Externally Funded Contract Research Project

Completion Report

on

Bio-efficacy and evaluation of fertilizer-PASP (Potassium salt of Active Phosphorus) in sugarcane plants and ratoon crop

Sponsoring Agency

ISHA Agro Sciences PVT LTD Pune (Maharashtra)

Submitted by

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Center wise report for the year 2021-22

LUCKNOW CENTRE

Project: Evaluation of PSAP on Growth, Yield and Quality of Sugarcane in Different Agro-Climatic Zones of the Country.

Objective of Trials:

1. To work out the optimum dose and schedule of PSAP application in sugarcane.
2. To assess the effect of PSAP on sugarcane growth, yield and juice quality.
3. To analyze the impact of the product on soil fertility and cultivation economics.

Methodology

Experiment was conducted at research farm of ICAR-Indian Institute of Sugarcane Research Lucknow. 10 treatments were replicated thrice and analyzed in RBD design. Planting of Colk 09204 variety at 120 cm spacing has been done on 29-02-2021. Initial set soaking with PSAP has been performed as per the technical program. Inter-culture operations were performed during the month of April and May. Foliar application of PSAP was done according to the different rate and days after planting which was guided in technical program.

Treatments

T_1: Recommended dose of NPK (RDF)
T_2: RDF+ Sett soaking with 0.8% PSAP solution
T_3: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)
T_6: Recommended N, 50% P and 50% K
T_7: T_6+ Sett soaking with 0.8% PSAP solution
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)
T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)

Results

Initial soil data Bulk density: 1.21 g/cc infiltration rate: 6.0 mm/hr, Porosity: 33.33%, organic carbon: 0.41%, soil pH: 7.17, EC: 0.11, available N: 264.23 Kg / ha, P_2O_5:24.19 Kg / ha, K_2O: 350.45 in Kg / ha

Data on germination count at 30 and 45 DAP showed that highest germination % was found in treatment T_9 (18.19 at 30 DAP, 28.5% at 45 DAP) which was at par with treatment T_{10} (17.37 at 30 DAP, 27.20 % at 45 DAP) while lowest was found in T_2 (12.14 at 30 DAP, 17.5% at 45 DAP) treatment.

Table 1 Effect of treatment on germination%, plant height, plant fresh and dry weight

Treatments	Germination %	Plant Height (cm) at tillering stage	Fresh and dry weight (gm)/cane at tillering stage			
			Stem Fresh weight	Stem dry weight	Leaf fresh weight	Leaf dry weight
T_1:Recommended dose of NPK (RDF)	15.10	97.13	103.00	23.52	89.67	45.36
T_2:RDF+ Sett soaking with 0.8% PSAP solution	11.89	94.80	76.67	13.74	88.50	43.78
T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	13.70	94.27	74.67	21.20	132.33	62.66
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	12.14	94.07	103.50	26.84	84.17	40.50
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	16.26	97.47	95.33	20.65	106.17	50.42
T_6: Recommended N, 50% P and 50% K	18.19	99.67	107.83	26.62	111.17	61.72
T_7: T_6+ Sett soaking with 0.8% PSAP solution	14.40	97.67	103.17	25.50	100.50	48.44
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	14.98	93.67	122.67	25.64	121.93	45.47
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	17.37	102.00	87.67	18.78	109.33	41.15
T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	16.50	97.87	117.67	26.41	86.00	34.04
SEm±	0.41	2.71	3.05	0.68	2.57	1.06
CD	1.22	NS	9.05	2.02	7.64	3.14

- The data recorded on fresh stem weight showed that highest fresh weight was found in treatment T8(122.6g) which was significantly higher than all treatment except treatment T10. The lowest fresh stem weight was observed in T3 (74.67g) treatment.
- Similarly highest dry weight was reported in T4 (26.84g) treatment, it was statistically higher than treatments T1, T2, T3, T4, T5 and T9 and at par with remaining treatments. The lowest stem dry weight found in T2(13.74g).
- The highest fresh (121.93g) and dry leaf weight (62.66g)/ plant were measured in treatment T3, which was significantly higher than all the treatments in case of fresh weight.

Table 2 Effect of treatment on tillering pattern of sugarcane plant crop

Treatments	Tiller counts/ha		
	May	June	July
T_1:Recommended dose of NPK (RDF)	21450.62	32047.33	37397.12
T_2:RDF+ Sett soaking with 0.8% PSAP solution	17746.91	32615.23	40380.66

T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	19855.97	34646.09	39351.85
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	17541.15	31172.84	37757.20
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	23919.75	38580.25	36522.63
T_6: Recommended N, 50% P and 50% K	25205.76	36831.28	41872.43
T_7: T_6+ Sett soaking with 0.8% PSAP solution	23174.90	39300.41	41152.26
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	20010.29	27674.90	36779.84
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	24794.24	33590.53	39094.65
T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	22685.19	37705.76	34310.70
SEm±	589.62	679.91	768.49
CD	1751.86	2020.11	2283.30

- Plant height data at tillering stage did not affect significantly due to the treatment while maximum plant height (102 cm) was recorded at T_9 treatment.
- Plant dry weight at tillering stage data showed that maximum dry weight (stem +leaf)/cane (89.50 g/cane) was found in T_9 treatment which was at par with T_{10} treatment whereas minimum was found in T_2 treatment.
- Tillering data at periodic interval revealed that maximum tiller count/ha (25205.76 May, 39300.41 June and 41872.43 July) was found in T_9 treatment which was at par with T_{10} treatment. Minimum tiller count/ha was found in T_2 treatment.

Table 3 effect of different PSAP treatments of yield parameters and yield of sugarcane

Treatments	**Length (cm)**	**Girth (mm)**	**Cane weight (kg)**	**NMC 000/ha**	**Yield t/ha**
T_1:Recommended dose of NPK (RDF)	171.20	21.26	0.67	49451.30	39.09
T_2:RDF+ Sett soaking with 0.8% PSAP solution	170.67	22.81	0.71	50651.58	32.00
T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	175.53	22.42	0.70	50137.17	32.20
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	158.40	21.48	0.65	51406.04	30.66
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	160.73	22.37	0.71	52366.26	41.26
T_6: Recommended N, 50% P and 50% K	174.73	21.43	0.64	49897.12	37.86
T_7: T_6+ Sett soaking with 0.8% PSAP solution	155.60	23.45	0.71	51783.26	39.51
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	161.07	23.81	0.72	50685.87	41.26
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	177.73	21.18	0.74	53566.53	42.28

T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	174.40	20.06	0.75	52537.72	41.77
SEm±	4.08	0.59	0.02	357.20	1.49
CD	12.13	1.76	0.06	1061.30	4.44

- Data recorded on single cane parameters showed that lengthiest cane was measured in T9 (177.73 cm) treatment which was statistically superior to T4, T5, T7, and T8 and remained at par with T1, T2, T3, T6 and T10. The smallest cane (155.6 cm) was measured in the treatments T7.
- In the case of average cane girth the thickest cane was reported in the treatment T8 (23.81mm) followed by T7. The treatments T8 thickening was significantly higher than T1, T4, and T10 but at par with remaining treatments. The thinnest cane was measured in the treatment T10 (20.06 mm).
- Regarding observation on cane weight it was reported that the heaviest cane was weighted in the treatment T10 (0.75 kg), it was statistically superior to T1 and T3 while remaining treatments lesser in weight. Lightest cane weight was found the treatment T6 (0.64 kg)
- In present investigation the maximum cane yield was obtained from treatment T9 (42.28 t/ha), as the number of millable cane was higher in the particular treatment. It was statistically superior to treatments T2, T3 and T4 treatments but remain similar with T1, T5, T6, T7, T8 and T10 treatments. The lowest cane yield (30.66t/ha) was weighted in the treatments T4.

COIMBATORE CENTRE

AS-76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality.

The experiment on evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality was initiated during March 2021. The experiment was conducted in randomized Block Design with three replications and 12 treatments. The treatment includes T_1- Application of RDF without sett soaking, T_2- RDF+ sett soaking with 0.8 % PSAP solution, T_3- Recommended N, 50 % P and 50% K, T_4- T_3 + sett soaking with 0.8% PSAP solution, T_5- T_2 + Foliar spray of PSAP @0.4, 0.65 and 0.8 at 60, 90 and 120 DAP, T_6- T_2 + + Foliar spray of PSAP @0.4, 0.65 and 1.10 at 60, 90 and 120 DAP, T_7- T_2 + + Foliar spray of PSAP @0.4, 0.65, 1.10 and 1.10 at 60, 80,100 and 120 DAP, T_8- T_4 + Foliar spray of PSAP @0.4, 0.65, 0.8 and 1.10 at 60, 90 and 120 DAP, T_9 - T_4 + Foliar spray of PSAP @0.4, 0.65 and 1.10 at 60, 90 and 120 DAP, T_{10}- T_4 + Foliar spray of PSAP @0.4, 0.65, 1.10 and 1.10 at 60, 80,100 and 120 DAP. Juice analysis done at 10thand 12thmonths after planting revealed that nutrient management had no effect on juice quality parameters. The crop was harvested after twelve months and NMC, cane height, cane girth, number of nodes, cane weight, and cane yield per plot were recorded. PSAP-based nutrient management in plant sugarcane crop showed better cane yield in plant crop with sett soaking with 0.8% PSAP solution + recommended N, 50 % P and 50% K+ foliar spray of PSAP @0.4, 0.65, 1.10 and 1.10 at 60, 80,100 and 120 DAP.

Table 3: Yield and yield attributes as influenced by different treatments

Treatments	Cane height (cm)	Cane girth (mm)	SCW (kg)	NMC ($100x10^3$)	Cane Yield (t/ha)
100% RDF + WSS	201.7	28.5	1.27	93.31	118.2
100% RDF + SS (0.8% PSAP)	214.5	28.7	1.29	96.11	123.9
100% N + 50% PK +WSS	196.1	26.2	1.18	91.74	92.9
100% N + 50% PK +SS(0.8% PSAP)	206.7	26.9	1.16	94.10	109.3
100% RDF+SS+ three FS(0.4,0.65, 0.8% PSAP)	212.2	29.9	1.40	92.01	128.9
100% RDF+SS+ three FS(0.4,0.65,1.1% PSAP)	217.3	30.3	1.42	94.92	133.2
100% RDF+SS+ four FS(0.4,0.65,1.1,1.1)	218.9	30.5	1.44	95.63	137.8
100%N +50% PK+SS+ four FS(0.4, 0.65, 0.8 and 1.1% PSAP)	217.2	29.4	1.33	89.24	118.6
100%N +50% PK+SS+ three FS(0.4, 0.65 and 1.1% PSAP)	222.2	30.1	1.43	90.58	128.8
100%N +50% PK+SS+four FS(0.4, 0.65, 1.1 and 1.1% PSAP)	221.1	30.6	1.45	98.29	139.7
SED	10.36	1.15	0.06	3.19	9.15
CD	NS	2.39	1.12	6.66	19.10

RDF: Recommended dose of fertilizers, **WSS**: Without sett soaking, **SS**: Sett soaking **FS**: Foliar spray

Table 4: Juice quality parameters as influenced by different treatments

Treatments	Sucrose (%)	CCS (%)	CCS Yield (t/ha)
100% RDF + WSS	19.36	13.99	16.53
100% RDF + SS (0.8% PSAP)	19.17	13.82	17.10
100% N + 50% PK +WSS	19.49	14.18	13.29
100% N + 50% PK +SS(0.8% PSAP)	19.78	14.27	15.58
100% RDF+SS+ three FS(0.4,0.65, 0.8% PSAP)	18.96	13.69	17.76
100% RDF+SS+ three FS(0.4,0.65,1.1% PSAP)	19.46	14.21	18.92
100% RDF + SS+ four FS(0.4,0.65,1.1,1.1)	20.17	14.75	20.34
100% N +50% PK +SS + four FS(0.4, 0.65, 0.8 and 1.1% PSAP)	19.87	14.78	17.50
100%N +50% PK+ SS+ three FS(0.4, 0.65 and 1.1% PSAP)	19.98	14.60	18.83
100%N +50% PK+SS+four FS(0.4, 0.65, 1.1 and 1.1% PSAP)	20.08	14.75	20.62
SED	0.79	0.77	1.77
CD	NS	NS	3.66

RDF: Recommended dose of fertilizers, **WSS**: Without sett soaking, **SS**: Sett soaking **FS**: Foliar spray

GURDASPUR CENTRE

AS-76	**:**	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality**
Objective	:	1. To work out the optimum dose and schedule of PSAP application in sugarcane crop. 2. To assess the effect of PSAP on sugarcane growth, yield and juice quality. 3. To analyse the impact of the product on soil fertility and cultivation economics.
Year of start	:	2021 (to be carried out for two consecutive years)

Treatment details:

T1- Recommended dose of NPK
T2- RDF + Sett soaking with 0.8% PSAP solution
T3- Recommended N, 50% P and 50% K
T4- T3 + Sett soaking with 0.8% PSAP solution
T5- T2 + Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP
T6- T2 + Foliar spray of PSAP @ 0.4, 0.65 & 1.10% @ 60, 90 & 120 DAP
T7- T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP
T8- T4+ Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP
T9- T4 + Foliar spray of PSAP @ 0.4, 0.65 & 1.10% @ 60, 90 & 120 DAP
T10- T4 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP

The experiment was started in spring 2020-21 in Randomized Block Design for evaluating efficacy of PSAP. Variety CoPB 96 was planted at a spacing of 120 cm. Recommended dose of NPK in sugarcane was given to the crop along with sett soaking and foliar spray of PSAP which was split as per the treatments. The crop was raised as per package of practices of the PAU, Ludhiana.

Higher germination (34.7%) was observed in treatment T8 (T4+ Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP) over all other treatments. There was no significant difference among different treatments with respect to germination. Significantly higher NMC (110.0 thousand/ha) was recorded in T7 (T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP) which was at par with treatments T5, T6, T8, T9 and T10 treatments among other treatments. Significantly higher cane girth (2.20 cm) was recorded with treatment T9 (T4 + Foliar spray of PSAP @ 0.4, 0.65 & 1.10% @ 60, 90 & 120 DAP) which was at par with treatments T2 and T4 among all other treatments. Higher cane yield (93.53 t/ha), CCS (14.07) and CCS (12.92 t/ha) was recorded with treatments T10, T7 and T9, respectively as there is no significant effect of different treatments.

Table 7: Effect of PSAP on enhancement of sugarcane growth, yield and quality.

