NATIONAL SUGAR INSTITUTE AND ISHA AGRO SCIENCES PVT. LIMITED COLLABORATIVE RESEARCH PROJECT REPORT

on

"TESTING OF PSAP – POTASSIUM SALT OF ACTIVE PHOSPHORUS" A RESEARCH MOLECULE ON SUGARCANE FOR 2020-21"

Principal Investigator

Dr. Ashok Kumar

Assistant Professor Agricultural Chemistry

&

Co-Principal Investigator

Dr. Lokesh Babar

Junior Scientific Officer (Agricultural Chemistry)

National Sugar Institute

Ministry of Consumer Affairs, Food and Public Distribution

Department of Food & Public Distribution

Govt. of India

Kanpur (U.P) 208017

Project Report of National Sugar Institute, Kanpur and Isha Agro Sciences Pvt. Limited, Pune Collaborative Research Project (2020-21)

Name of the Project :	**Testing of PSAP – Potassium salt of active phosphorus" a research molecule on sugarcane for 2020-21**
Location :	Division of Agriculture Chemistry, Farm- National Sugar Institute, Kanpur-208017.
Name of P.I. :	Dr. Ashok Kumar, Assistant Professor (Agril. Chemistry) Division of Agriculture Chemistry, National Sugar Institute, Kanpur-208 017.
Name of Co-P.I. :	Dr. Lokesh Babar, Junior Scientific Officer (Agril. Chemistry) Division of Agriculture Chemistry, National Sugar Institute, Kanpur-208 017.
Site of Experimentation:	National Sugar Institute, Agriculture Farm, Kanpur.

INTRODUCTION

Sugarcane is grown in about 26 million ha in the world with total production of nearly 1900 million tonnes (FAOSTAT 2018). Approximately, 75% of total sugar production comes from sugarcane and the rest from sugar beet. More than 115 countries cultivate sugarcane with total sugar production of 171 million tonnes. India has emerged as the largest sugar producing country followed by Brazil.

Besides, sugar as major product, sugarcane is also used as raw material for value added products like feed, fibre and energy, especially bio-fuel and co-generation. The crop being one of the most efficient converter of biomass to energy and thereby an excellent source of bio-fuel production, there has been heightened focus on sugarcane cultivation, sugar trade and other related products at national as well as global level. Out of total global sugar output, developing nations contribute approximately 70-75% of the production. In majority of developing countries, sugar production is mostly consumed domestically except in Brazil where annual growth has enabled the country to turn its attention towards sugar export market.

Global sugarcane production was nearly 260 million tonnes from 6.3 million ha area, with average productivity of nearly 41 tonnes per ha during 1950's. In 1980's, world annual sugarcane production had reached up to 770 million tonnes with the average yield of 57 tonnes per ha. In another three and half decades time, world sugarcane production achieved the new height by more than two fold production increase to 1900 million tonnes from area of 26 million ha.

In nutshell, global sugarcane production had enhanced nearly seven times during past seven decades. The sugarcane area and productivity also improved 4.0 and 1.85 times, respectively with average sustained CGR of nearly 1.1 per cent per annum during 1960-2017 (FAOSTAT 2018).

Although, India had emerged as 4th largest sugar exporting nation since year 2015-16, with the share of 4.55% in total sugar export. The major export destinations for Indian sugar have been Indonesia, Myanmar, Somalia, Sudan, Sri Lanka and UAE. Due to sustained higher sugar production in India, thus, negligible amount of sugar was imported from global market under quota system.

Indian sugar industry is quite vibrant, supports approximately 6.5- 7.5 million farmers through sugarcane cultivation and other related industries. This crop is cultivated on about 5 million ha i.e., 3.52% of net sown area and produces approximately 350-380 million tonnes sugarcane with average productivity of 70 tonne per ha. The area,

production and productivity of sugarcane in India during 1950-51 to 2017-18 given in Table 1, clearly revealed the continuous upward trend. Although national average productivity has been hovering around 80 t/ha, tropical states recorded higher productivity ranging from 80 to 105 t/ha.

A Recent farmer participatory survey revealed that growers generally apply more than 200 Kg Nitrogen ha^{-1} and 45 to 60 kg P_2O_5 $ha,^{-1}$ however use of potassium K, secondary nutrients and micronutrients is all together missing. Farmers are experiencing declining responses to N and P due to omission of other essential nutrients in their fertilizer schedule. Adaption of balanced and judicious use of all needed nutrients can help to improve cane productivity and enhance sugar recovery by rendering resistance against biotic and abiotic stresses, and better synthesis and storage of sugar (Yadav *et.al.* 1993).

