ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE
ZONAL AGRICULTURAL RESEARCH STATION POWARKHEDA – 461 110 (M. P.)
ANNUAL PROGRESS REPORT (2011-12)

CROP PRODUCTION

Experiment no. 1: AS 42 (A) - Agronomic evaluation of new promising genotypes of sugarcane (early maturity)

Objective: To work out agronomy of early maturing sugarcane genotypes from Advance Varietal Trial (AVT).

Treatment : 9 (3 varieties x 3 fertility levels)

Varieties : Co 0403 Co Snk 3632 Co C 671

Fertilizer levels: 1. 75 per cent recommended dose of NPK (300:80:60)
2. 100 per cent recommended dose of NPK (300:80:60)
3. 125 per cent recommended dose of NPK (300:80:60)

Design: RBD **Replications:** 3

Plot Size: 5.4 x 6.0 m^2 (6 rows at 90 cm row spacing) **Planting date : 13-05-2011**

Soil fertility status: Available N – 224 kg/ha, P- 21.9 kg/ha and K – 488 kg/ha

Results:

Germination (%): Among varieties the germination percentage recorded higher with Co C 671(60.1%) than Co 0403 (57.6%) and Co Snk 3632 (59.3%) but the difference recorded at par. The germination percentage was not influenced also due to different fertility levels. However, due to delayed planting the germination percentage recorded lower during experimentation.

Table -1 (AS-42:A):Effect of different fertility levels on growth, yield and quality of early maturing sugarcane genotypes at Powarkheda.

S. No.	Treatments	Germination (%)	Shoots (000'/ha)	Plant Height (cm)	NMC (000'/ha)	Brix (%)	Cane Yield (t/ha)
	Genotypes						
1	**Co 0403**	57.6	85.56	193	65.07	22.1	87.78
2	**Co Snk 3632**	59.3	82.96	181	58.89	21.7	80.48
3	**Co C 671**	60.1	83.70	175	58.15	22.4	78.77
	S Em +	**1.3**	**2.41**	**5**	**1.47**	**0.3**	**2.13**
	CD at 5%	**NS**	**NS**	**15**	**4.42**	**NS**	**6.39**
	Fertilizer dose (% Recommended NPK)						
1	**75%**	58.3	80.00	160	55.56	21.6	76.54
2	**100%**	59.3	84.81	188	61.48	21.8	82.22
3	**125%**	59.4	87.41	201	65.19	22.3	88.27
	S Em +	**1.3**	**2.41**	**5**	**1.47**	**0.3**	**2.13**
	CD at 5%	**NS**	**7.3**	**15**	**4.42**	**NS**	**6.39**

Shoots/tillers (000/ ha): The differences for tillers per hectare did not differ significantly among varieties. However, among varieties Co 0403 showed higher number of tillers (85.56) than Co Snk 3632 (82.96) and Co C 671(83.7). The differences for tillers influenced significantly due to fertility levels. The significantly higher number of tillers recorded with 125% recommended dose of NPK (87.41) as compared with 75% recommended dose of NPK (80.00) but was at par with 100% recommended dose of NPK (84.81).

Plant Height (cm): Among varieties Co 0403 showed significantly higher plant height (193 cm) as compared to Co C 671 (175 cm) but was at par with Co Snk 3632 (181 cm). Fertilizer levels showed significant influence on plant height. The maximum plant height (201 cm) recorded with 125% RDF and the differences were significantly higher than the plant height obtained due to application of 75% RDF (160 cm). The plant height also increased significantly due to application of 100 % RDF (188 cm) than 75% RDF. Both the levels of RDF (100 and 125%) showed at par plant height but were significantly higher than the 75% RDF.