Treatments	Germination (%)	NMC (000/ha)	Girth (cm)	Cane Yield (t/ha)	CCS (%)	CCS (t/ha)
T1	30.7	86.3	2.10	82.80	13.53	11.22
T2	32.7	90.3	2.17	82.93	13.60	11.28
T3	28.0	92.7	2.03	84.27	13.88	11.69
T4	32.3	94.7	2.13	80.83	13.85	11.17
T5	31.0	101.7	2.07	87.07	13.68	11.90
T6	29.0	106.0	2.03	89.37	13.83	12.37
T7	32.7	110.0	2.10	90.57	14.07	12.75
T8	34.7	104.3	2.10	92.23	13.83	12.74
T9	34.0	107.7	2.20	93.07	13.88	12.92
T10	33.0	105.7	2.03	93.53	13.75	12.87
CD at 5%	NS	14.1	0.09	NS	NS	NS

KOLHAPUR CENTRE

Name of the trial		**AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality * (Sponsored trial)**
Objective		1. To work out the optimum dose and schedule of PSAP application in sugarcane crop 2. To assess the effect of PSAP on sugarcane growth, yield and juice quality 3. To analyse the impact of the product on soil fertility and cultivation economics
Year of Start		2021 (to be carried out for two consecutive years)
Treatments (10)	**T_1**	Recommended dose of NPK (RDF)
	T_2	RDF + sett soaking with 0.8 % PSAP solution
	T_3	Recommended N, 50% P and 50% K
	T_4	T_3 + sett soaking with 0.8 % PSAP solution
	T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
	T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
	T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
	T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
	T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
	T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
Season		: Seasonal/Suru 2021
Plot size		: 6 m x 6 R x 1.2 m
Fertilizer Dose		: 250: 115: 115 N: P_2O_5:K_2O kg/ha.
Design and Replications		: RBD and Three
Date of Planting		: 11/02/2021
Crop duration		: 12 months
Observations to be recorded		1. Germination count/ plant population at 30 and 45 DAP 2. Tiller population at monthly interval 3. Millable canes, length, girth and cane weight at harvest 4. Cane and sugar yield 5. Juice quality parameters (Brix, pol, purity) at 10 and 12 months age 6. Soil analysis initial and after harvest of each crop (bulk density, infiltration rate, organic carbon, soil pH, EC, available N, P_2O_5, K_2O in kg/ha) 7. Economics 8. Nutrient uptake (N, P, K)) at harvest 9. Soil microbial parameters (optional) 10. Phyto-toxicity to sugarcane crop, if any. Visual observations to be recorded and reported.

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality influenced during 10 months crop age * (Sponsored trial)

Sr. No.	Treatment	Germination % (30 DAP)	No. of tillers ('000/ ha) 120 days	Stalk length (cm)	Stalk diameter (cm)	Avg. cane wt. (kg)	° Brix	Sucrose %	Purity %	CCS %
1	T_1	60.22	92.21	230.00	2.67	1.20	18.59	13.89	74.41	8.64
2	T_2	54.66	86.96	203.33	2.53	0.96	17.75	13.45	73.33	8.56
3	T_3	55.89	87.19	220.00	2.62	0.96	18.25	13.58	73.71	8.55
4	T_4	57.99	89.97	230.00	2.62	1.06	18.25	13.66	74.41	8.63
5	T_5	60.88	100.00	243.33	2.82	1.24	18.75	13.95	74.58	8.73
6	T_6	60.99	100.46	250.00	2.91	1.18	18.92	13.96	73.52	8.74
7	T_7	62.22	106.40	253.33	3.02	1.41	19.59	14.24	75.75	9.20
8	T_8	62.00	101.62	250.00	3.01	1.41	19.59	14.16	74.85	8.79
9	T_9	64.78	110.11	256.67	3.24	1.52	19.92	16.36	78.81	10.64
10	T_{10}	61.22	101.23	250.00	3.00	1.32	19.09	13.97	74.70	8.76
	Mean	**60.06**	97.62	**238.67**	**2.84**	**1.23**	**18.87**	**14.12**	**74.81**	**8.92**
	SE (m)±	5.26	4.68	8.882	0.102	0.071	0.325	0.172	0.775	0.169
	CD at 5%	**NS**	14.02	26.594	0.305	0.213	0.972	0.515	2.320	0.505
	CV %	15.12	8.31	6.446	6.200	10.050	2.979	2.108	1.794	3.28

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality influenced during 12 months crop age * (Sponsored trial)

Sr. No.	Treatment	Stalk length (cm)	Stalk diameter (cm)	Avg. cane wt. (kg)	NMC (000 ha^{-1}) at harvest	Cane yield (t ha^{-1})	CCS (t ha^{-1})	° Brix	Sucrose %	Purity %	CCS %
1	T_1	250.00	2.76	1.18	85.26	96.70	12.02	21.08	17.83	86.89	12.08
2	T_2	244.33	2.67	1.00	79.32	92.75	10.03	21.06	16.56	81.66	10.81
3	T_3	244.00	2.84	1.00	81.79	96.22	11.01	21.08	16.64	84.27	11.40
4	T_4	249.67	2.84	1.10	84.80	93.28	11.61	21.08	17.05	85.86	11.42
5	T_5	250.33	2.76	1.23	87.50	104.78	13.18	21.18	18.15	88.30	12.31
6	T_6	255.00	2.93	1.27	88.50	115.03	14.49	21.22	18.52	90.60	12.85
7	T_7	262.33	3.03	1.47	92.75	123.90	17.25	21.49	19.64	92.62	13.86
8	T_8	261.67	2.98	1.40	91.83	119.98	16.14	21.45	19.53	92.19	13.80
9	T_9	271.00	3.18	1.57	96.22	136.47	18.81	21.52	19.75	93.19	13.92
10	T_{10}	255.00	2.98	1.30	90.82	116.43	14.58	21.32	19.51	91.56	13.78
	Mean	**254.33**	**2.89**	**1.25**	**87.87**	**109.55**	**13.91**	**21.25**	**18.31**	**88.71**	**12.62**
	SE (m)±	3.69	0.08	0.087	2.35	8.06	1.06	0.12	0.51	1.75	0.49
	CD at 5%	11.06	0.23	0.260	7.05	24.15	3.16	0.35	1.52	5.25	1.46
	CV %	11.45	4.55	12.01	4.64	12.75	13.16	4.78	4.80	3.43	6.70

Note:

1. The sugarcane planting date was 11th Feb 2021
2. The rainfall during tillering stage i.e. May (122 mm received in 5 Rainy days) and June 2021 (360.6 mm in 14 Rainy days)
3. Post tillering stage coincided during July 2021 received 744.2 mm was received in 21 rainy days all the
4. Field trials was submerged for 8 days and approx. 20 feet of water level was noticed in the field and silting was noticed which affected yield attributes.
5. Grand growth stage coincided during August and Sept 2021 received 290.9 mm in 32 rainy days.

6. During October to December 253 mm rainfall occurred in 16 rainy days. During this period field was stagnated with water there by side shoots were noticed and formation of aerial root was noted in all the field trials.
7. In the December month the **Monitoring Team** also visited the field and has noted the same also directed the center to inform the same in the report.
8. Over all the yield of the crop was considerably decreased due the flood followed by stagnation of water for more than 8 days damaging the apical portion, silting further, extended rainy season affected the field condition.

NAYGARH CENTRE

AS 76:	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality (Sponsored trial)**
Year of initiation	2021 (to be carried out for two consecutive years)
Design	RBD
Treatments	10
Replication	3
Variety	Co Or 03151
Recommended fertilizer dose	250:100:60 N: P_2O_5: K_2O kg /ha
Plot size	6 rows of 6m length
Spacing	120 cm between rows with 3 bud setts
Date of planting	06.01.2021
Date of harvest	07.01.2022

Treatment Details:

T_1	Recommended dose of NPK (RDF)
T_2	RDF + sett soaking with 0.8 % PSAP solution
T_3	Recommended N, 50% P and 50% K
T_4	T3 + sett soaking with 0.8 % PSAP solution
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP

AS 76.1 Effect of PSAP application on germination, no. of shoots and yield parameters of sugarcane

Treatments		Germination %		No of shoots (000/ha)		Length of cane (m)	Girth of cane (cm)	Weight of cane (kg)
		30 DAP	45 DAP	120 DAP	180 DAP			
T_1	Recommended dose of NPK (RDF)	38.87	55.53	81.77	80.87	2.70	1.94	1.28
T_2	RDF + sett soaking with 0.8 % PSAP solution	40.17	56.83	84.23	81.93	2.78	2.03	1.29
T_3	Recommended N, 50% P and 50% K	35.23	42.90	76.13	75.23	2.23	1.68	1.03
T_4	T3 + sett soaking with 0.8 % PSAP solution	38.33	45.33	78.07	77.17	2.27	1.75	1.08
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	41.37	54.70	83.13	82.92	2.91	2.30	1.42
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	41.03	55.03	91.37	90.27	3.03	2.38	1.44
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	44.47	56.47	92.63	91.73	3.34	2.58	1.46
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	39.24	48.24	78.13	77.23	2.61	2.04	1.31
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	38.87	48.87	83.63	82.73	2.76	2.23	1.35
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	40.17	48.50	85.37	84.80	3.06	2.38	1.37
SEm ±		1.44	2.46	2.66	2.57	0.14	0.15	0.06
CD at 5 %		4.27	7.31	7.91	7.62	0.40	0.43	0.17
CV%		6.25	8.32	6.53	6.39	8.52	9.82	7.70

AS 76.2 Effect of PSAP application on yield and quality of sugarcane

Treatments	Brix %	NMC ('000/ha)	Cane yield (t/ha)	CCS %	CCS (t/ha)

T_1	Recommended dose of NPK (RDF)	18.76	73.50	93.98	11.03	10.37
T_2	RDF + sett soaking with 0.8 % PSAP solution	19.11	75.23	96.79	11.35	10.98
T_3	Recommended N, 50% P and 50% K	18.73	69.87	71.66	10.70	7.67
T_4	T3 + sett soaking with 0.8 % PSAP solution	18.76	71.80	77.61	10.77	8.38
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	18.90	77.55	110.07	11.45	12.60
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	18.97	81.57	116.97	11.58	13.52
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	19.34	85.03	122.48	11.60	14.16
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	18.87	71.87	94.07	11.23	10.55
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	18.93	76.70	104.00	11.33	11.81
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	19.24	79.43	109.02	11.56	12.60
SEm $\pm$		0.30	2.82	4.55	0.36	0.58
CD at 5 %		NS	8.36	13.52	NS	1.73
CV%		4.73	6.40	7.91	5.52	8.96

The experiment was laid out in randomized block design with ten treatments as per the technical programme on red laterite soil of the experimental farm of Sugarcane Research Station, Nayagarh. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dsm-1. Available N content was in lower range (155 kg/ha), but the soil was medium in available P (19.6 kg/ha) and (K 164 kg/ha) content. There is significant difference among treatment for all the parameters like germination %, shoot count, length of cane, girth of cane, weight of cane, Net Millable Cane count, cane yield and CCS yield. Out of the ten treatments, application of RDF + sett soaking with 0.8 %

PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP i.e T_7 proved to be the best with highest number of net millable canes (85.03 th/ha), cane (122.48 t/ha) and CCS yield (14.16.t/ha). However this treatment is at par with treatment T_6 (i.e application of RDF + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP) and T_{10} (i.e application of recommended N, 50% P and 50% K + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP). The higher yield parameters i.e. number of shoots/ha, weight, length and girth of cane in the above mentioned treatments were the factors of higher cane and CCS yield. This suggests, the crop responds better to foliar application of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP along with sett soaking with 0.8 % PSAP solution.

PUNE CENTRE

Project No. **: AS 76**

Title **: Evaluation of PSAP on AICRP in Sugarcane at given Varieties in different agro climatic zones**

Objectives **:**

1. To work out the optimum dose and schedule of PSAP application in sugarcane.
2. To assess the effect of PSAP on sugarcane growth, yield and juice quality.
3. To analyse the impact of the product on soil fertility and cultivation economics.

Principal Investigator : Dr. Preeti Deshmukh, Scientist & Head

Co-principal Investigator : Mr. S. B. Bramhe

Soil **:** Black cotton soil

Design **:** RBD

Replication **:** Three

Spacing **:** 4.5”

Plot size **:** 54.8m^2

Planting season **:** Suru

Variety **:** Co 86032

Location **:** Vasanatdada Farm

Date of Planting **:** 27.01.2021

Date of harvesting **:** 26.02.2022

Year of commencement **:** 2020-21

Year of completion **:** 2023-24

Treatment Details:

Tl 100% RD (Recommended Dose) of Fertilizers through Soil- Control Plot -1

T2- Tl + sett soaking with 0.8% PSAP solution

T3- T2 + 12.5 Kg PSAP/Ha PSAP 3 in three foliar sprays at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%

T4 -T2 + 15 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%

T5 - T2 + 25 kg/ha PSAP 3 in three four spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @ 100 DAP@1.1% and 120 DAP@1.1%

T6 – Control-2, RDF N 100% and 50% P & K

T7 – T6 + sett soaking with 0.8% PSAP solution

T8 - T6 + 12.5 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%

T9 – T6 - 15 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%

T10 – T6- 25 kg/ha PSAP 3 in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @ 100 DAP@1.1% and 120 DAP@1.1%

Results:

The field experiment was conducted to study the Evaluation of PSAP on AICRP in sugarcane at given varieties in different agro climatic zones. The data with respect to cane yield, sugar yield, growth parameters, juice quality and economics are presented in Table 1.

Cane yield:

The cane yield data showed that maximum cane yield (118.4 tha^{-1}) obtained in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at 45,60,90 and 120 days after planting was found significantly superior over RDF (106.1 tha^{-1}). The cane yield (115.4 tha^{-1}) obtained in treatment T10 where applied recommended dose of fertilizer (N 100% and 50% P & K) along with foliar application of PSAP @ 25kg/ha in four splits at 45,60,90 and 120days after planting was found significantly superior over RDF (102.0) where applied RDF (N 100% and 50% P & K). This might be due to the high content of available soil phosphorus and potassium.

Commercial Cane Sugar Yield

The numerically maximum CCS yield (17.28 t ha^{-1}) in treatment T4 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 15kg/ha in three splits at ,60,90 and 120 days after planting and differences was found non-significant.

Plant population

The numerically highest plant population (91.1 thousand ha^{-1}) was recorded in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at 60, 80,100 and 120 days after planting. Foliar application of PSAP in different splits was found non-significant for number of millibale canes.

Growth parameters

The maximum milliable cane height (230.4 cm) was recorded in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at,60,80,100 and 120 days after planting followed by (226.3 cm) was recorded in treatment T4 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 15kg/ha in four splits at,60,90 and 120 days after planting was found significantly superior over RDF (207.6 cm).

Cane girth was significantly increased in treatment T5 (9.08) where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at, 60, 80,100 and 120 days after planting over RDF (8.08). The data of no. of internode was found more or less same in all the treatments.

Juice quality

The juice quality parameters with respect to brix, pol, purity and CCS % were not affected by application of fertilizers in splits.

Economical evaluation

The highest benefit cost ratio (1.78) where applied RDF (N 100% and 50% P & K) followed by 1.73 where applied 100% RDF

Conclusion

The results concluded that application of recommended dose of fertilizer alongwith foliar application of PSAP @25kg/ha in four spilts increased the cane yield by 12.3 tha^{-1} but application of recommended dose of fertilizer is found to be economical.