Nutrients play an important role in crop production. Phosphorus plays a major role in metablolic processes and potash is important to induce ability to tolerate various stresses. Conventionally these major crop nutrients are supplied through chemical fertilizers through soil. 90 % of phosphate gets fixed in soil and only 10 % is absorbed by crop plants. Potash is given in ionic form, whereas its associate's cation has a role which is not synergetic to given Potash.

Availability of applied P and K to the crops is uncertain due to immobilization fixation and leaching of these nutrients in soil and hence, its uptake through roots varies from 15-60 days based on soil, water and climate conditions. Absorption of P and K fertilizer through foliage is hardly 5 to 8 per cent. Crop susceptibility to pest and disease decreases due to P and K fertilizer sprays. Nitrogen, phosphorus and potash are very important essential major nutrients required by sugarcane crop for good growth. Nitrogen plays major role in building protoplasm and nucleus. Phosphorus is very important for sugar synthesis, energy storage and sugar translocation in plant body and potash plays very important role in providing protection against various stresses. Nitrogen is easily available through various sources like chemical fertilizer, microbial activities etc but phosphorus applied through chemical fertilizers get fixed in soil and hardly 10-13 percent is available to crop plants with help of PSB the P availability is improved slightly. Higher sugar gets translocated in stalk and in turn improves the cane girth and cane weight. PSAP is beneficial to both cane grower to get the higher net return and better sugar recovery per cent for sugar industry. Keeping in view above factors, the present study was conducted to find out the economic dose of potassium salt of active phosphorus for growth, juice purity and overall economics of sugarcane (*Saccharum sp.*) in central plane zone of U.P.

To overcome the constrains of Phosphorus and Potash, in place of conventional fertilizers that are traditionally used in agriculture, PSAP – A Noval testing molecule –Potassium salt of active phosphorus is proposed for the study. 1.8 Kg powder form of PSAP in 1 liter water is quickly gets absorbed by green leaves. PSAP can be sprayed at any given stage of crop plants and higher doses do not have any phytotoxicity, PSAP can be applied through foliar, sprinkle, drip, soil drench and root tip. Foliar application of PSAP is extremely effective amongst all.

Therefore the present research project entitled "Testing of PSAP – "Potassium salt of active phosphorus" a research molecule on sugarcane for 2019-20" was proposed to be under taken at the National Sugar Institute.

I) Objectives:

1. To study the effect of PSAP on Sugarcane Quality and Yield.
2. To Estimate the cost/benefit ratio of PSAP for farmer.
3. To find best recommendations of cost effective treatments based on study.
4. To study the Soil Nutrients status as well as other soil parameters before and after experiments.

PART-A: Experiments conducted on testing of PSAP on Cane Variety Co 0238 during 2019-2020 (Ratoon Crop)

II) Treatments:

Appropriate formulations of fertilizer application with PSAP applied based on Potassium salt of active phosphorus.

T_1 – 100 % R.D.F. (180:80:80)-Control

T_2- 100 % R.D.F. (180:80:80) + 12.5 kg PSAP /ha , (4 Foliar spray -60, 75, 90 & 120 D.A.P.)

T_3- 100 % R.D.F. (180:80:80) + 12.5 kg PSAP /ha (3 Foliar spray -60, 90 & 120 D.A.P.)

T_4- 50 % R.D.F. of P & K (180:40:40)-Control

T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5 kg PSAP /ha (4 Foliar spray -60, 75, 90 & 120 D.A.P.)

T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5 kg PSAP /ha (3 Foliar spray-60, 90 & 120 D.A.P.)

** R.D.F. (Recommended dose of fertilizer)

**PSAP (Potassium salt of active Phosphorus)

** D.A.P. (Days after Planting)

III) Field Trials: a) Ratoon

No. of treatments: 6, **No. of replications:** 3

Total No. of Plots: 6x3=18 **Plot size:** 5X5m =25 m^2 **Net area:** 450m^2

Variety: CoS-0238

Design: Randomized Block Design (RBD)
Recommended dose of Fertilizer (RDF) for Nitrogen, Phosphorus and Potash will be 180:80:80 Kg/ha respectively.
Sources: N: Urea and DAP, P: DAP and K: MOP

** DAP - Diammonium Phosphate

**MOP - Muriate of Potash

IV) Observation to be recorded:

(A) Yield Parameters:

1. Germination
2. Number of millable cane
3. Average Cane Weight
4. Cane and CCS yields

(B) Quality Parameters:

1. Juice Purity
2. Pol % Cane
3. CCS % Or CCS (Yield T/ha)
4. Brix %

(C) Soil nutrients:

1. Soil Parameters before and after trials

RESULTS AND DISCUSSION

Table 1: Effect of PSAP on sugarcane yield and yield attributing parameters Ratoon.