Net Millable Canes (000/ha): The NMC influenced significantly due to varieties and fertility levels during experimentation. Among varieties the NMC recorded significantly higher with Co 0403 (65.07) as compared to Co Snk 3632 (58.89) and Co C 671 (58.15). The NMC values recorded in-between Co Snk 3632 and Co C 671 were at par. The NMC increased correspondingly with the increase in fertilizer levels. Significantly higher NMC (65.19) recorded with 125% RDF than 75% RDF (55.56) but was at par than 100% RDF (61.48). The NMC also obtained significantly higher due to application of 100% RDF than 75% RDF.

Brix (%): The brix values ranged from 21.7 to 22.4 per cent for varieties and 21.6 to 22.3 per cent in fertilizer levels. However, brix values did not differ significantly due to varieties and fertilizer levels.

Cane Yield (t/ha): Among varieties CO 0403 recorded significantly higher cane yield of 87.78 t/ha than the cane yield obtained with Co Snk 3632 (80.48 t/ha) and Co C 671 (78.77 t/ha). Application of fertilizer doses increased cane yield correspondingly with the increase in fertilizer levels and significantly higher cane yield (88.27 t/ha) obtained due to application of 125 % RDF than 75% RDF (76.54 t/ha). The cane yield obtained at par in-between 100 and 125 % RDF.

Summary:

Results revealed that among the early genotypes Co 0403 gave significantly higher cane yield of 87.78 t/ha than Co Snk 3632 (80.48 t/ha) and Co C 671 (78.77 t/ha). Application of 125 % RDF gave significantly higher cane yield of 88.27 t/ha than 75 % RDF (976.54 t/ha) but increase in cane yield was at par in-between 100 and 125% RDF.

Expt. No.2. (AS 42 B): Agronomic evaluation of new promising genotypes of sugarcane (Midlate maturity)

Objective: To workout agronomy of sugarcane genotypes from advanced vareital trial (AVT).

Treatments: 09 (3 varieties X 3 fertilizer levels)

Varieties: Co 0214 Co 0409 Co 86032

Fertilizer levels: i. 75% Recommended dose of NPK

ii. 100% Recommended dose of NPK

iii. 125% Recommended dose of NPK

Design: RBD, **Replication:** 03

Plot size: 5.4 X 6.0 m^2 (6 rows at 90 cm row spacing)

Planting date: 15.05.2011

Soil Fertility Status: Available N – 224 kg/ha, P – 21.9 kg/ha, K – 488 kg/ha

Results:

Germination (%): The germination percentage did not differ significantly either due to varieties or fertility levels. However, germination percentage ranged from 55.8 to 56.7 percent for varieties and 56.0 to 56.5 percent for fertility levels. The germination percentage recorded low during experimentation because of delayed in planting.

Tillers/ Shoots ('000'/ha): The tillers population was not influenced significantly due to different varieties. However, Co 0214 showed highest numbers of tillers (96.86) followed by Co 0409 (90.74) and Co 86032 (88.90). Application of fertilizer levels showed higher number of tillers and significantly higher number of tillers obtained at 100% RDF (94.80) and 125% RDF (98.50) as compared to number of tillers recorded with 75% RDF (83.15). Number of tillers recorded at par in between 100 and 125% recommended dose of NPK.

Table 2: (AS 42 B): Effect of different fertility levels on growth yield and quality of late maturing sugarcane genotypes at Powarkheda

S. No.	Treatments	Germina--tion (%)	Tillers (000'/ha)	Plant Height (cm)	NMC (000'/ha)	Brix (%)	Cane Yield (t/ha)
	Genotypes						
1	Co 0214	56.3	96.86	184	68.51	21.56	90.52
2	Co 0409	55.8	90.74	187	64.45	21.67	85.88
3	Co 86032	56.7	88.90	180	63.14	22.08	83.84
	S Em +	**0.7**	2.94	**3**	**2.40**	**0.21**	**2.95**
	CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
	Fertilizer dose (% Recommended NPK)						
1	**75%**	56.0	83.15	177	59.26	21.60	79.46
2	**100%**	56.3	94.80	186	66.67	21.65	88.48
3	**125%**	56.5	98.50	188	70.19	21.96	92.33
	S Em +	**0.7**	**2.94**	**3**	**2.40**	**0.21**	**2.95**
	CD at 5%	**NS**	**8.83**	**10**	**7.29**	**NS**	**8.84**