Table 1: Effect of PSAP on sugarcane growth parameters

Treatment	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})	B:C ratio	No. of milliable cane ('000') ha	Milliable cane height (cm)	No. of Internode	Girth (cm)	CCS %
T1 – Control – 1, 100% RDF	106.1	15.68	1.73	85.3	207.6	19.6	8.08	14.45
T2 – T1+ sett soaking with 0.8% PSAP solution	109.2	16.54	1.74	83.4	210.4	20.1	8.11	15.16
T3:T2 + 12.5 Kg PSAP/Ha PSAP 3 in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	112.3	16.76	1.59	91.0	215.9	20.2	8.66	15.24
T4 -T2 + 15 kg/ha PSAP 3 in three foliar spray at 60DAP@0.40%,90DAP@0.65 and120 DAP@1.1%	113.5	17.28	1.57	88.2	226.3	19.1	8.96	15.23
T5 - T2 + 25 kg/ha PSAP 3 in four foliar spray at 60DAP@0.40%,80DAP@0.65%@100 DAP@1.1% and 120 DAP@1.1%	118.4	16.93	1.50	91.1	230.4	18.6	9.08	15.63
T6 – Control-2, RDF N 100% and 50% P & K	102.0	15.92	1.74	83.5	206.2	19.6	8.13	14.61
T7 – T6 + sett soaking with 0.8% PSAP solution	106.4	15.58	1.78	84.0	209.1	19.8	8.23	14.62
T8 - T6 + 12.5 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	107.6	15.73	1.58	84.7	215.9	19.6	8.31	14.59
T9 – T6 - 15 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	112.1	16.71	1.61	89.6	219.3	20.1	8.38	14.91
T10 – T6- 25 kg/ha PSAP 3 in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	115.4	17.03	1.51	84.1	220.9	18.9	8.43	14.76
SE CD	3.18 9.45	0.58 NS		2.32 NS	5.01 14.88	0.30 NS	0.29 0.87	0.31 NS

PUSA CENTRE

AS 76.Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality (sponsored trial) 2021-22

The data on growth, yield attributes, cane yield and quality parameters of sugarcane have been placed from Table 8 and 9.

Treatments showed remarkable variation in germination percent, single cane weight and cane yield. Though tillers plant height, millable canes, brix, pol and purity percent juice was found to non-significant. Higher single cane weight (1460 g/ plant) was noticed due to the treatment T_6 (RDF + sett soaking with 0.8% PSAP solution + foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP which was followed by treatment T_5 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP) and T_7 (T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP). Treatment T_7 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP) showed significantly higher cane yield (105.0 t/ ha) which was statistically similar to T_6 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP), T_5 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP), T_2 (RDF + sett soaking with 0.8% PSAP solution) and T_{10} (T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP). Though lowest cane yield (76.4 t/ ha) was noticed due to the treatment T_3 (Recommended N, 50% P and 50% K).

Summary:

Treatment T_7 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP) was equally effective as T_6 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP), T_5 (T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP), T_2 (RDF + sett soaking with 0.8% PSAP solution) and T_{10} (T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP) for better productivity.

Table 8: AS 76.Effect of PSAP on growth and yield attributes of sugarcane (sponsored trial) 2021-22

Treatment	Germination (%) at 45 DAP	Tillers ($\times 10^3$/ha) at 120 DAP	Plant height (cm)	Millable canes ($\times 10^3$/ha)	Single Cane Weight (g)
Early promising genotype					
T_1- Recommended dose of NPK (RDF)	27.3	114.3	285.3	70.4	1140
T_2 – RDF + sett soaking with 0.8% PSAP solution	27.6	117.6	299.3	70.9	1328
T_3 – Recommended N, 50% P and 50% K	35.0	111.5	295.7	71.5	1090
T_4 – **T_3** + sett soaking with 0.8% PSAP solution	27.8	116.4	285.7	70.3	1148
T_5 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	25.9	121.9	302.6	69.8	1427
T_6 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	25.2	124.6	304.7	70.6	1460
T_7 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	33.4	131.9	308.0	77.8	1410
T_8 – **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	28.7	114.9	299.0	69.9	1193
T_9– **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP	30.9	114.7	292.7	70.6	1196
T_{10}– **T_4** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	32.7	115.1	297.3	69.7	1330
SEm±	1.92	6.53	13.93	3.83	77.3
CD (P=0.05)	5.7	NS	NS	NS	230
CV %	11.3	9.6	8.1	9.3	11

Table 9: AS 76. Effect of PSAP on yield and quality of sugarcane (sponsored trial) 2021-22

Treatment	Cane yield (t/ha)	Brix (%)	Pol (%)	Purity (%)
Early promising genotype				
T_1- Recommended dose of NPK (RDF)	79.1	21.5	18.78	87.8
T_2 – RDF + sett soaking with 0.8% PSAP solution	92.5	20.7	18.18	87.7
T_3 – Recommended N, 50% P and 50% K	76.4	20.6	18.19	88.0
T_4 – **T_3** + sett soaking with 0.8% PSAP solution	79.7	21.1	18.38	87.3
T_5 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	99.1	20.7	18.26	88.1
T_6 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	102.2	21.1	18.42	87.1
T_7 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	105.0	20.9	18.32	87.7
T_8 – **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	82.7	21.1	18.39	87.3
T_9– **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP	83.2	20.8	18.22	87.8
T_{10}– **T_4** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	92.0	21.1	18.46	87.5
SEm±	4.88	0.31	0.165	0.56
CD (P=0.05)	14.5	NS	NS	NS
CV %	9.5	2.6	1.56	1.1

SANKESHWAR CENTRE

1	**Project No.**	**AICRP (AS 76)**
2	Department	Sugarcane Agronomy
3	Project Title	AS-76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality
4	Objectives	• To work out the optimum dose and schedule of PSAP application in sugarcane crop • To assess the effect of PSAP on sugarcane growth, yield and juice quality • To analyse the impact of the product on soil fertility and cultivation economics
5	Project Leader Associate	Dr. S.S. Nooli, Agronomist, AICRP (S)
6	New/Continued	New
7	Year of Start	2021
8	Design	RBD
9	Treatments	T_1-Recommended dose of NPK (RDF) T_2-RDF + sett soaking with 0.8 % PSAP solution T_3-Recommended N, 50% P and 50% K T_4-T_3 + sett soaking with 0.8 % PSAP solution T_5-T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP T_6-T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP T_7-T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP T_8-T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP T_9-T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP T_{10}-T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
10	a) No. of Replications	3
	b) Plot Size	6.75 m X 6 m =40.5 m^2
	c) Date of planting	23-12-2020
	d) Date of harvest	17-01-2022
	e) Plot No	11
	f) Variety	CoSnk 15104 (SNK 09227)

Results

Yield and yield attributes (Table 3)

Sett soaking with 0.8 % PSAP solution with recommended dose of fertilizer followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP recorded significantly higher cane yield of 137.66 t/ha which was on par with and RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90

and 120 DAP (T_6) (129.90 t/ha) and RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP (T_5) (125.70 t/ha). Single cane weight and NMC followed the same trend .

Juice quality (Table 4)

Quality parameter *viz.,* per cent brix, pol, purity and CSS did not differ due to the sett soaking and foliar application of PSAP. However, RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP recorded significantly higher sugar yield of 16.12 t/ha as compared to other treatment combinations .

Economics (Table 9)

Significantly higher net returns (Rs 251648 ha^{-1}) was recorded with RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP than other trements. However, higher B:C ratio (2.97) was recorded in Recommended dose of fertilizer (RDF).

Conclusion

- Sett soaking with 0.8 % PSAP solution with recommended dose of fertilizer followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP recorded significantly higher cane yield.
- Foliar application of PSAP performed better over and above with the application of RDF.
- Higher net returns were recorded with RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP. However, due to higher market price of PSAP and application rate higher B:C ratio was recorded in RDF.

Initial composite soil sample properties of the site

Chemical properties

pH (1:2.5)	EC (dS/m) (1:2.5)	Available nutrients (kg/ha)			OC (%)
		N	P_2O_5	K_2O	
7.79	0.35	247.1	37.2	439.1	0.53

Physical properties

Sand (%)	Fine sand (%)	Silt (%)	Clay (%)
7.8	8.3	25.2	58.7
Bulk density (gm cc^{-1})		Infiltration rate (cm hr^{-1})	
1.29		0.46	

Table 1 Effect of PSAP on germination of plant cane

Treatment details		Germination count ('000 ha^{-1})	
		30 DAP	**45 DAP**
T_1	Recommended dose of NPK (RDF)	29.21	36.40
T_2	RDF + sett soaking with 0.8 % PSAP solution	32.93	38.60
T_3	Recommended N, 50% P and 50% K	28.61	35.20
T_4	T_3 + sett soaking with 0.8 % PSAP solution	30.67	39.10
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	34.04	42.24
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	35.42	43.64
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	35.52	45.04
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	31.18	39.16
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	33.15	40.12
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	33.35	40.15
S. Em. ±		**1.25**	**1.54**
CD (P=0.05)		**3.64**	**4.48**

Table 2. Effect of PSAP on tiller count of plant cane

Treatment details	Tiller count ('000 ha^{-1})		
	90 DAP	**120 DAP**	**150 DAP**

T_1	Recommended dose of NPK (RDF)	127.50	135.50	147.90
T_2	RDF + sett soaking with 0.8 % PSAP solution	129.80	136.70	149.50
T_3	Recommended N, 50% P and 50% K	115.80	122.90	132.50
T_4	T_3 + sett soaking with 0.8 % PSAP solution	117.90	124.20	134.70
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	133.50	142.20	155.60
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	138.50	147.20	159.50
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	139.50	148.20	160.10
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	119.50	126.90	136.80
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	121.90	130.10	138.60
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	122.40	131.20	141.50
S. Em. ±		**4.86**	**5.16**	**5.59**
CD (P=0.05)		**14.18**	**15.05**	**16.33**

Table 3. Effect of PSAP on yield parameters and yield of plant cane

Treatment details		Single cane weight (kg)	NMC ('000 ha^{-1})	Cane yield (t ha^{-1})
T_1	Recommended dose of NPK (RDF)	1.79	89.25	119.70

T_2	RDF + sett soaking with 0.8 % PSAP solution	1.87	95.36	121.90
T_3	Recommended N, 50% P and 50% K	1.01	79.84	97.50
T_4	T_3 + sett soaking with 0.8 % PSAP solution	1.29	81.56	99.20
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.89	95.50	125.70
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.96	95.59	129.90
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	2.31	96.83	137.66
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.68	82.15	104.23
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.69	84.52	109.25
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.73	88.18	113.90
S. Em. ±		**0.07**	**3.43**	**4.45**
CD (P=0.05)		**0.20**	**10.12**	**13.01**

Table 4. Effect of PSAP on quality parameters of plant cane

Treatment details		**Brix (%)**	**Pol (%)**	**Purity (%)**	**CSS (%)**	**CCS yield (t/ha)**
T_1	Recommended dose of NPK (RDF)	20.95	17.94	85.61	12.22	14.64
T_2	RDF + sett soaking with 0.8 % PSAP solution	20.86	17.94	86.06	12.24	14.93
T_3	Recommended N, 50% P and 50% K	20.86	17.76	85.15	12.06	11.76
T_4	T_3 + sett soaking with 0.8 % PSAP solution	21.67	18.34	84.60	12.41	12.31

T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	20.40	17.48	85.71	11.91	14.95
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.34	17.39	85.52	11.83	15.37
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.51	17.33	84.50	11.72	16.12
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	19.95	17.19	86.18	11.75	12.24
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.84	17.95	86.18	12.27	13.38
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.61	17.92	86.97	12.30	14.00
S. Em. ±		**0.39**	**0.30**	**0.70**	**0.21**	**0.53**
CD (P=0.05)		**NS**	**NS**	**NS**	**NS**	**1.54**

Table 5. Effect of PSAP on growth parameters of plant cane at harvest

Treatment details		**Cane height (m)**	**Cane girth (cm)**
T_1	Recommended dose of NPK (RDF)	2.79	2.76
T_2	RDF + sett soaking with 0.8 % PSAP solution	2.81	2.76
T_3	Recommended N, 50% P and 50% K	2.67	2.76
T_4	T_3 + sett soaking with 0.8 % PSAP solution	2.94	2.81
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	2.80	2.82

T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	2.72	2.84
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	2.83	2.91
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	2.60	2.83
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	2.76	2.82
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	2.90	2.77
S. Em. ±		**0.08**	**0.06**
CD (P=0.05)		**NS**	**NS**

Table 6. Effect of PSAP on the post-harvest soil parameters of plant cane

Treatment details		**Bulk Density (g cc^{-1})**	**Infiltration rate (cm hr^{-1})**	**pH**	**Electrical Conductivity (ds m^{-1})**	**Organic Carbon (%)**
T_1	Recommended dose of NPK (RDF)	1.27	0.46	7.76	0.31	0.59
T_2	RDF + sett soaking with 0.8 % PSAP solution	1.28	0.47	7.81	0.32	0.61
T_3	Recommended N, 50% P and 50% K	1.29	0.48	7.79	0.32	0.57
T_4	T_3 + sett soaking with 0.8 % PSAP solution	1.26	0.46	7.82	0.35	0.53

T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.28	0.45	7.80	0.34	0.53
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.27	0.43	7.74	0.33	0.52
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.28	0.44	7.78	0.35	0.58
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.27	0.47	7.79	0.34	0.57
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.28	0.48	7.73	0.35	0.59
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.29	0.45	7.79	0.34	0.61
S. Em. ±		**0.98**	**0.02**	**0.02**	**0.01**	**0.01**
CD (P=0.05)		**NS**	**NS**	**NS**	**NS**	**NS**
Initial values		**1.29**	**0.46**	**7.79**	**0.35**	**0.53**

Table 7. Effect of PSAP on nutrient uptake of plant cane at harvest

Treatment details		**Nutrient uptake (kg ha^{-1})**		
		N	**P**	**K**
T_1	Recommended dose of NPK (RDF)	309.50	42.50	282.10
T_2	RDF + sett soaking with 0.8 % PSAP solution	307.50	43.70	284.50
T_3	Recommended N, 50% P and 50% K	262.50	32.10	259.40
T_4	T_3 + sett soaking with 0.8 % PSAP solution	264.50	35.60	260.10
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	314.50	43.50	256.10
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	315.40	44.80	288.90

T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	317.50	46.50	292.50
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	287.60	37.80	268.40
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	290.40	38.10	270.10
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	292.50	39.50	271.80
S. Em. ±		11.39	1.56	10.41
CD (P=0.05)		**33.25**	**4.57**	**30.39**
Initial soil status		**247.1**	**37.2**	**439.1**

Table 8. Effect of PSAP on post harvest available soil nutrient status of plant cane

Treatment details		**Available nutrient status (kg ha^{-1})**		
		N	**P_2O_5**	**K_2O**
T_1	Recommended dose of NPK (RDF)	197.50	36.40	369.70
T_2	RDF + sett soaking with 0.8 % PSAP solution	199.40	35.20	367.30
T_3	Recommended N, 50% P and 50% K	240.50	36.80	392.40
T_4	T_3 + sett soaking with 0.8 % PSAP solution	242.50	33.30	391.70
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	192.00	35.40	395.70
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	191.10	34.10	362.90
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	189.00	32.40	359.30

T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	218.90	38.50	383.40
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	216.10	39.50	381.70
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	214.00	39.40	380.00
S. Em. ±		**8.05**	**1.38**	**14.55**
CD (P=0.05)		**23.51**	**4.02**	**33.12**
Initial soil status		**247.1**	**37.2**	**439.1**

Table 9. Effect of PSAP on economic parameters of plant cane cultivation

Treatment details		**Cost of cultivation**	**Gross returns**	**Net returns**	**B:C Ratio**
T_1	Recommended dose of NPK (RDF)	112986	335160	222174	2.97
T_2	RDF + sett soaking with 0.8 % PSAP solution	118986	341320	222334	2.87
T_3	Recommended N, 50% P and 50% K	111215	273000	161785	2.45
T_4	T_3 + sett soaking with 0.8 % PSAP solution	117215	277760	160545	2.37
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	132861	351960	219099	2.65
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	133086	363720	230634	2.73
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	133786	385434	251648	2.88
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	131090	291844	160754	2.23

T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	131315	305900	174585	2.33
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	132015	318920	186905	2.42
S. Em. ±		**-**	**12467**	**12467**	**0.10**
CD (P=0.05)		**-**	**36389**	**36389**	**0.29**

UCHANI CENTRE

AS- 76	**:**	**Evaluation of Potassium Salt of Active Phosphorus (PSAP) in Sugarcane**
Objective	**:**	To assess the effect of PSAP on sugarcane growth, yield and juice quality
Year of start	**:**	2020-21

Treatments:

T1	100% RDF* through soil- Control plot-1
T2	T_1+ sett soaking with 0.8% PSAP solution
T3	T_2 + 12.5 kg PSAP/ha through foliar in three sprays
T4	T_2+ 15 kg PSAP/ha through foliar in three sprays
T5	T_2 + 25 kg PSAP/ha through foliar in four sprays
T6	RDN and 50% of P and K- Control plot-2
T7	T_6+ sett soaking with 0.8% PSAP solution
T8	T_7 + 12.5 kg PSAP/ha through foliar in three sprays
T9	T_7 + 15 kg PSAP/ha through foliar in three sprays
T10	T_7 + 25 kg PSAP/ha through foliar in four sprays

The experiment consisting of ten treatments was planted on mid maturing variety CoH 13263 at 120 cm row spacing on March 10, 2021 in spring season in randomized block design with three replications. The recommended dose of NPK 150-50-50 (T1-T5) and 150-25-25 NPK kg/ha (T6-T10) was applied in spring sugarcane. Full dose of P and K as per treatments was applied in furrows at the time of planting. The soil of the experimental field was sandy loam in texture with low in organic carbon (0.40), medium in available phosphorus (11.7 kg/ha) and medium in available K (178 kg/ha). The crop was raised as per package of practices of the region. The crop was harvested on March 10, 2022. The crop was irrigated at 8-10 days and 20 days interval during pre-monsoon and post-monsoon season, respectively.