Treatments	Plant Height (cm)	Inter node length (cm)	Number of inter nodes per cane	No. of Shoot per meter	Height of cane (cm)	Girth of cane (cm)	No of Millable canes 000 (ha^{-1})	Cane weight (gm)	Cane yield (t/ha)
T_1- 100 % R.D.F. (180:80:80)- Control	230.0	9.22	20.0	9.40	172.0	7.2	72.00	958	69.2
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray- 60, 75, 90 & 120 D.A.P.)	318.0	9.82	20.50	11.70	220	8.76	98.20	1090	109.5
T_3- 100 % R.D.F. (180:80:80) +	312.10	9.65	20.20	10.60	214.0	8.52	94.00	1060	100.8

12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)									
T_4- 50 % R.D.F. of P & K (180:40:40)- Control	220.30	9.50	19.80	9.40	166.2	7.0	74.8	950.8	67.10
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	262.10	9.82	1992	10.72	185	7.82	90.2	1038.5	96.20
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)	238.20	9.70	19.98	9.52	186.8	7.90	83.20	1036.2	92.80
S.E.	16.3	1.20	1.04	1.30	7.60	1.25	4.10	31.2	3.70
C.D. %	33.57	2.47	2.14	2.67	15.65	2.57	8.44	64.27	7.62

The data of table 1 revealed that more plant height (318.00cm), Girth of cane (9.82 cm) in T_2 treatment and Cane yield (109.5 t/ha) in T_2 than control (without PSAP application treatment). Effect of PSAP on number of internodes per cane plant and single inter node length were non-significant but maximum value was recorded (20.50 per cane plant and 9.82 cm) in T_2 treatment.

Table 2: Effect of PSAP on quality, nutrient uptake and economics of sugarcane

Treatments	Brix	Pol %	Purity	Sucrose %	CCS (t/ha)	Uptake (Kg/ha)			Cost of cultivation (Rs. ha^{-1})	Gross Income (Rs. ha^{-1})	B:C ration
						N	P	K			
T_1- 100 % R.D.F. (180:80:80)- Control	21.16	14.20	85.44	17.43	8.16	179.92	29.06	332.16	133527	234000	1.75
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	21.89	14.85	90.77	18.59	13.99	273.75	45.10	383.50	156639	319150	2.04
T_3- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (3 Foliar spray - 60, 90 & 120 D.A.P.)	21.82	14.95	89.87	18.23	12.52	252.10	42.00	352.80	155939	305500	1.96

T_4- 50 % R.D.F. of P & K (180:40:40)- Control	21.22	14.28	86.24	17.17	7.72	167.75	27.10	196.10	130987	243100	1.86
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	21.92	14.81	90.33	18.35	12.04	242.10	38.10	284.10	154099	293150	1.90
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray - 60, 90 & 120 D.A.P.)	21.86	14.84	90.35	18.04	11.34	234.10	36.97	272.10	153399	270400	1.76
S.E.	1.32	--	--	--	--	13.10	2.60	17.1	-	5380	-
C.D. %	N.S.	--	--	--	--	26.98	5.35	35.22	-	11082.80	0.12

A difference in sucrose per cent due to PSAP treatment was not significant. Application of PSAP resulted into increase in sucrose per cent in all PSAP treatments against non PSAP application treatment and recorded highest value (18.59 per cent) in T_2 treatment. Differences in data of purity per cent due to different PSAP treatment were non-significant and recorded highest value (90.77 per cent) in T_2 treatment compared with all PSAP treatments.

Better performance of CCS (t/ha) was noted in 100 per cent recommended dose of NPK (180:80:80) and 12.5 kg/ha PSAP at 60, 75, 90 and 120 DAP was possible due to over all good plant growth enabling plants to accumulate more photosynthesis for synthesis of sucrose.

Cost of cultivation depends on variable input and their availability and price in local market. Data from above table 2 showed that maximum cost of cultivation (Rs. 156639 ha^{-1}) was noted in T_2 due to additional cost of PSAP and minimum value of cost of cultivation value was having in control (Rs. 133527 ha^{-1}). Differences between maximum and minimum value of cost of cultivation was obtained only Rs. 23112 ha^{-1}. Gross income and benefit cost ratio value were obtained significantly higher in T_2 treatment (Rs. 319150 ha^{-1} and 2.04), respectively compared with all other treatments. Higher numbers of foliar spray of 12.5kg/ha PSAP gave higher Gross income and benefit cost ratio due to better response of foliar spray of PSAP on cane productivity.