Plant height (cm): The cane plant height was not varied significantly due to varieties. However, among varieties Co 0409 showed higher plant height (187 cm) followed by Co 0214 (184 cm) and Co 86032 (180 cm). Application of fertilizer levels increased plant height significantly and recorded higher plant height (188 cm) due to application of 125% RDF than 75% RDF (177 cm). The plant height recorded at par in between 100 and 125% recommended dose of NPK.

Net Millable Cane (NMC '000'/ha): Among varieties the NMC population recorded higher with Co 0214 (68.51) as compared to NMC obtained with Co 0409 (64.45) and Co 86032 (63.14) but increase in NMC was not reach up to the level of significance. The NMC increased significantly due to application of fertilizer levels and significantly higher NMC (70.19) recorded with 125% NPK than 75% NPK (59.26). The NMC also increased significantly due to application of 100% recommended dose of NPK (66.67) than 75% NPK. The NMC values recorded with 100 and 125% NPK was at par.

Brix (%): The brix values did not differ significantly either due to varieties or fertility levels. However, among varieties the brix value ranged from 21.56 to 22.08 for varieties and 21.60 to 21.96% for fertility levels.

Cane yield (t/ha): The cane yield was not influenced significantly due to different varieties. However, among varieties Co 0214 (90.52 t/ha) followed by Co 0409 (85.88

t/ha) showed higher cane yield than the yield obtained with Co 86032 (83.84 t/ha). The cane yield increased significantly due to increase in fertility levels. Significantly higher cane yield (92.33 t/ha) recorded due to application of 125% NPK than 75% NPK (79.46 t/ha). The significantly higher cane yield of 88.48 t/ha also obtained due to application of 100% NPK as compared to the yield obtained with 75% NPK (79.46 t/ha). However, cane yield did not differ significantly between 100 and 125% recommended dose of NPK.

Summary: Results revealed that the different genotypes evaluated during experimentation did not show significant difference in cane yield. However, among varieties Co 0214 (90.52 t/ha) followed by Co 0409 (85.88 t/ha) yielded numerically higher as compared to Co 86032 (83.84 t/ha). The varieties responded to variable doses of fertilizer application and significantly higher cane yield of 92.33 and 88.48 tons per hectare recorded due to application of 125 and 100% RDF than the 75% RDF (79.46 t/ha), respectively. However, cane yield did not differ significantly between 100 and 125 percent RDF.

Expt. No.3 (AS 62): Management of binding weeds in sugarcane.

Objectives: To control binding weeds/creepers in sugarcane

Treatments:

T1: Control (weedy Check)
T2: Hoeing at 30 , 60 and 90 DAP
T3: Atrazine @ 2 kg a.i./ha (PE) followed by 2, 4- D 1kg a.i./ha at 60 DAP
T4: Atrazine @ 2 kg a.i./ha (PE) after 1st Irrigation and hoeing followed by 2, 4- D 1kg a.i./ha at 75 DAP
T5: Metribuzine @ 1.25 kg a.i./ha (PE) followed by 2, 4- D 1kg a.i./ha at 75 DAP
T6: Atrazine @ 2 kg a.i./ha (PE) + Almix 20 g a.i. /ha at 75 DAP
T7: Metribuzine @ 1.25 kg .i./ha (PE) + Almix 20 g a.i. /ha at 75 DAP
T8: Atrazine @ 2 kg a.i./ha (PE) + Ethoxysulfurona. 50 g a.i. /ha at 75 DAP
T9: Atrazine @ 2 kg a.i./ha (PE) + Dicamba 350 g a.i. /ha at 75 DAP
T10: Metribuzine @ 1.25 kg a.i./ha (PE) + Dicamba 350 g a.i. /ha at 75 DAP