Germination, growth parameters and yield attributes were significantly affected by different treatments of sett soaking and foliar spray of PSAP at different intervals. Significantly higher germination and tillers were recorded with dipping of setts in 0.8% PSAP solution as compared to untreated control. No significant difference in germination percent was recorded between RDF and RDN-50% P & K fertility levels. Significantly higher number of tillers, NMC, cane weight and cane yield were recorded in RDF as compared RDN-50% P & K fertility levels. Significantly highest cane yield was recorded in T5 (RDF+ sett treatment+ 25 kg/ha PSAP) and T10 (RDN-50 % P &K + sett treatment + 25 kg/ha PSAP) treatments as compared to their respective control treatments. Percent increase in cane yield and yield attributes was higher under RDN-50% P & K fertility treatments as compared to RDF treatments.

Table 10: Effect of different treatments on growth and yield of sugarcane

	Treatments	Germination (%)	Tillers (000/ha)	NMC (000/ha)	Cane weight (g)	Cane yield (t/ha)
T1	100% RDF* through soil- Control plot-1	46.9	125.8	93.5	918	82.8
T2	T_1+ sett soaking with 0.8% PSAP** solution	52.7	135.7	103.1	969	90.7
T3	T_2 + 12.5 kg PSAP/ha through foliar in three sprays	53.0	141.8	108.8	1028	98.5
T4	T_2+ 15 kg PSAP/ha through foliar in three sprays	52.6	144.2	113.0	1061	108.4
T5	T_2 + 25 kg PSAP/ha through foliar in four sprays	53.9	146.3	116.2	1082	115.6
T6	RDN and 50% of P and K- Control plot-2	44.0	110.6	80.7	870	72.0
T7	T_6+ sett soaking with 0.8% PSAP solution	49.8	123.5	91.1	934	78.2
T8	T_7 + 12.5 kg PSAP/ha through foliar in three sprays	50.3	128.2	97.0	998	87.8
T9	T_7 + 15 kg PSAP/ha through foliar in three sprays	49.6	130.1	101.2	1020	95.3
T10	T_7 + 25 kg PSAP/ha through foliar in four sprays	50.6	132.4	105.3	1045	103.5
CD at 5%		4.8	10.2	8.4	92	7.3

Summary: Significantly higher germination (52.7, 49.8%) and tillers (135.7, 123.5 thousand/ha) were recorded with dipping of setts in 0.8% PSAP solution as compared to untreated controls. No significant difference in germination percent was recorded between RDF (46.9%) and RDN-50 % P & K fertility levels (44.0%). Significantly highest cane yield was recorded in T5-RDF+ sett treatment+ 25 kg/ha PSAP (115.6 t/ha) and T10-RDN-50 % P & K + sett treatment + 25 kg/ha PSAP (103.5) treatments as compared to their respective control treatments T1 and T6. Percent increase in cane yield and yield attributes due to application of PSAP was comparatively higher under RDN-50% P & K fertility treatments as compared to RDF treatments.

Report for the year 2022-23

"Evaluation of PSAP on Growth, Yield and Quality of Sugarcane in Different Agro-Climatic Zones of the Country"

COIMBATORE CENTRE

AS-76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality.

1.	**Project No.**	**AS -76 AICRP**
2.	**Title**	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality**
3.	**Project Leader:** **Associate :**	Dr. P. Geetha, Senior Scientist Dr. S. Anusha, Scientist, and Dr. V. Krishnapriya
4.	**Objectives**	• To work out the optimum dose and schedule of PSAP application in sugarcane crop • To assess the effect of PSAP on sugarcane growth, yield and juice quality • To analyse the impact of the product on soil fertility and cultivation economics
5.	**Details of the treatment/ technical programme**	**Design: RBD** T1 - Application of RDF without sett soaking, T2 - RDF + sett soaking with 0.8 % PSAP solution, T3 - Recommended N, 50 % P and 50% K, T4 - T3 + sett soaking with 0.8% PSAP solution, T5 - T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.8 at 60, 90 and 120 DAP, T6 - T2 + + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 at 60, 90 and 120 DAP, T7 - T2 + + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 at 60, 80,100 and 120 DAP, T8 - T4 + Foliar spray of PSAP @ 0.4, 0.65, 0.8 and 1.10 at 60, 90 and 120 DAP, T9 - T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 at 60, 90 and 120 DAP, T10 - T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 at 60, 80,100 and 120 DAP.
6.	**Plot size**	6m x 6m = 36 m^2
7.	**Replication**	3
8.	**Date of start**	12.03.2022
9.	**Date of harvest**	02.04.2023

Table 1. Initial Soil Nutrient status

Soil Texture	Clay loam
Soil pH	8.2
EC (dS/m)	0.47
Available Nutrient status (Kg/ha)	
Nitrogen	143.21
$P_2 0_5$	25.18
K_2O	421.11
Organic carbon	0.53

Results:

The experiment on evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality was initiated during March 2022. The experiment was conducted in randomized Block Design with three replications and 12 treatments. The treatment includes Juice analysis done at 10^{th} and 12^{th} months after planting revealed that nutrient management had no effect on juice quality parameters. The crop was harvested after twelve months and NMC, cane height, cane girth, number of nodes, cane weight, and cane yield per plot were recorded.

Yield and yield attributes. (Table 2)

The influence of PSAP-based nutrient management on yield attributes were found non-significant However, PSAP-based nutrient management in plant sugarcane crop showed better cane yield (123 t/ha) with sett soaking @ 0.8% PSAP solution + RDN, 50 % P and 50% K + foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 during 60, 80, 100 and 120 DAP. The quality parameters such as Brix%, Sucrose %, Purity and CCS% did not vary due to the application of PSAP, however the high sugar yield (16.54 t/ha) was recorded with 100% Nitrogen +50% PK + sett soaking + four FS (0.4, 0.65, 1.1 and 1.1% PSAP).

Table 2: Yield and yield attributes as influenced by PSAP in plant cane (2022-23)

Treatments	Cane height (cm)	Cane girth (mm)	SCW (kg)	NMC ($x10^3$)	Cane Yield (t/ha)
100% RDF + WSS	231.7	32.43	1.8	66.56	103.84
100% RDF + SS (0.8% PSAP)	227.8	32.49	1.6	68.64	96.44
100% N + 50% PK +WSS	237.2	33.99	1.8	59.60	97.13
100% N + 50% PK +SS (0.8% PSAP)	245.0	32.53	1.9	45.65	87.42
100% RDF+SS+ three FS (0.4,0.65, 0.8% PSAP)	232.2	31.32	1.5	61.60	93.03
100% RDF+SS+ three FS(0.4,0.65,1.1% PSAP)	223.9	32.81	1.5	56.56	102.29
100% RDF + SS+ four FS(0.4,0.65,1.1,1.1)	236.1	33.16	1.8	57.28	103.94
100% N +50% PK +SS + four FS(0.4, 0.65, 0.8 and 1.1% PSAP)	242.0	34.17	1.9	60.40	102.67
100%N +50% PK+ SS+ three FS(0.4, 0.65 and 1.1% PSAP)	227.8	32.45	1.6	72.88	113.69
100%N +50% PK+SS+ four FS(0.4, 0.65, 1.1 and 1.1% PSAP)	230.2	31.32	1.7	81.16	124.39
SED	10.54	1.32	0.18	7.7	13.9
CD	NS	NS	NS	16.2	25.3

RDF: Recommended dose of fertilizers, **WSS**: Without sett soaking, **SS**: Sett soaking **FS**: Foliar spray

Table 3: Quality parameters as influenced by PSAP in plant cane (2022-23)

Treatments	Brix (%)	Sucrose (%)	Purity (%)	CCS (%)	CCS Yield (t/ha)
100% RDF + WSS	18.3	18.30	92.17	13.4	13.91

100% RDF + SS (0.8% PSAP)	20.4	18.73	92.13	13.2	12.73
100% N + 50% PK +WSS	20.1	18.37	91.67	12.9	12.53
100% N + 50% PK +SS (0.8% PSAP)	19.9	17.73	89.83	12.3	10.75
100% RDF+SS+ three FS (0.4,0.65, 0.8% PSAP)	20.0	18.73	93.60	13.3	12.37
100% RDF+SS+ three FS(0.4,0.65,1.1% PSAP)	18.9	18.00	96.20	12.9	13.20
100% RDF + SS+ four FS(0.4,0.65,1.1,1.1)	19.4	18.60	96.23	13.3	13.82
100% N +50% PK +SS + four FS(0.4, 0.65, 0.8 and 1.1% PSAP)	19.4	18.20	94.20	12.9	13.24
100%N +50% PK+ SS+ three FS(0.4, 0.65 and 1.1% PSAP)	19.5	18.83	96.73	13.6	15.46
100%N +50% PK+SS+ four FS (0.4, 0.65, 1.1 and 1.1% PSAP)	18.9	18.40	97.53	13.3	16.54
SED	1.014	0.65	4.10	0.71	0.55
CD	NS	NS	NS	NS	1.03

GURDASPUR CENTRE

AS-76	**:**	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality**
Objective	:	1. To work out the optimum dose and schedule of PSAP application in sugarcane crop. 2. To assess the effect of PSAP on sugarcane growth, yield and juice quality. 3. To analyse the impact of the product on soil fertility and cultivation economics.
Year of start	:	2021 (to be carried out for two consecutive years)

Treatment details:

T1- Recommended dose of NPK
T2- RDF + Sett soaking with 0.8% PSAP solution
T3- Recommended N, 50% P and 50% K
T4- T3 + Sett soaking with 0.8% PSAP solution
T5- T2 + Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP
T6- T2 + Foliar spray of PSAP @ 0.4, 0.65 & 1.10% @ 60, 90 & 120 DAP
T7- T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP
T8- T4+ Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP
T9- T4 + Foliar spray of PSAP @ 0.4, 0.65 & 1.10% @ 60, 90 & 120 DAP
T10- T4 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP

The experiment was started in spring 2021-2022 as ratoon on dated 10-03-2022 as well as new plantation on dated 11-03-2022 in Randomized Block Design for evaluating efficacy of PSAP.

Variety CoPB 96 was planted at a spacing of 120 cm. Recommended dose of NPK in sugarcane was given to the crop along with sett soaking and foliar spray of PSAP which was split as per the treatments. The crop was raised as per the package and practices of the PAU, Ludhiana.

Effect of PSAP in plant crop:

Significantly higher germination (52.9%) was observed in treatment T8 (T4+ Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP) over T1, T2 and T3 treatments while other treatments were at par with T8 treatment. Significantly higher NMC (110.0 thousand/ha) was recorded in T10 (T4 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP) which was at par with treatments T8 and T9 treatments among other treatments. There was no significant difference with respect to cane girth and CCS % but higher cane girth was recorded with T4 treatment (2.97 cm) and CCS with T2 treatment (14.48 %). There is significant difference among different treatments with respect to cane length, cane yield and CCS. T10 recorded significantly higher cane length being at par with treatments T7, T8 and T9 respectively. Significantly highest cane yield (110.90 t/ha) and CCS (15.54 t/ha) was observed with the application of T7 (T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP) which was at par with treatment T6 (for cane yield) and treatments T5 and T6 (for CCS t/ha) among all other treatments (Table 6).

Table 6: Effect of PSAP on enhancement of sugarcane growth, yield and quality in plant crop.

Treatments	Germination (%)	NMC (000/ha)	Cane Girth (cm)	Cane Length (cm)	Cane Yield (t/ha)	CCS (%)	CCS (t/ha)
T1	43.1	86.8	2.80	275.7	92.80	14.03	13.03
T2	43.7	89.2	2.83	273.0	94.93	14.48	13.74
T3	43.7	92.2	2.86	257.0	82.59	14.21	11.74
T4	46.6	94.0	2.97	261.7	84.15	14.08	11.85
T5	46.8	95.9	2.93	264.3	98.72	14.09	13.92
T6	48.3	98.0	2.83	268.3	102.04	14.26	14.55

T7	50.5	98.7	2.90	293.0	110.90	14.01	15.54
T8	52.9	112.9	2.90	297.0	86.90	13.71	11.93
T9	50.8	105.0	2.93	296.3	89.64	14.01	12.56
T10	52.3	116.0	2.93	300.0	91.20	14.21	12.96
CD at 5%	**6.4**	**12.6**	**NS**	**16.2**	**11.99**	**NS**	**1.80**

Effect of PSAP in ratoon crop:

Significantly higher germination (34.7%) was observed in treatment T8 (T4+ Foliar spray of PSAP @ 0.4, 0.65 & 0.80% @ 60, 90 & 120 DAP) over T1, T3, T5 and T6 treatments while other treatments were at par with T8 treatment. Significantly higher NMC (90.7 thousand/ha) was recorded in T7 (T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP) which was significantly superior over T3, T4 and T8 treatments. There was no significant difference with respect to cane girth, CCS % and CCS t/ha but higher cane girth was recorded with T7 treatment (2.33 cm), CCS with T3 treatment (14.26 %) and CCS t/ha with T10 treatment (13.18 t/ha). There is significant difference among different treatments with respect to cane length and cane yield with respect to different treatment levels. T2 recorded significantly higher cane length being at par with treatments T4, T7, T8, T9 and T10 respectively. Significantly highest cane yield (96.52 t/ha) was observed with the application of T7 (T2 + Foliar spray of PSAP @ 0.4, 0.65 1.10 & 1.10% @ 60, 80, 100 & 120 DAP) which was at par with treatment T5 and T6 among all other treatments (Table 7).