Table 3: Effect of PSAP on mean observation Data or summary

S. No.	Parameters	Control	Treated	Difference
1.	Number of Shoot per Meter	9.40	**10.63**	1.23

2.	Height of Sugarcane Plant (cm)	225.15	**282.6**	57.45
3.	Height of cane (cm)	169.1	201.45	32.35
4.	Girth of cane (cm)	7.1	8.25	1.15
5.	Cane weight (gm)	954.4	**1056.17**	101.77
6.	Cane yield (t/ha)	68.15	99.82	31.67
7.	No of Millable canes (ha^{-1})	73.4	**91.4**	18.00

The data of table 3 revealed that better cane weight (1056.17 cm), Height of cane plant (282.6 cm) and number of Millable canes (91.4 ha^{-1}) in treated plant than control (without PSAP application treatment). Effect of PSAP on number of shoot per meter was found non-significant with maximum value recorded as (10.63cm) in PSAP treatments.

Table 4: Effects of treatments on available N, P and K (Kg/ha) before and after harvest of sugarcane crop:

Treatments	Before			After		
	Available Nutrient (Kg/ha)			Available Nutrient (Kg/ha)		
	N	P	K	N	P	K
T_1- 100 % R.D.F. (180:80:80)-Control	280.5	26.2	135.0	279.2	25.8	132.8
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray- 60, 75, 90 & 120 D.A.P.)	283.2	26.4	138.2	280.5	25.9	137.1
T_3- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)	283.2	26.2	138.0	289.8	26.5	137.5
T_4- 50 % R.D.F. of P & K (180:40:40)-Control	279.8	25.5	132.5	280.1	25.8	133.8
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray-60, 75, 90 & 120 D.A.P.)	282.5	25.8	135.5	283.0	25.8	135.0
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray-60, 90 & 120 D.A.P.)	282.6	25.8	135.2	283.0	26.0	134.6
S.E.	1.98	1.18	2.10	2.10	1.20	1.96
C.D. %	NS	NS	NS	NS	NS	NS

The data of table 4 showed that values of Available N, P and K after harvest of sugar cane crop are non-significant compare to initial values of available N, P and K in soil of experimental site.

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CONCLUSION

On the basis of above study, it is concluded that application of PSAP only through foliar sprays (four prays at 60, 75, 90 and 120 DAP) gave significantly better results with all doses of PSAP than control (without PSAP application treatment). Foliar application of PSAP @ 12.5 kg per hectare at different periods after planting along with 100 per cent recommended dose of NPK (180:80:80) applied in sugarcane cultivation is helpful in improved growth, juice purity and higher net return with improved benefit cost ratio.

PART-B: Experiments conducted on testing of PSAP on Cane Variety CoS 08272 during 2019-2020 (Plant Crop)

B) Cane Variety CoS 08272 Plant

No. of treatments: 6, **No. of replications:** 3

Total No. of Plots: 6x3=18 **Plot size**: 5X5m =25 m2 **Net area:** 450m2

Variety- CoS-08272

Design: Randomized Block Design (RBD)
Recommended dose of Fertilizer (RDF) for Nitrogen, Phosphorus and Potash will be 180:80:80 Kg/ha respectively.

Sources: N: Urea and DAP, P: DAP and K: MOP

** DAP - Diammonium Phosphate

**MOP - Muriate of Potash

IV) Observation to be recorded:

(A) Yield Parameters:

1. Germination
2. Number of millable cane
3. Average Cane Weight

4. Cane and CCS yields

(B) Quality Parameters:

1. Juice Purity
2. Pol % Cane
3. CCS % Or CCS (Yield T/ha)
4. Brix %

(C) Soil nutrients:

1. Soil Parameters before and after trials

Table 1: Effect of PSAP on sugarcane yield and yield attributing parameters Plant