Design: RBD, **Replication:** 03

Variety: Co 86 – 600 **Plot size:** 5.4 X 6.0 m^2 **Planting date:** 29.04.2011

Results:

Weed biomass (kg/ha): The pre-dominant weeds of the experimental field during kharif and rabi seasons in sugarcane were *Cyperus rotundus, Saccharum spontaneum, Cynodon dactylon, Hibiscus* spp., *Corchorus* spp. *Physalis minima, Digera muricata, Commelina benghalensis, Solanum nigrum, Celosia argentea, Digitaria sanguinalis,*

Parthenium hysterophorus, Convolvulus arvensis and other weeds. The weed biomass recorded at harvesting stage was significantly influenced due to weed control treatments. The significantly higher weed biomass (4180 kg/ha) recorded in control plot as compared to all treatments. The weed biomass reduced significantly and recorded lowest (769 kg/ha) in T_2 treatment (three hoeing) which was followed by T_{10} (786 kg/ha), T_9 (820kg/ha) and T_5 (916 kg/ha) treatment and recorded at par.

Weed control efficiency (WCE%): The highest weed control efficiency (81.6%) was recorded in treatments T_2 (three hoeings) and closely followed by T_{10} (81.2%), T_9 (80.4%), and T_5 (78.1%). However, application of Atrazine at 2 kg/ha or Metribuzine at 1.25 kg/ha as pre emergence kept field weed free about one and half month and controlled the weed emergence effectively during experimentation.

Germination (%): The cane germination percentage recorded low due to delay in cane planting but the germination percentage did not differ significantly due to herbicidal treatments. However, germination percentage ranged from 55.2 to 58.0% for treatments.

Shoots/Tillers ('000'/ha): The tillers population ranged between 78.07 to 88.90 thousand per hectare among treatment T_1 to T_{10} but the differences due to population in treatments did not differ significantly. This showed that none of the treatment was phytotoxic in terms of reducing the cane population.

Plant height (cm): The plant height recorded significantly higher with T_9 (190 cm) treatment closely followed by T_2 (188 cm) and T_{10} (187 cm) treatment as compared to untreated control plot (176 cm) but among all treated plots the plant height recorded at par.

Net millable canes (NMC '000'/ha): The significantly highest number of millable canes was recorded in T_{10} (63.68) treatment which was closely followed by T_2 (63.38), T_9 (62.80) and T_5 (61.64) than T_1 (51.50) control untreated plot and these treatments were at par. However, NMC population values among all treated plots did not differ significantly.

Brix value (%): The treatments did not influence the brix values significantly during experimentation. However, brix value ranged from 20.59 to 21.88% under different treatments.

Table 3. (AS 62): Effect of treatments on weed control efficiency, growth, yield and quality of sugarcane