Table 7: Effect of PSAP on enhancement of sugarcane growth, yield and quality in ratoon crop.

Treatments	Germination (%)	NMC (000/ha)	Cane Girth (cm)	Cane Length (cm)	Cane Yield (t/ha)	CCS (%)	CCS (t/ha)
T1	30.7	82.7	2.17	199.7	84.71	14.11	11.34
T2	32.7	81.8	2.20	211.3	85.37	14.09	11.49
T3	28.0	69.0	2.13	194.3	77.90	14.26	11.91
T4	32.3	71.2	2.17	207.7	79.33	14.18	11.15
T5	31.0	85.2	2.23	197.0	86.23	13.89	12.09
T6	29.0	87.8	2.23	190.3	93.07	14.15	12.06
T7	32.7	90.7	2.33	207.3	96.52	14.08	11.34
T8	34.7	77.8	2.33	205.3	80.47	14.08	12.43
T9	34.0	81.7	2.33	202.0	80.61	14.12	12.78
T10	33.0	82.8	2.20	206.3	83.93	14.09	13.18
CD at 5%	**3.6**	**10.7**	**NS**	**10.9**	**10.32**	**NS**	**NS**

LUCKNOW CENTER

Title: Evaluation of PSAP on Growth, Yield and Quality of Sugarcane in Different Agro-Climatic Zones of the Country

Objective of Trials:

1. To work out the optimum dose and schedule of PSAP application in sugarcane.
2. To assess the effect of PSAP on sugarcane growth, yield and juice quality.
3. To analyze the impact of the product on soil fertility and cultivation economics.

Methodology

Experiment was conducted at research farm of ICAR-Indian Institute of Sugarcane Research Lucknow. 10 treatments were replicated thrice and analyzed in RBD design. Planting of Colk 09204 variety at 120 cm spacing has been done. Initial set soaking with PSAP has been performed as per the technical program. Inter-culture operations were performed during the month of April and May. Foliar application of PSAP was done according to the different rate and days after planting which was guided in technical program.

Treatments

T_1: Recommended dose of NPK (RDF)

T_2: RDF+ Sett soaking with 0.8% PSAP solution

T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)

T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)

T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)

T_6: Recommended N, 50% P and 50% K

T_7: T_6+ Sett soaking with 0.8% PSAP solution

T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)

T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)

T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP

(25 kg PSAP/ha)

Results

Table 1 effect of different PSAP treatments of and yield of sugarcane plant crop 2022-23

Treatments	Shoot count	NMC 000/ha	Yield t/ha
T_1:Recommended dose of NPK (RDF)	92911.88	93582.38	78.45
T_2:RDF+ Sett soaking with 0.8% PSAP solution	86590.04	85440.61	85.82
T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	88643.68	87643.68	81.99
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	88601.53	87835.25	76.82
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	95977.01	89272.03	74.90
T_6: Recommended N, 50% P and 50% K	94827.59	87452.11	78.35
T_7: T_6+ Sett soaking with 0.8% PSAP solution	89846.74	89367.82	76.63
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	89655.17	83141.76	86.69
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	86302.68	84099.62	85.73
T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	94731.80	84099.62	86.88

The second plant crop was grown to verify the applied effect of PSAP but on second plant crop the treatment of PSAP could not impose due to some technical reason. However from above information Table 1 it is evident that that the sugarcane plant crop gave good number of shoot, NMC and yield. In this regard the highest shoots were recorded from treatment in designate T_5 while lowest one from treatment in designate T_9. The maximum yield was observed from Treatment in designate T_{10}.

Table 2 effect of different PSAP treatments of and yield of sugarcane ratoon crop of 2021-22

Treatments	Shoot count	NMC (000/ha)	Yield (t/ha)
T_1:Recommended dose of NPK (RDF)	31738.68	25874.49	13.32
T_2:RDF+ Sett soaking with 0.8% PSAP solution	50308.64	41152.26	21.66

T_3:T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	61059.67	50874.49	32.97
T_4: T_2+ Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	59722.22	50925.93	27.31
T_5: T_2+ Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	35339.51	26594.65	19.50
T_6: Recommended N, 50% P and 50% K	43981.48	33950.62	12.50
T_7: T_6+ Sett soaking with 0.8% PSAP solution	56378.60	45627.57	15.74
T_8: T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha)	66820.99	57561.73	22.89
T_9: T_7 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP (15 kg PSAP/ha)	42901.23	33899.18	22.33
T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (25 kg PSAP/ha)	19495.88	19238.68	14.76
SEm±	4749.91	4272.03	2.81
CD	14112.68	12692.86	8.37

In the present investigation it was revealed that highest shoot (66820.99) count Table 2 was found in the treatment T_8 (T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha), which was significantly higher than T_1, T_2, T_5, T_6, T_9, T_{10} and at par with T_3, T_4, T_7 and T_8. lowest number of shoots (19495.88) were counted in the T_{10} (T_{10}: T_7 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP(25 kg PSAP/ha). Similarly highest NMC (57561.73) was also recorded in the treatment T_8 which was significantly higher than T_1, T_2, T_5, T_6, T_9, & T_{10} and at remain statistically similar with T_3, T_4 and T_7. The yield recorded in ratoon crop was very low and the maximum yield was found in the T_8 (T_7+ Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP (12.5 kg PSAP/ha) treatment it was superior to the T_1, and T_6 while remain similar to all other treatments.

One important thing is necessary to mention here the treatment effect could not visualize clearly because the above crop was severely affected from mealy bug and other disease and many plots having nearly complete loss of plant population.

KOLHAPUR CENTRE

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality influenced during 10 months crop age * (Sponsored trial)

Treatment	CCS %	Sucrose %	Brix ^{0}	Purity %	Extraction %	Stalk Length (cm)	Stalk diameter (cm)	Single cane weight (kg)	Tilllering count (000/ha) 120 DAP	Germination % 30 DAP
T1	9.01	14.30	19.24	72.32	42.73	221.67	2.84	1.39	120.30	55.79

T2	8.74	13.74	17.31	72.09	38.40	210.00	2.41	2.04	113.67	46.84
T3	8.89	13.76	17.31	72.16	39.83	21.67	2.46	1.21	114.73	51.62
T4	9.00	13.88	18.48	72.19	42.00	215.00	2.48	1.21	120.00	52.24
T5	9.05	14.38	19.48	72.84	43.90	223.33	2.89	1.41	125.10	57.49
T6	9.05	14.66	20.18	73.21	43.90	235.00	2.91	1.52	125.17	57.56
T7	9.21	14.74	20.34	77.94	51.53	255.00	3.11	1.81	132.93	62.58
T8	9.16	14.69	20.31	77.90	47.63	250.00	3.00	1.79	131.03	57.79
T9	9.46	15.33	21.25	79.50	52.00	278.34	3.18	1.89	135.40	64.63
T10	9.08	14.66	20.24	74.34	46.97	248.33	2.96	1.66	128.97	57.72
Mean	**9.07**	**14.41**	**19.41**	**74.45**	**44.89**	**215.83**	**2.82**	**1.59**	**125.22**	**56.43**
SE(m)±	0.06	0.18	0.42	0.49	0.92	8.67	0.09	0.06	4.57	2.67
CD at 5 %	0.17	0.52	1.26	1.45	2.75	25.95	0.28	0.17	13.69	7.98
C.V. (%)	1.08	2.10	3.76	1.13	3.54	6.40	5.67	6.67	6.35	8.18

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality influenced during 12 months crop age * (Sponsored trial)

Treatment	CCS (t/ha)	Cane yield (t/ha)	CCS % (12m)	Sucrose % (12m)	Brix ^{0} (12 m)	Purity % (12m)	NMC at 12 m (000/ha)	Extraction% (12m)	Stalk length (12m)	Stalk diameter (12m)	Single cane wt(12 m) kg
T1	16.76	120.71	13.93	19.73	21.14	64.53	80.86	46.87	265.00	3.11	1.39
T2	12.07	85.70	13.76	19.47	21.00	62.68	73.38	39.07	250.00	2.85	1.06
T3	13.92	99.66	13.83	19.60	21.07	62.90	74.69	46.20	253.33	3.02	1.19
T4	14.58	104.45	13.92	19.70	21.07	63.78	77.24	46.23	265.00	3.09	1.28
T5	17.14	120.74	13.96	19.75	21.17	64.78	81.40	47.60	305.00	3.18	1.48

T6	17.49	126.30	13.98	19.99	21.74	65.42	81.40	50.27	315.00	3.23	1.64
T7	20.58	148.70	14.09	20.07	22.27	66.75	86.65	56.37	335.00	3.27	2.03
T8	20.32	145.22	14.03	20.03	21.80	66.06	84.49	54.17	326.66	3.27	1.69
T9	21.73	154.34	14.38	20.10	22.27	67.73	88.50	62.50	348.33	3.55	2.07
T10	20.11	142.69	14.01	20.02	21.74	65.87	83.80	53.40	318.33	3.23	1.66
Mean	17.47	124.85	13.99	19.85	21.53	65.05	81.24	50.27	298.17	3.18	1.55
SE(m) ±	0.82	5.86	0.10	0.07	0.15	0.44	2.28	2.16	11.90	0.10	0.08
CD at 5 %	2.44	17.55	0.29	0.20	0.43	1.32	6.81	6.48	35.61	0.30	0.23
C.V. (%)	8.09	8.13	1.21	0.57	1.16	1.18	4.85	7.45	6.91	5.43	8.49

AS 76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality influenced during ratoon crop (11 month) (Sponsored trial)

Treatment	CCS (t/ha)	Cane yield (t/ha)	CCS % (11 month)	Sucrose % (11 month)	Brix ^{0} (11 month)	Purity % (11 month)	Extraction % (11 month)	NMC at (11 month) (000/ha)	Stalk length (cm)	Stalk diameter (cm)	Single Cane Weight (kg)
T1	16.16	114.25	14.16	19.74	20.50	95.51	45.12	89.74	212.33	2.54	1.19
T2	12.96	91.98	14.09	19.64	20.30	92.96	42.17	78.17	201.33	2.24	0.94
T3	13.48	95.19	14.09	19.68	20.46	95.08	42.88	80.79	206.00	2.52	0.98
T4	13.54	96.08	14.14	19.71	20.50	95.39	44.30	87.19	210.00	2.53	1.06
T5	16.51	116.13	14.17	19.76	20.63	95.52	45.34	90.28	216.67	2.54	1.27
T6	16.81	118.16	14.21	19.77	20.66	95.66	46.57	91.59	266.67	2.55	1.28
T7	18.16	126.37	14.23	19.91	20.93	97.13	53.27	97.53	239.00	3.11	1.57
T8	17.41	122.91	14.23	19.90	20.70	96.43	49.20	97.45	230.00	2.84	1.40

T9	18.29	128.55	14.37	20.11	21.63	97.28	69.88	98.45	245.33	3.19	1.60
T10	17.41	122.29	14.22	19.77	20.66	95.84	47.34	92.67	228.00	2.70	1.38
Mean	**16.07**	**113.19**	**14.19**	**19.80**	**20.70**	**95.68**	**48.61**	**90.39**	**225.53**	**2.68**	**1.27**
SE(m)±	0.89	6.19	0.05	0.06	0.08	0.28	2.85	3.34	8.40	0.09	0.05
CD at 5 %	2.67	18.52	0.14	0.17	0.23	0.85	8.53	10.00	25.16	0.26	0.15
C.V. (%)	9.59	9.47	0.58	0.50	0.64	0.51	10.36	6.40	6.57	5.60	6.94

NAYGARH CENTRE

AS 76:	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality (Ratoon crop)**
Year of initiation	2021 (to be carried out for two consecutive years)
Design	RBD
Treatments	10
Replication	3
Variety	Co Or 03151
Recommended fertilizer dose	250:100:60 N: P_2O_5:K_2O kg /ha
Plot size	6 rows of 6m length
Spacing	120 cm between rows with 3 bud setts
Date of ratooning	28.02.2022
Date of harvest	07.01.2023

Treatment Details:

T_1	Recommended dose of NPK (RDF)
T_2	RDF + sett soaking with 0.8 % PSAP solution
T_3	Recommended N, 50% P and 50% K
T_4	T3 + sett soaking with 0.8 % PSAP solution
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP

AS 76.1Effect of PSAP application on germination, no. of shootsand yield parameters of sugarcane

Treatments		Germination %		No of shoots (000/ha)		Length of cane (m)	Girth of cane (cm)	Weight of cane (kg)
		30 DAR	45 DAR	120 DAR	180 DAR			
T_1	Recommended dose of NPK (RDF)	32.53	42.87	70.97	70.37	2.62	1.97	1.25
T_2	RDF + sett soaking with 0.8 % PSAP solution	33.50	44.83	73.43	71.43	2.61	2.04	1.26
T_3	Recommended N, 50% P and 50% K	29.23	32.90	65.33	64.73	2.16	1.58	1.03
T_4	T3 + sett soaking with 0.8 % PSAP solution	31.33	35.33	67.27	66.67	2.20	1.61	1.04
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	33.03	44.37	72.33	72.42	2.68	2.32	1.35
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	33.37	46.03	80.57	79.77	2.79	2.35	1.36
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	35.14	47.47	81.83	81.23	3.11	2.50	1.37
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	30.24	39.57	67.33	66.73	2.51	2.02	1.29
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	31.53	39.20	72.83	72.23	2.56	2.12	1.30
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	33.17	41.83	74.57	74.30	2.93	2.24	1.35
	SEm±	1.03	2.19	2.66	2.57	0.15	0.15	0.05
	CD at 5 %	3.06	6.51	7.91	7.62	0.46	0.44	0.14

AS 76.2Effect of PSAP application on yield and quality of sugarcane

Treatments		Brix %	NMC (‘000/ha)	Cane yield (t/ha)	CCS %	CCS (t/ha)
T_1	Recommended dose of NPK (RDF)	19.76	63.30	79.28	11.00	8.72
T_2	RDF + sett soaking with 0.8 % PSAP solution	20.11	65.03	82.09	11.18	9.17
T_3	Recommended N, 50% P and 50% K	19.73	59.67	61.63	10.37	6.40
T_4	T3 + sett soaking with 0.8 % PSAP solution	19.76	61.60	63.91	10.44	6.68

T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	19.57	67.35	90.70	11.18	10.14
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.30	71.37	96.94	11.25	10.91
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.67	74.83	102.11	11.47	11.70
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	19.87	63.33	81.70	11.13	9.09
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.60	66.50	85.96	11.17	9.60
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.24	69.23	93.32	11.23	10.50
	SEm±	0.87	2.87	3.19	0.31	0.45
	CD at 5 %	NS	8.53	9.48	NS	1.35

The experiment was laid out in randomized block design with ten treatments as per the technical programme on red laterite soil of the experimental farm of Sugarcane Research Station, Nayagarh. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dsm-1. Available N content was in lower range (155 kg/ha), but the soil was medium in available P (19.6 kg/ha) and (K 164 kg/ha) content.There is significant difference among treatment for all the parameters like germination %, shoot count, length of cane, girth of cane, weight of cane, Net Millable Cane count, cane yield and CCS yield.Out of the ten treatments, application of RDF + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAPi.e T_7proved to be the best with highest number of net millable canes (74.83th/ha), cane (102.11 t/ha) and CCS yield (11.70.t/ha). However this treatment is at par with treatment T_6(i.eapplication of RDF + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP)and T_{10} (i.eapplication of recommended N, 50% P and 50% K + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP).The higher yield parameters i.e. number of shoots/ha, weight, length and girth of cane in the above mentioned treatments were the factors of higher cane and CCS yield.This suggests,

the crop responds better to foliar application of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP along with sett soaking with 0.8 % PSAP solution.

