73 7.82	5057 14463	5057 14463	0.052 0.15
Interaction	--------	N.S.	N.S.	N.S.	N.S.
S. E ± C.D.at 5%	--------	5.11 N.S.	9449 N.S.	9449 N.S.	0.098 N.S.

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