Treatments	Germi-nation (%)	Shoots ('000'/ha)	Plant height (cm)	NMC ('000'/ha)	Brix (%)	Cane yield (t/ha)	Weed biomass (kg/ha)	WCE (%)
1. Control (weedy Check)	57.1	78.07	176	51.50	20.59	66.4	4.80	-
2. Hoeing at 30 , 60 and 90 DAP	57.3	89.36	188	63.38	21.18	86.8	769	81.6
3. Atrazine @ 2 kg a.i./ha (PE) followed by 2, 4-D 1kg a.i./ha at 60 DAP	57.7	82.36	183	58.35	21.76	78.9	1317	68.5
4. Atrazine @ 2 kg a.i./ha (PE) after 1st Irrigation and hoeing followed by 2, 4-D 1kg a.i./ha at 75 DAP	56.2	81.31	184	57.00	21.67	77.1	1087	74.0
5. Metribuzine @ 1.25 kg a.i./ha (PE) followed by 2, 4-D 1kg a.i./ha at 75 DAP	55.2	86.91	186	61.64	21.02	83.3	916	78.1
6. Atrazine @ 2 kg a.i./ha (PE) + Almix 20 g a.i /ha at 75 DAP	57.6	83.79	181	59.01	21.51	79.8	1353	67.6
7. Metribuzine @ 1.25 kg a.i /ha (PE) + Almix 20 g a.i /ha at 75 DAP	56.1	81.72	183	57.35	21.59	77.4	1287	69.2
8. Atrazine @ 2 kg a.i./ha (PE) + Ethoxysulfuron 50 g a.i /ha at 75 DAP	58.0	82.40	182	56.39	21.55	76.2	1380	67.0
9. Atrazine @ 2 kg a.i./ha (PE) + Dicamba 350 g a.i /ha at 75 DAP	57.5	88.40	190	62.80	21.23	84.9	820	80.4
10. Metribuzine @ 1.25 kg a.i./ha (PE) + Dicamba 350 g a.i /ha at 75 DAP	55.6	88.90	189	63.68	21.88	86.1	786	81.2
S.Em.±	**1.3**	**3.47**	**3**	**2.21**	**1.08**	**3.2**	**79**	**-**
C.D. at 5%	**NS**	**NS**	**11**	**7.68**	**NS**	**10.9**	**273**	**-**

Cane yield (t/ha): The cane yield significantly influenced due to weed control treatments. The highest cane yield of 86.8 t/ha recorded in T_2 (three hoeings) which was closely followed by T_{10} (86.1 t/ha), T_9 (84.9 t/ha) and T_5 (83.3 t/ha). Among these treatments the cane yield recorded at par and gave significantly higher cane yield as compared to control (66.4 t/ha). The cane yield recorded lowest in untreated plot and at par with T_4 (77.1 t/ha) and T_8 (76.2 t/ha). However, all the treatments gave higher cane yield than untreated plot but recorded at par cane yield among themselves.

Summary: Three hoeings at 30, 60 and 90 DAP gave highest cane yield of 86.8 t/ha. The application of Atrazine at 2.0 kg/ha or Metrabuzin 1.25 kg/ha followed by Dicamba 350 a/ha at 75 DAP proved equally effective in reducing the weed intensity and increasing the cane yield during the experimentation. The application of Metribuzine at 1.25 kg/ha PE + 2,4 – D at 1.0 kg/ha at 75 DAP also proved effective in reducing the intensity of weeds and enhancing the cane yield.

Expt. No. 4 (AS- 64): Response of sugarcane crop to different plant nutrients in varied agro-ecological situations

Objective: To study differential response of sugarcane crop to different nutrients.

Treatments: 12

1.	**Control (no fertilizer)**
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.	**Soil test based fertilizer application**

Note: FYM was applied @ 20t/ha as common to all treatments.

RDF - 300:80:60 NPK/ha

Design: RBD Replications: 3 Plot size: 4.5 X 6 m2 (5 rows at 90 cm spacing)

Planting date: 30.04.2011 Variety: Co JN 86 – 600

Soil Fertility status:

S.No.	Properties	Value
1.	Available N	228 kg/ha
2.	Available P_2O_5	22.4 kg/ha
3.	Available K_2O	497 kg/ha
4.	S	16 kg/ha
5.	Zn	0.61 ppm
6.	Fe	8.7
7.	pH	7.8
8.	EC	0.17mmhos/cm
9.	OC (%)	0.49 %
10.	Soil Texture	Clay loam (deep black soils)

Results:

Germination (%): The germination percentage was not influenced due to various treatments during experimentation. However, germination per cent ranged between 56.98 to 59.57 per cent among treatments.

Tillers/ Shoots (000'/ha): The number of tillers increased significantly due to application of all plant nutrients and there was beneficial effect observed in increasing the number of tillers either with the application of the alone plant nutrients or in combination with major plant nutrients. The number of tillers increased significantly due to application of N alone (72.33), NP (80.33), NPK (84.67) and highest number of tillers recorded in NPK+S (87.00) than control plot (55.67). However, number of tillers values recorded in combination of NPK and other micro nutrients was at par.