AS 76:	**Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality (2nd year plant crop)**
Year of initiation	2021 (to be carried out for two consecutive years)
Design	RBD
Treatments	10
Replication	3
Variety	Co Or 03151
Recommended fertilizer dose	250:100:60 N: P_2O_5:K_2O kg /ha
Plot size	6 rows of 6m length
Spacing	120 cm between rows with 3 bud setts
Date of Planting	10.02.2022
Date of harvest	10.01.2023

Treatment Details:

T_1	Recommended dose of NPK (RDF)
T_2	RDF + sett soaking with 0.8 % PSAP solution
T_3	Recommended N, 50% P and 50% K
T_4	T3 + sett soaking with 0.8 % PSAP solution
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP

AS 76.1Effect of PSAP application on germination, no. of shootsand yield parameters of sugarcane

Treatments		**Germination %**		**No of shoots (000/ha)**		**Length of cane (m)**	**Girth of cane (cm)**	**Weight of cane (kg)**
		30 DAP	**45 DAP**	**120 DAP**	**180 DAP**			
T_1	Recommended dose of NPK (RDF)	38.73	56.20	81.83	81.20	2.76	1.97	1.28
T_2	RDF + sett soaking with 0.8 % PSAP solution	39.50	56.97	84.57	82.17	2.79	2.05	1.28

T_3	Recommended N, 50% P and 50% K	35.23	42.57	75.80	74.90	2.32	1.70	1.02
T_4	T3 + sett soaking with 0.8 % PSAP solution	38.33	45.53	78.20	77.33	2.34	1.78	1.08
T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	41.37	55.03	83.47	82.58	2.88	2.31	1.41
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	41.03	55.23	91.53	90.60	3.04	2.35	1.41
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	44.27	55.81	92.97	91.40	3.18	2.51	1.40
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	39.57	48.34	77.47	76.90	2.71	2.05	1.30
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	39.20	49.03	82.97	82.40	2.73	2.20	1.29
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	40.50	48.83	86.03	84.47	2.91	2.31	1.33
	SEm±	1.44	2.33	2.97	2.62	0.11	0.15	0.06
	CD at 5 %	4.28	6.94	8.83	7.79	0.32	0.43	0.17

AS 76.2Effect of PSAP application on yield and quality of sugarcane

Treatments		**Brix %**	**NMC ('000/ha)**	**Cane yield (t/ha)**	**CCS %**	**CCS (t/ha)**
T_1	Recommended dose of NPK (RDF)	19.43	73.83	94.65	11.17	10.57
T_2	RDF + sett soaking with 0.8 % PSAP solution	20.11	75.63	97.12	11.28	10.95
T_3	Recommended N, 50% P and 50% K	20.07	70.00	71.66	10.84	7.77
T_4	T3 + sett soaking with 0.8 % PSAP solution	20.09	71.47	76.94	10.84	8.35

T_5	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	20.57	77.68	109.07	11.48	12.53
T_6	T2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.63	81.90	114.97	11.62	13.31
T_7	T2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.34	85.40	119.48	11.67	13.91
T_8	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	20.20	71.53	92.73	11.30	10.46
T_9	T4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.27	76.03	98.66	11.40	11.29
T_{10}	T4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.24	79.77	106.02	11.66	12.36
	SEm±	0.96	2.67	4.30	0.35	0.60
	CD at 5 %	NS	7.94	12.79	NS	1.78

The experiment was laid out in randomized block design with ten treatments as per the technical programme on red laterite soil of the experimental farm of Sugarcane Research Station, Nayagarh. The soil was acidic (pH 5.33) in reaction with electrical conductivity of 0.206 dsm-1. Available N content was in lower range (155 kg/ha), but the soil was medium in available P (19.6 kg/ha) and (K 164 kg/ha) content. There is significant difference among treatment for all the parameters like germination %, shoot count, length of cane, girth of cane, weight of cane, Net Millable Cane count, cane yield and CCS yield.Out of the ten treatments, application of RDF + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAPi.e T_7proved to be the best with highest number of net millable canes (85.40th/ha), cane (119.48 t/ha) and CCS yield (13.91.t/ha). However this treatment is at par with treatment T_6(i.eapplication of RDF + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP)and T_{10} (i.eapplication of recommended N, 50% P and 50% K + sett soaking with 0.8 % PSAP solution along with foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP). The higher yield parameters i.e. number of shoots/ha, weight, length and girth of cane in the above mentioned treatments were the factors of higher cane and CCS yield. This suggests,

the crop responds better to foliar application of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP along with sett soaking with 0.8 % PSAP solution.

PUNE CENTRE

Project No. : AS 76

Title : Evaluation of PSAP on AICRP in Sugarcane at given Varieties in different agro climatic zones

Objectives :

4. To work out the optimum dose and schedule of PSAP application in sugarcane.
5. To assess the effect of PSAP on sugarcane growth, yield and juice quality.
6. To analyse the impact of the product on soil fertility and cultivation economics.

Principal Investigator : Dr. Preeti Deshmukh, Scientist & Head

Co-principal Investigator : Mr. S. B. Bramhe

Soil : Black cotton soil **Design:** RBD

Replication: Three **Spacing :** 4.5”

Plot size : 54.8m^2

Planting season : Suru

Variety : Co 86032

Location : Vasanatdada Farm

Date of Planting : 27.01.2021**(1st plantcane)**

: 26.02.2022 (Ratoon)

: 02.01.2022(2nd Plantcane)

Date of harvesting : 26.02.2022

: 14.03.2023

: 16.03.2023

Treatment Details:

Tl 100% RD (Recommended Dose) of Fertilizers through Soil- Control Plot -1

T2- Tl + sett soaking with 0.8% PSAP solution

T3- T2 + 12.5 Kg PSAP/ha in three foliar sprays at 60 DAP@ 0.40%, 90 DAP @ 0.65% and 120 DAP@0.80%

T4 -T2 + 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40%, 90 DAP @ 0.65% and 120 DAP@1.1%

T5 - T2 + 25 kg/ha PSAP in three four spray at 60 DAP@ 0.40%, 80 DAP @ 0.65%, 100 DAP@1.1% and 120 DAP@1.1%

T6 – Control-2, RDF N 100% and 50% P & K

T7 – T6 + sett soaking with 0.8% PSAP solution

T8 - T6 + 12.5 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40%, 90 DAP @ 0.65% and 120 DAP@0.80%

T9 – T6 - 15 kg/ha PSAP 3 in three foliar spray at 60 DAP@ 0.40%, 90 DAP @ 0.65% and 120 DAP@1.1%

T10 – T6- 25 kg/ha PSAP 3 in four foliar spray at 60 DAP@ 0.40%, 80 DAP @ 0.65%, 100 DAP@1.1% and 120 DAP@1.1%

Results:

The field experiment was conducted to study the Evaluation of PSAP on AICRP in sugarcane at given varieties in different agro climatic zones. The pooled data with respect to cane yield, sugar yield, growth parameters, juice quality and economics are presented in Table 1to 4.

Cane yield:

The pooled cane yield data showed that maximum cane yield (115.9 tha^{-1}) obtained in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at 60,80,100 and 120 days after planting was found significantly superior over RDF (105.9 tha^{-1}). The cane yield (110.6 tha^{-1}) obtained in treatment T10 where applied recommended dose of fertilizer (N 100% and 50% P & K) alongwith foliar application of PSAP @ 25kg/ha in four splits at 60,80,100 and 120days after planting was found significantly superior over RDF (100.3 tha^{-1}) where applied RDF (N 100% and 50% P & K).

Commercial Cane Sugar Yield

The maximum CCS yield (17.09 t ha^{-1}) in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at 60,80,100 and 120 days after planting was found significantly superior over RDF (16.10 tha^{-1}). The CCS yield (16.44 tha^{-1}) obtained in treatment T10 where applied 100% recommended dose of nitrogen and 50% recommended dose of phosphorous and potassium along with foliar application of PSAP @ 25kg/ha in four splits at 60,80,100 and 120days after planting was found significantly superior over RDF (15.59 tha^{-1}) where applied RDF (N 100% and 50% P & K).

Plant population

The numerically highest plant population (73.7 thousand ha^{-1}) was recorded in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @

25kg/ha in four splits at 60, 80,100 and 120 days after planting. Foliar application of PSAP in different splits was found non-significant for number of millibale canes.

Growth parameters

The maximum milliable cane height (234.4 cm) was recorded in treatment T5 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at 60,80,100 and 120 days after planting followed by (225.5 cm) was recorded in treatment T4 where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 15kg/ha in four splits at,60,90 and 120 days after planting was found significantly superior over RDF (212.4 cm).

Cane girth was significantly increased in treatment T5 (9.19) where applied 100% recommended dose of fertilizer alongwith foliar application of PSAP @ 25kg/ha in four splits at, 60, 80,100 and 120 days after planting over RDF (8.21). The data of no. of internode was found more or less same in all the treatments.

Juice quality

The juice quality parameters with respect to brix, pol, and purity and CCS % were not affected by foliar application of PSAP in splits.

Economical evaluation

The highest benefit cost ratio (2.50) where applied 100% RDF (N100% and 50% P& K) followed by 2.49 where applied RDF (N 100% and 50% P & K) with sett soaking with 0.8% PSAP solution

Conclusion

The results concluded that application of recommended dose of fertilizer alongwith foliar application of PSAP @25kg/ha in four spilts increased the cane yield by 10 tha^{-1} but the application of recommended dose of fertilizer is found to be economical.

Table 1: Effect of PSAP on cane and sugar yield

Treatments	Cane Yield (tha^{-1})				CCS Yield (tha^{-1})			
	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean
T1- Control – 1, 100% RDF	106.1	93.4	118.1	105.9	15.7	14.1	18.5	16.10
T2-T1+ sett soaking with 0.8% PSAP solution	109.2	94.0	119.4	107.5	16.5	14.1	17.6	16.09
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	112.3	92.7	119.9	108.3	16.8	13.9	17.4	16.02

T4-T2 + 15 kg/ha PSAP in three foliar spray at 60DAP@0.40%,90DAP@0.65and120 DAP@1.1%	113.5	92.2	123.2	109.6	17.3	14.0	19.5	16.94
T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100 DAP@1.1% and 120 DAP@1.1%	118.4	100.3	128.8	115.9	16.9	15.7	18.6	17.09
T6- Control-2, RDF N 100% and 50% P & K	102.0	93.3	107.2	100.8	15.9	14.6	16.2	15.59
T7- T6 + sett soaking with 0.8% PSAP solution	106.4	94.1	113.0	104.5	15.6	14.1	16.7	15.45
T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	107.6	89.8	115.1	104.2	15.7	13.7	17.2	15.57
T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	112.1	92.1	120.8	108.3	16.7	13.9	17.3	15.97
T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	115.4	94.3	122.1	110.6	17.0	14.7	17.6	16.44
S.E.D **CD at 5%**	4.49 9.45	4.83 NS	5.04 10.60	2.13 4.48	0.83 NS	0.77 1.63	0.83 1.75	0.35 0.75

Table 2: Effect of PSAP on sugarcane growth parameters

Treatments	**No. of millable cane ('000/ha)**				**Millable cane height (cm)**			
	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean
T1- Control – 1, 100% RDF	85.33	66.4	90.4	80.7	207.6	209.8	219.9	212.4
T2-T1+ sett soaking with 0.8% PSAP solution	83.40	67.3	91.6	80.8	210.4	222.8	227.8	220.3
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	91.03	68.9	95.3	85.1	215.9	219.3	230.4	221.9
T4-T2 + 15 kg/ha PSAP in three foliar spray at 60DAP@0.40%,90DAP@0.65and120 DAP@1.1%	88.19	64.7	93.7	82.2	226.3	221.6	228.6	225.5

T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100DAP@1.1% and 120 DAP@1.1%	91.09	77.3	101.2	89.8	230.4	229.4	243.3	234.4
T6- Control-2, RDF N 100% and 50% P & K	83.52	66.8	87.9	79.4	206.2	218.2	226.4	217.0
T7- T6 + sett soaking with 0.8% PSAP solution	84.02	68.8	91.6	81.5	209.1	219.1	222.0	216.7
T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	84.73	66.8	94.5	82.0	215.9	223.2	229.6	222.9
T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	89.62	65.6	97.5	84.2	219.3	221.1	227.3	222.6
T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100DAP@1.1% and 120 DAP@1.1%	84.11	69.2	98.3	83.9	220.9	226.1	240.4	229.1
S.E.D **CD at 5%**	3.29 NS	3.19 NS	4.99 NS	2.15 4.51	7.08 14.88	9.17 NS	6.28 13.21	4.32 9.08

Table 3: Effect of PSAP on sugarcane growth parameters

Treatments	**Internode**				**Girth (cm)**			
	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean
T1- Control – 1, 100% RDF	19.6	19.3	21.0	20.0	8.08	8.01	8.54	8.21
T2-T1+ sett soaking with 0.8% PSAP solution	20.1	18.8	21.4	20.1	8.11	8.30	8.39	8.26
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	20.2	21.1	21.7	21.0	8.66	8.51	8.46	8.54
T4-T2 + 15 kg/ha PSAP in three foliar spray at 60DAP @0.40%,90DAP@0.65and120 DAP@1.1%	19.1	19.0	22.6	20.2	8.96	8.31	8.82	8.70
T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100DAP@1.1% and 120 DAP@1.1%	18.6	20.0	22.0	20.2	9.08	9.24	9.24	9.19
T6- Control-2, RDF N 100% and 50% P & K	19.6	19.1	21.0	19.9	8.13	7.97	7.90	8.00
T7- T6 + sett soaking with 0.8% PSAP solution	19.8	21.4	22.7	21.3	8.23	8.18	8.26	8.22

T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	19.6	19.1	21.3	20.0	8.31	8.39	8.28	8.33
T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	20.1	20.9	21.6	20.9	8.51	8.41	8.77	8.56
T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	18.9	20.6	23.0	20.8	8.43	8.68	9.19	8.76
S.E.D **CD at 5%**	0.91 NS	0.96 NS	0.89 NS	0.71 NS	0.29 NS	0.37 NS	0.30 0.64	0.21 0.46

Table 4: Effect of PSAP on sugarcane juice quality

Treatments	**Brix %**				**CCS %**			
	1st Plant cane	Ratoon	2nd Plantcane	Pooled mean	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean
T1- Control – 1, 100% RDF	21.2	21.6	20.2	21.0	14.8	15.1	13.6	14.5
T2-T1+ sett soaking with 0.8% PSAP solution	21.7	21.8	20.1	21.2	15.2	15.0	13.6	14.6
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	21.4	21.9	19.1	20.8	14.9	15.0	12.4	14.1
T4-T2 + 15 kg/ha PSAP in three foliar spray at 60DAP@0.40%,90DAP@0.65and120 DAP@1.1%	21.7	22.0	20.1	21.3	15.2	15.2	13.8	14.7
T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100DAP@1.1% and 120 DAP@1.1%	21.0	22.6	19.3	21.0	14.3	15.7	13.0	14.3
T6- Control-2, RDF N 100% and 50% P & K	22.4	22.2	19.1	21.2	15.6	15.7	12.8	14.7
T7- T6 + sett soaking with 0.8% PSAP solution	21.3	21.6	19.3	20.7	14.6	15.0	12.6	14.1
T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	21.1	22.3	19.6	21.0	14.6	15.3	13.1	14.3

T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	21.5	21.9	19.5	20.9	14.9	15.1	13.0	14.3
T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	21.1	22.2	19.9	21.1	14.8	15.6	13.4	14.6
S.E.D **CD at 5%**	0.44 NS	0.42 NS	0.43 NS	0.26 NS	0.34 NS	0.42 NS	0.47 NS	0.19 NS

Table 5: Effect of PSAP on sugarcane juice quality

Treatments	**Pol**				**Purity**			
	1st Plant cane	Ratoon	2nd Plantcane	Pooled mean	1st Plantcane	Ratoon	2nd Plantcane	Pooled mean
T1- Control – 1, 100% RDF	20.3	20.8	18.9	20.0	96.7	96.0	93.4	95.4
T2-T1+ sett soaking with 0.8% PSAP solution	20.7	20.8	18.9	20.1	96.0	95.0	93.8	94.9
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	20.5	20.8	17.4	19.6	96.0	94.7	91.2	94.0
T4-T2 + 15 kg/ha PSAP in three foliar spray at60DAP@0.40%,90DAP@0.65and120 DAP@1.1%	20.9	21.0	18.9	20.3	96.2	95.4	94.3	95.3
T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100 DAP@1.1% and 120 DAP@1.1%	19.8	21.6	18.1	19.8	94.7	95.5	93.5	94.6
T6- Control-2, RDF N 100% and 50% P & K	21.5	21.5	17.8	20.2	96.0	96.9	93.0	95.3
T7- T6 + sett soaking with 0.8% PSAP solution	20.2	20.6	17.7	19.5	94.8	95.6	91.7	94.0
T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	20.1	21.1	18.3	19.8	95.3	94.8	92.9	94.3
T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	20.5	20.9	18.1	19.8	95.7	95.3	92.8	94.6

T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	20.3	21.4	18.6	20.1	96.1	96.4	93.8	95.4
S.E.D **CD at 5%**	0.30 NS	0.34 NS	0.39 NS	0.18 NS	0.38 NS	1.12 NS	0.69 NS	0.44 NS

Table 6: Effect of PSAP on economics

Treatment	**B: C ratio**			
	1st Plantcane	Ratoon	2nd Plantcane	Pooled
T1- Control – 1, 100% RDF	1.73	3.70	2.11	2.51
T2-T1+ sett soaking with 0.8% PSAP solution	1.74	3.54	2.09	2.46
T3-T2 + 12.5 Kg /ha PSAP in three foliar sprays at 60 DAP@ 0.40%,90 DAP @ 0.65% and 120 DAP@0.80%	1.59	2.68	1.84	2.04
T4-T2 + 15 kg/ha PSAP in three foliar spray at 60DAP@0.40%,90DAP@0.65and120 DAP@1.1%	1.57	2.55	1.84	1.99
T5-T2 + 25 kg/ha PSAP in four foliar spray at 60DAP@0.40%,80DAP@0.65%@,100DAP @1.1% and 120 DAP@1.1%	1.50	2.33	1.75	1.86
T6- Control-2, RDF N 100% and 50% P & K	1.74	3.98	2.01	2.58
T7- T6 + sett soaking with 0.8% PSAP solution	1.78	3.81	2.07	2.55
T8-T6 + 12.5 kg/ha PSAP three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@0.80%	1.58	2.74	1.84	2.06
T9-T6 - 15 kg/ha PSAP in three foliar spray at 60 DAP@ 0.40% 90 DAP @ 0.65% and 120 DAP@1.1%	1.61	2.68	1.88	2.06
T10–T6- 25 kg/ha PSAP in four foliar spray at 60 DAP@ 0.40% 80 DAP @ 0.65% @100 DAP@1.1% and 120 DAP@1.1%	1.51	2.29	1.72	1.84

PUSA CENTRE

AS 76. Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality (sponsored trial) 2021-22

The data on growth, yield attributes, cane yield, quality parameters, nutrient uptake by sugarcane and available NPK in post harvest soil have been placed from Table 15-17. Treatments showed significant variation in germination percent, tillers, millable canes and single cane weight. Significantly higher cane yield (108.5 t/ha) was obtained with RDF + sett soaking with 0.8% PSAP solution + foliar application of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP (T_7) which was statistically comparable to T_6 and T_5. Similarly higher sugar yield (14.16 t/ha) was noticed with T_7 which was followed by T_6 and T_5. Similar was the trend in case of N,P and K uptake by sugarcane. Available N,P and K in post harvest soil was found to be non-significant.

AS 76. Summary:

Treatment T_7 (RDF + sett soaking with 0.8% PSAP solution (T_2) + foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP was equally effective as T_6 (T_2 + foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP) and T_5 (T_2 + foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP) for better productivity.

Table 1. AS 76: Effect of PSAP on growth and yield attributes and yield of sugarcane (sponsored trial) 2022-23

Treatment	Germination (%) at 45 DAP	Tillers ($\times 10^3$/ha) at 120 DAP	Cane length (cm)	Millable canes ($\times 10^3$/ha)	Single Cane Weight (g)	Cane yield (t/ha)
T_1- Recommended dose of NPK (RDF)	27.2	97.5	274	76.3	1060	78.6
T_2 – RDF + sett soaking with 0.8% PSAP solution	30.6	105.0	277	79.5	1141	89.3
T_3 – Recommended N, 50% P and 50% K	25.6	93.2	271	73.7	1062	76.7
T_4 – **T_3** + sett soaking with 0.8% PSAP solution	28.1	94.8	277	75.8	1030	77.4
T_5 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	31.8	110.6	290	84.0	1192	96.8

T_6 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	32.5	112.3	296	84.7	1220	102.6
T_7 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	33.2	122.7	302	91.6	1203	108.5
T_8 – **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	29.5	103.7	280	78.6	1065	83.1
T_9– **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP	28.4	101.8	282	78.5	1090	84.5
T_{10}– **T_4** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	30.8	106.3	284	80.7	1103	87.9
SEm±	1.63	5.89	14.7	4.44	58.3	5.23
CD (P=0.05)	4.9	17.5	NS	13.2	173	15.5
CV %	9.5	9.7	9	9.6	9	10.2

Table 2. AS 76: Effect of PSAP on quality and sugar yield of sugarcane (sponsored trial) 2022-23

Treatment	Brix (%)		Pol (%)		Purity (%)		CCS %		Sugar yield (t/ha)
	10 month	12 month	10 month	12 month	10 month	12 month	10 month	12 month	
Early promising genotype									
T_1- Recommended dose of NPK (RDF)	20.5	21.5	17.99	18.68	87.9	86.9	11.87	12.81	10.07
T_2 – RDF + sett soaking with 0.8% PSAP solution	19.8	21.8	17.40	19.02	87.9	87.2	12.22	13.07	11.67
T_3 – Recommended N, 50% P and 50% K	21.1	21.4	18.78	18.86	88.1	87.5	12.12	13.03	9.99
T_4 – **T_3** + sett soaking with 0.8% PSAP solution	19.9	21.4	17.51	18.70	87.9	87.4	11.94	12.86	9.96
T_5 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	20.3	21.4	17.99	18.55	88.5	86.7	11.29	12.71	12.30
T_6 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	18.9	21.3	17.52	18.50	87.3	87.0	12.15	12.69	13.02
T_7 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	20.7	21.2	18.15	18.83	87.9	89.1	12.20	13.05	14.16

T_8 – **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	19.7	21.1	17.41	18.64	88.2	88.2	12.53	12.89	10.71
T_9– **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP	20.9	21.6	18.25	19.07	87.5	88.3	11.19	13.18	11.14
T_{10}– **T_4** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	20.3	20.8	17.97	18.28	88.7	87.9	12.00	12.61	11.08
SEm±	0.54	0.38	0.429	0.342	0.71	0.66	0.212	0.266	0.60
CD (P=0.05)	1.6	NS	1.28	1.02	NS	2.0	0.63	NS	1.79
CV %	4.6	3.1	4.16	3.17	1.4	1.3	3.07	3.57	9.16

Table 3: AS 76. Effect of PSAP on nutrient uptake by sugarcane and available nutrient in post-harvest soil (sponsored trial) 2022-23

Treatment	N-uptake (Kg/ha)	P-uptake (Kg/ha)	K-uptake (Kg/ha)	Available N (Kg/ha)	Available P (Kg/ha)	Available K (Kg/ha)
T_1- Recommended dose of NPK (RDF)	215.2	20.6	224.0	254	12.3	115
T_2 – RDF + sett soaking with 0.8% PSAP solution	237.8	22.8	251.2	241	11.6	114
T_3 – Recommended N, 50% P and 50% K	210.0	19.8	221.5	253	11.9	119
T_4 – **T_3** + sett soaking with 0.8% PSAP solution	214.8	20.3	226.4	255	12.4	122
T_5 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	265.0	24.0	265.0	237	11.2	112
T_6 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	277.0	25.4	280.9	236	11.4	110
T_7 – **T_2** + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	288.9	26.4	293.0	232	11.1	108
T_8 – **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 0.80% at 60, 90 and 120 DAP	224.4	21.5	236.8	247	11.2	117
T_9– **T_4** + Foliar spray of PSAP @ 0.4, 0.65 and 1.10% at 60, 90 and 120 DAP	231.3	21.9	240.8	246	11.8	119

T_{10}– T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10% at 60, 80, 100 and 120 DAP	234.0	21.8	247.2	245	11.9	116
SEm±	13.74	1.39	14.87	12.8	0.62	6.4
CD (P=0.05)	41	4.1	44.2	NS	NS	NS
CV %	9.9	10.7	10.4	9	9.1	10

SANKESHWAR CENTRE

1	**Project No.**	**AICRP (AS 76)**
2	Department	Sugarcane Agronomy
3	Project Title	AS-76: Evaluating efficacy of PSAP for enhancement of sugarcane growth, yield and quality
4	Objectives	• To work out the optimum dose and schedule of PSAP application in sugarcane crop • To assess the effect of PSAP on sugarcane growth, yield and juice quality • To analyse the impact of the product on soil fertility and cultivation economics
5	Project Leader Associate	Dr. S.S. Nooli, Agronomist, AICRP (S)
6	New/Continued	New
7	Year of Start	2021
8	Design	RBD
9	Treatments	T_1-Recommended dose of NPK (RDF) T_2-RDF + sett soaking with 0.8 % PSAP solution T_3-Recommended N, 50% P and 50% K T_4-T_3 + sett soaking with 0.8 % PSAP solution T_5-T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP T_6-T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP T_7-T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP T_8-T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP T_9-T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP T_{10}-T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP
10	a) No. of Replications	3
	b) Plot Size	9.45 m X 4.5 m =42.5 m^2
	c) Date of planting	20.12.2021
	d) Date of harvest	10.01.2023
	e) Plot No	3
	f) Variety	CoSnk 15104 (SNK 09227)

Results

Yield and yield attributes (Table 3)

Sett soaking with 0.8 % PSAP solution with recommended dose of fertilizer followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 days after planting (DAP) recorded significantly higher cane yield of 151.77 t/ha which was on par with and RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP (T_6) (147.49 t/ha) and RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP (T_5) (144.2 t/ha). Single cane weight and NMC followed the same trend .

Juice quality (Table 4)

Quality parameters *viz.,* per cent brix, pol, purity and CSS did not differ due to the sett soaking and foliar application of PSAP. However, RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP recorded significantly higher sugar yield of 20.5 t/ha as compared to other treatment combinations.

Economics (Table 9)

Significantly higher net returns (Rs 298754 ha^{-1}) was recorded with RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP than other treatments. However, higher B:C ratio (3.40) was recorded in Recommended dose of fertilizer (RDF).

Conclusion

- Sett soaking with 0.8 % PSAP solution with recommended dose of fertilizer followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP recorded significantly higher cane yield.
- Foliar application of PSAP performed better over and above with the application of RDF.
- Higher net returns were recorded with RDF + sett soaking with 0.8 % PSAP solution followed by foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP. However, due to higher market price of PSAP and application rate higher B:C ratio was recorded in RDF.

Initial composite soil sample properties of the site

Chemical properties

pH (1:2.5)	EC (dS/m) (1:2.5)	Available nutrients (kg/ha)			OC (%)
		N	P_2O_5	K_2O	
7.85	0.39	269.5	38.9	475.0	0.51

Physical properties

Sand (%)	Fine sand (%)	Silt (%)	Clay (%)
7.8	8.3	25.2	58.7
Bulk density (gm cc^{-1})		**Infiltration rate (cm hr^{-1})**	
1.27		0.39	

Table 1 Effect of PSAP on germination percentage of plant cane

Treatment details		Germination percentage (%)	
		30 DAP	45 DAP
T_1	Recommended dose of NPK (RDF)	52.18	65.02
T_2	RDF + sett soaking with 0.8 % PSAP solution	59.74	70.03
T_3	Recommended N, 50% P and 50% K	49.60	61.03
T_4	T_3 + sett soaking with 0.8 % PSAP solution	51.65	65.85
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	61.40	76.19
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	64.41	79.35
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	64.85	82.24
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	54.57	68.53
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	59.74	72.30
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	59.92	72.14
	S. Em. ±	**2.22**	**2.74**
	CD (P=0.05)	**6.49**	**7.99**

Table 2. Effect of PSAP on tiller count of plant cane

Treatment details		Tiller count ('000 ha^{-1})		
		90 DAP	120 DAP	150 DAP
T_1	Recommended dose of NPK (RDF)	134.9	143.4	156.5
T_2	RDF + sett soaking with 0.8 % PSAP solution	139.5	146.9	160.7
T_3	Recommended N, 50% P and 50% K	119.0	126.3	136.1
T_4	T_3 + sett soaking with 0.8 % PSAP solution	117.7	123.9	134.4
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	142.7	152.0	166.3
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	149.2	158.6	171.8
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	150.9	160.3	173.2
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	123.9	131.6	141.8
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	130.2	138.9	148.0
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	130.3	139.7	150.6
	S. Em. ±	**5.13**	**5.45**	**5.91**
	CD (P=0.05)	**14.99**	**15.91**	**17.26**

Table 3. Effect of PSAP on yield parameters and yield of plant cane

Treatment details		Single cane weight (kg)	NMC ('000 ha^{-1})	Cane yield (t ha^{-1})
T_1	Recommended dose of NPK (RDF)	1.85	94.46	134.70
T_2	RDF + sett soaking with 0.8 % PSAP solution	1.91	102.51	139.36
T_3	Recommended N, 50% P and 50% K	1.09	83.90	95.50
T_4	T_3 + sett soaking with 0.8 % PSAP solution	1.29	84.50	102.99
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.95	102.06	144.22
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.99	102.99	147.49
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	2.27	104.75	151.77
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.52	85.18	103.80
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.58	90.25	110.50
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.62	93.88	114.50
	S. Em. ±	**0.08**	**3.64**	**4.87**
	CD (P=0.05)	**0.21**	**10.63**	**14.21**