Plant height (cm): The plant height increased significantly due to application of all plant nutrient treatments than control (169 cm). The significant increase in plant height was more apparent due to application of N alone (181cm) than control plots (169 cm) and plant height recorded at par among all plant nutrient treatments.

Net millable canes (NMC 000'/ha): the NMC influenced significantly due to application of nutrients either alone or in combination with NPK. Significantly higher NMC values recorded at N alone (68.52), NP (75.62), NPK (79.73) than control (52. 16). The application of NPK showed significantly higher values of NMC than the alone application of N but was at par in between an NP and NPK. Application of micronutrients with NPK although showed higher values of NMC but increase in NMC was not reached up to the level of significance.

Brix (%): The value of brix per cent did not differ significantly due to various treatments during experimentation. The brix percentage ranged between 21.29 to 22.15 per cent.

Cane Yield (t/ha): The cane yield increased significantly due to application of plant nutrients either alone or in combination with NPK. The increase in cane yield was more promised and recorded higher with application of N alone (69.24 t/ha), NP (78.81 t/ha) and NPK (81.79 t/ha) than control (53.19 t/ha). Application of all micronutrients with NPK although showed increase in cane yield but increase in yield was not reached up to the level of significance.

Table 4.(AS-64): Effect of different treatments on growth, yield and quality of sugarcane.

S.No.	Treatments	Germination (%)	Tillers (000'/ha)	Height (cm)	NMC (000'/ha)	Brix (%)	Yield (t/ha)
1	**Control**	59.57	55.67	169	52.16	21.40	53.19
2	**N**	57.41	72.33	181	68.52	21.37	69.24
3	**NP**	59.26	80.33	186	75.62	21.45	78.81
4	**NPK**	57.56	84.67	189	79.73	21.48	81.79
5	**NPK+S**	57.68	87.00	190	81.69	21.55	83.33
6	**NPK+Zn**	56.98	85.00	190	80.45	21.53	82.51
7	**NPK+Fe**	57.72	85.33	189	79.84	21.29	82.20
8	**NPK+Mn**	58.49	85.67	187	80.35	21.40	83.23
9	**NPK+S+Zn**	57.71	84.67	192	79.94	22.16	83.64
10	**NPK+S+Zn+Fe**	57.65	85.67	190	81.17	22.12	83.85
11	**NPK+S+Zn+Fe+Mn**	58.64	86.67	193	81.58	22.15	84.16
12	**Soil test based**	58.79	85.33	188	79.63	21.47	82.20
S Em ±		**1.03**	**2.70**	**3**	**3.28**	**0.28**	**3.42**
CD at 5%		**NS**	**7.91**	**9**	**9.60**	**NS**	**10.02**

Summary: The cane yield and yield attributes increased significantly due to application of major plant nutrients viz. N, NP and NPK than control (without fertilizers). Application of micronutrients with NPK although showed beneficial effects on crop growth and yield of the crop but increase in cane yield was not reached up to the level of significance.

Experiment no. 5 (AS 61): Optimizing irrigation schedule in sugarcane under different planting methods.

Objective: To enhance water and crop productivity in sugarcane**.**

Treatments: 9 (3 x3)

(i) Planting methods : 3

1, Conventional planting (at 90 cm row spacing)
2. Paired row planting (at 30:150 cm row spacing)
3. Paired cum Trench planting (at 30:150 cm row spacing)

(ii) Irrigation schedual (IW/CPE ratio) : 3

1. 0.6
2. 0.9
3. 1.2

Design :RBD – Factorial **Replication:** 3 **IW**=8.0 cm

Plot size: 10 x 7.2 m (8 rows) Date of Planting : 22.05.2011

Variety : Co 86032 Recommended dose of fertilizer: NPK (300:80:60 kg/ ha)

Results: The experiment failed due to late planting and poor germination.