Table 4. Effect of PSAP on quality parameters of plant cane

Treatment details		Brix (%)	Pol (%)	Purity (%)	CSS (%)	CCS yield (t/ha)
T_1	Recommended dose of NPK (RDF)	20.9	19.1	91.6	13.5	18.1
T_2	RDF + sett soaking with 0.8 % PSAP solution	20.7	19.2	92.7	13.6	18.9
T_3	Recommended N, 50% P and 50% K	20.8	19.0	91.0	13.3	12.7
T_4	T_3 + sett soaking with 0.8 % PSAP solution	21.1	19.8	93.7	14.0	14.4
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	20.6	18.7	90.9	13.1	18.9
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.2	18.8	92.8	13.3	19.6
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.7	19.2	92.6	13.5	20.5
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	19.9	18.7	94.4	13.4	13.9
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	20.5	19.2	93.8	13.6	15.1

T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	20.8	19.2	92.1	13.5	15.5
	S. Em. ±	**0.79**	**0.73**	**3.55**	**0.52**	**0.66**
	CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**1.91**

Table 5. Effect of PSAP on growth parameters of plant cane at harvest

Treatment details		**Cane height (m)**	**Cane girth (cm)**
T_1	Recommended dose of NPK (RDF)	2.89	2.82
T_2	RDF + sett soaking with 0.8 % PSAP solution	2.91	2.83
T_3	Recommended N, 50% P and 50% K	2.71	2.84
T_4	T_3 + sett soaking with 0.8 % PSAP solution	2.83	2.82
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	2.9	2.85
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	2.79	2.87
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	3.01	2.93
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	2.71	2.81
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	2.79	2.79
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	2.93	2.78
	S. Em. ±	**0.11**	**0.09**
	CD (P=0.05)	**NS**	**NS**

Table 6. Effect of PSAP on the post harvest soil parameters of plant cane

Treatment details		**Bulk Density (g cc^{-1})**	**Infiltration rate (cm hr^{-1})**	**pH**	**Electrical Conductivity (ds m^{-1})**	**Organic Carbon (%)**
T_1	Recommended dose of NPK (RDF)	1.26	0.41	7.86	0.30	0.51
T_2	RDF + sett soaking with 0.8 % PSAP solution	1.27	0.40	7.79	0.29	0.53

T_3	Recommended N, 50% P and 50% K	1.28	0.42	7.81	0.31	0.52
T_4	T_3 + sett soaking with 0.8 % PSAP solution	1.25	0.38	7.83	0.30	0.54
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.27	0.39	7.79	0.29	0.55
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.26	0.37	7.81	0.31	0.56
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.28	0.40	7.84	0.33	0.55
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	1.29	0.41	7.75	0.29	0.58
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	1.31	0.42	7.76	0.33	0.54
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	1.29	0.41	7.81	0.34	0.57
	S. Em. ±	**0.92**	**0.01**	**0.02**	**0.01**	**0.01**
	CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**
	Initial values	**1.27**	**0.39**	**7.85**	**0.32**	**0.51**

Table 7. Effect of PSAP on nutrient uptake of plant cane at harvest

Treatment details		Nutrient uptake (kg ha^{-1})		
		N	**P**	**K**
T_1	Recommended dose of NPK (RDF)	348.3	47.8	317.4
T_2	RDF + sett soaking with 0.8 % PSAP solution	351.6	50.0	325.3
T_3	Recommended N, 50% P and 50% K	257.1	31.4	254.1
T_4	T_3 + sett soaking with 0.8 % PSAP solution	274.6	37.0	270.0
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	350.1	49.9	299.8
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	358.1	50.9	324.4
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	365.1	53.2	333.9
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	286.4	37.6	267.3
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	293.7	38.5	273.2
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	294.0	39.7	273.2
	S. Em. ±	12.6	1.71	11.34
	CD (P=0.05)	**36.08**	**5.00**	**33.10**
	Initial soil status	**269.5**	**38.9**	**475.0**

Table 8. Effect of PSAP on post harvest available soil nutrient status of plant cane

Treatment details		Available nutrient status (kg ha^{-1})		
		N	P_2O_5	K_2O
T_1	Recommended dose of NPK (RDF)	220.3	41.0	416.0
T_2	RDF + sett soaking with 0.8 % PSAP solution	228.0	40.2	419.9
T_3	Recommended N, 50% P and 50% K	235.6	36.0	384.4
T_4	T_3 + sett soaking with 0.8 % PSAP solution	251.8	34.6	406.7
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	220.3	40.6	454.0
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	217.0	38.7	412.0
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	204.5	33.2	396.1
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	221.6	38.3	381.8
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	218.6	40.0	386.1
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	215.1	39.6	382.0
S. Em. ±		**8.65**	**1.48**	**15.75**
CD (P=0.05)		**25.26**	**4.33**	**45.98**
Initial soil status		**269.5**	**38.9**	**475.0**

Table 9. Effect of PSAP on economic parameters of plant cane cultivation

Treatment details		Cost of cultivation	Gross returns	Net returns	B:C Ratio
T_1	Recommended dose of NPK (RDF)	112986	383888	270902	3.40
T_2	RDF + sett soaking with 0.8 % PSAP solution	118986	397184	278198	3.34
T_3	Recommended N, 50% P and 50% K	111215	272175	160960	2.45
T_4	T_3 + sett soaking with 0.8 % PSAP solution	117215	293529	176314	2.50
T_5	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	132861	411023	278162	3.09
T_6	T_2 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	133086	420345	287259	3.16
T_7	T_2 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	133786	432540	298754	3.23
T_8	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 0.80 % at 60, 90 and 120 DAP	131090	295830	164740	2.26
T_9	T_4 + Foliar spray of PSAP @ 0.4, 0.65 and 1.10 % at 60, 90 and 120 DAP	131315	314925	183610	2.40
T_{10}	T_4 + Foliar spray of PSAP @ 0.4, 0.65, 1.10 and 1.10 % at 60, 80, 100 and 120 DAP	132015	326325	194310	2.47
S. Em. ±		**-**	**13872**	**13872**	**0.11**
CD (P=0.05)		**-**	**40492**	**40492**	**0.32**

UCHANI CENTRE

AS- 76	**:**	**Evaluation of Potassium Salt of Active Phosphorus (PSAP) in Sugarcane**
Objective	**:**	To assess the effect of PSAP on sugarcane growth, yield and juice quality
Year of start	**:**	2020-21

Treatments:

T1	100% RDF* through soil- Control plot-1
T2	T_1+ sett soaking with 0.8% PSAP solution
T3	T_2 + 12.5 kg PSAP/ha through foliar in three sprays
T4	T_2+ 15 kg PSAP/ha through foliar in three sprays
T5	T_2 + 25 kg PSAP/ha through foliar in four sprays
T6	RDN and 50% of P and K- Control plot-2
T7	T_6+ sett soaking with 0.8% PSAP solution
T8	T_7 + 12.5 kg PSAP/ha through foliar in three sprays
T9	T_7 + 15 kg PSAP/ha through foliar in three sprays
T10	T_7 + 25 kg PSAP/ha through foliar in four sprays

The experiment consisting of ten treatments was planted on mid maturing variety CoH 13263 at 120 cm row spacing on March 25, 2022 in spring season in randomized block design with three replications. The recommended dose of NPK 150-50-50 (T1-T5) and 150-25-25 NPK kg/ha (T6-T10) was applied in spring sugarcane. Full dose of P and K as per treatments was applied in furrows at the time of planting. The soil of the experimental field was sandy loam in texture with low in organic carbon (0.41), medium in available phosphorus (11.9 kg/ha) and medium in available K (181 kg/ha). The crop was raised as per package of practices of the region. The crop was harvested on March 1, 2023. The crop was irrigated at 8-10 days and 20 days interval during pre-monsoon and post-monsoon season, respectively.

Germination, growth parameters and yield attributes were significantly affected by different treatments of sett soaking and foliar spray of PSAP at different intervals. Higher germination and tillers were recorded with dipping of setts in 0.8% PSAP solution as compared to untreated control. No significant difference in germination percent was recorded between RDF and RDN-50% P & K fertility levels. Significantly highest cane yield was recorded in T5 (RDF+ sett treatment+ 25 kg/ha PSAP) and T10 (RDN-50 % P &K + sett treatment + 25 kg/ha PSAP) treatments as compared to their respective control treatments. Percent increase in cane yield and

yield attributes was higher under RDN-50% P & K fertility treatments as compared to RDF treatments (Table 11).

Significantly highest CCS yield was recorded in T5 (RDF+ sett treatment+ 25 kg/ha PSAP) and T10 (RDN-50 % P &K + sett treatment + 25 kg/ha PSAP) treatments as compared to their respective control treatments. ROVC (219358 Rs/ha) was computed highest with T5 (RDF+ sett treatment+ 25 kg/ha PSAP) followed by T4 (RDF+ sett treatment+ 15 kg PSAP/ha), whereas B: C (2.05) was computed highest with T2 (RDF+ sett soaking with 0.8% PSAP solution) followed by T4 (RDF+ sett treatment+ 15 kg PSAP/ha) (Table 12).

Table 1: Effect of different treatments on growth and yield of sugarcane

Treatments		**Germination (%)**	**Tillers (000/ha)**	**NMC (000/ha)**	**Cane weight (g)**	**Stalk length (m)**	**Cane diameter (cm)**	**No. of internodes**	**Cane yield (t/ha)**
T1	100% RDF* through soil- Control plot-1	47.8	126.2	94.9	920	1.51	2.32	19.2	83.9
T2	T_1+ sett soaking with 0.8% PSAP** solution	53.2	134.9	102.6	972	1.70	2.39	19.8	93.1
T3	T_2 + 12.5 kg PSAP/ha through foliar in three sprays	54.1	142.7	108.3	1031	1.85	2.44	20.2	103.9
T4	T_2+ 15 kg PSAP/ha through foliar in three sprays	53.7	145.0	112.1	1062	1.98	2.48	20.5	110.2
T5	T_2 + 25 kg PSAP/ha through foliar in four sprays	54.3	148.4	117.9	1080	2.09	2.51	20.7	117.5
T6	RDN and 50% of P and K- Control plot-2	45.6	112.2	84.1	886	1.33	2.24	18.6	72.0
T7	T_6+ sett soaking with 0.8% PSAP solution	50.6	124.5	92.8	941	1.53	2.33	19.3	82.0
T8	T_7 + 12.5 kg PSAP/ha through foliar in three sprays	51.5	129.4	98.9	1004	1.71	2.39	19.8	91.3
T9	T_7 + 15 kg PSAP/ha through foliar in three sprays	50.5	131.5	102.7	1023	1.83	2.43	20.1	98.8
T10	T_7 + 25 kg PSAP/ha through foliar in four sprays	51.8	132.7	106.9	1048	1.94	2.47	20.4	105.0
CD at 5%		5.2	13.4	10.6	102	0.20	NS	NS	12.3

Table 2: Effect of different treatments on quality and economics of sugarcane

Treatments		CCS (%)	CCS yield (t/ha)	Total variable cost (Rs/ha)	Gross returns (Rs/ha)	ROVC (Rs/ha)	B: C
T1	100% RDF* through soil- Control plot-1	11.88	9.96	164846	325196	160350	1.97
T2	T_1+ sett soaking with 0.8% PSAP** solution	12.23	11.30	175823	360856	185033	2.05
T3	T_2 + 12.5 kg PSAP/ha through foliar in three sprays	12.44	12.91	205642	402716	197074	1.96
T4	T_2+ 15 kg PSAP/ha through foliar in three sprays	12.58	13.89	213769	427135	213366	2.00
T5	T_2 + 25 kg PSAP/ha through foliar in four sprays	12.74	14.93	236072	455430	219358	1.93
T6	RDN and 50% of P and K- Control plot-2	11.68	8.39	155231	279072	123841	1.80
T7	T_6+ sett soaking with 0.8% PSAP solution	11.77	9.67	166688	317832	151144	1.91
T8	T_7 + 12.5 kg PSAP/ha through foliar in three sprays	12.08	11.02	195607	353879	158272	1.81
T9	T_7 + 15 kg PSAP/ha through foliar in three sprays	12.30	12.15	204454	382949	178495	1.87
T10	T_7 + 25 kg PSAP/ha through foliar in four sprays	12.46	13.06	226097	406980	180883	1.80
CD at 5%		NS	1.65	-	-	-	-

Fig 4: Field view of experiment on evaluation of Potassium Salt of Active Phosphorus (PSAP) in Sugarcane

Summary: Higher germination (53.2, 50.6%) and tillers (134.9, 124.5 thousand/ha) were recorded with dipping of setts in 0.8% PSAP solution as compared to untreated controls. No significant difference in germination percent was recorded between RDF (47.8%) and RDN-50 % P & K fertility levels (45.6%). Significantly highest cane yield was recorded in T5-RDF+ sett treatment+ 25 kg/ha PSAP (117.5 t/ha) and T10-RDN-50 % P & K + sett treatment + 25 kg/ha PSAP (105.0 t/ha) treatments as compared to their respective control treatments T1 and T6. Percent increase in

cane yield and yield attributes due to application of PSAP was comparatively higher under RDN-50% P & K fertility treatments as compared to RDF treatments.

Based on two year study it is concluded that T5-RDF+ sett treatment+ 25 kg/ha PSAP and T10-RDN-50 % P & K + sett treatment + 25 kg/ha PSAP were proved superior in terms of cane yield as compared to their respective control treatments T1 and T6. Percent increase in cane yield and yield attributes due to application of PSAP was comparatively higher under RDN-50% P & K fertility treatments as compared to RDF treatments.

IMPORTANT OBSERVATIONS:

PSAP (Potassium salt of active phosphorus) a compound developed and marketed by Isha Agro was evaluated for its efficacy in enhancing sugarcane growth and yield. Evaluated against recommended dose of fertilizers (NPK) and full nitrogen dose with half of P &K, the compound exhibited mixed response depending on the location's soil and agro-climatic conditions. Salient findings are:

1. Centres located in the NWZ recorded non-significant effect of PSAP on sugarcane growth and yield, except at Uchani where sugarcane sett soaking with 0.8 % solution of PSAP brought about significant improvement in germination, NMC and cane yield over no soaking. Across the centres in the zone soaking of setts in PSAP solution compensated for the reduction in P and K dose. Sett soaking followed by spray of PSAP at different growth stages in varying concentrations performed at par however, significantly better over sett soaking alone.
2. Peninsular zone characterized by conducive weather conditions for the crop recorded significant effect of PSAP on sugarcane growth and productivity. Soaking of setts in 0.8% PSAP solution alone caused significant improvement in germination and sugarcane growth. Centres located across the zone found significant improvement in cane yield with sett soaking followed by PSAP spray at 60, 80, 100 and 120 DAP at the respective concentrations of 0.4, 0.65, 1.1 and 1.1 %. Juice quality was, however not affected.
3. Similar effect of PSAP was recorded in east-coast and north central zones as it was for the peninsular zone.

CONCLUSION

Effect of PSAP on improving germination, growth and cane yield was more conspicuous in peninsular, east coast and north-central zones. Most of the centres in north-west zone did not observe significant effect of PSAP.

RECOMMENDATIONS

PSAP as sett soaking (0.8% solution) followed by foliar spray at 60, 80, 100 and 120 DAP at the respective concentrations of 0.4, 0.65, 1.1 and 1.1% is recommended for use in the Peninsular zones along with recommended dose of fertilizers.

Signature of the Scientist with seal:

Sanjay 12/2/2025

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