Treatments	Plant Height (cm)	Inter node length (cm)	Number of inter nodes per cane	No. of Shoot per meter	Height of cane (cm)	Girth of cane (cm)	No of Millable canes 000 (ha^{-1})	Cane weight (gm)	Cane yield (t/ha)	Germination %
T_1- 100 % R.D.F. (180:80:80)- Control	254.20	9.80	19.8	9.50	178	7.20	74.00	965	73.2	50.85
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray- 60, 75, 90 & 120 D.A.P.)	352.10	10.10	21.00	12.10	236	8.80	100.50	1100	106.8	55.10
T_3- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)	338.20	9.85	20.66	10.70	231.6	8.60	95.00	1080	101.0	54.00
T_4- 50 % R.D.F. of P & K (180:40:40)- Control	251.80	9.80	20.10	9.40	172	7.10	74.8	960.8	70.80	53.80
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	285.10	9.75	19.98	10.80	196.2	8.12	91.2	1040.6	98.20	54.20
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)	265.00	9.98	20.00	9.60	190.8	7.98	84.8	1036.2	94.70	53.10

S.E.	15.2	1.0	1.18	1.21	8.70	1.10	4.68	36.2	4.10	2.70
C.D. %	31.31	2.47	2.43	2.49	17.92	2.26	9.64	74.57	8.44	NS

The data of table 1 revealed that more plant height (352.10cm), Girth of cane (8.80 cm) in T_2 treatment and Cane yield (106.8 t/ha) in T_2 than control (without PSAP application treatment). Effect of PSAP on number of internodes per cane plant and single inter node length were non-significant but maximum value was recorded (21.00 per cane plant and 10.10 cm) in T_2 treatment.

Table 2: Effect of PSAP on quality, nutrient uptake and economics of sugarcane

Treatments	Brix	Pol %	Purity	Sucrose	CCS (t/ha)	Uptake (Kg/ha)			Cost of cultivation (Rs. ha^{-1})	Gross Income (Rs. ha^{-1})	B:C ration
						N	P	K			
T_1- 100 % R.D.F. (180:80:80)- Control	19.16	17.41	90.86	17.27	8.94	190.32	30.70	340.10	152411	237900	1.56
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	19.66	17.88	90.94	18.54	14.29	278.0	44.60	390.00	175523	347100	1.98
T_3- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (3 Foliar spray - 60, 90 & 120 D.A.P.)	20.56	17.91	87.11	18.34	13.04	262.6	42.28	354.73	174823	328250	1.88
T_4- 50 % R.D.F. of P & K (180:40:40)- Control	19.5	17.76	91.07	17.04	8.41	184.20	29.74	257.00	149871	230100	1.54
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray - 60, 75, 90 & 120 D.A.P.)	20.62	17.81	86.37	18.46	12.78	256.10	40.21	290.20	172983	319150	1.84
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray - 60, 90 & 120 D.A.P.)	20.12	18.14	90.16	18.16	12.16	247.10	38.00	301.10	172283	307775	1.75
S.E.	1.21	--	--	--	--	15.82	2.80	16.20	--	6250	0.05
C.D. %	N.S.	--	--	--	--	32.58	5.77	33.37	-	12875	0.10

A difference in sucrose per cent due to PSAP treatment was not significant. Application of PSAP resulted into increase in sucrose per cent in all PSAP treatments against non PSAP application treatment and recorded highest value (18.54 per cent) in T_2 treatment. Differences in data of purity per cent due to different PSAP treatment were non-significant and recorded highest value (90.94 per cent) in T_2 treatment compared with all PSAP treatments.

Better performance of CCS (t/ha) was noted in 100 per cent recommended dose of NPK (180:80:80) and 12.5 kg/ha PSAP at 60, 75, 90 and 120 DAP was possible due to over all good plant growth enabling plants to accumulate more photosynthesis for synthesis of sucrose.

Cost of cultivation depends on variable input and their availability and price in local market. Data from above table 2 showed that maximum cost of cultivation (Rs. 1,75,523 ha^{-1}) was noted in T_2 due to additional cost of PSAP and minimum value of cost of cultivation value was having in control (Rs. 1,52,411 ha^{-1}). Differences between maximum and minimum value of cost of cultivation was obtained only Rs. 23112 ha^{-1}. Gross income and benefit cost ratio value were obtained significantly higher in T_2 treatment (Rs. 347100 ha^{-1} and 1.98), respectively compared with all other treatments. Higher numbers of foliar spray of 12.5kg/ha PSAP gave higher Gross income and benefit cost ratio due to better response of foliar spray of PSAP on cane productivity.

Table 3: Effect of PSAP on mean observation Data or summary

S. No.	Parameters	Control	Treated	Difference
1.	Number of Shoot per Meter	9.45	10.80	1.35
2.	Height of Sugarcane Plant (cm)	253	310.1	57.10
3.	Height of cane (cm)	175	**231.65**	56.65
4.	Girth of cane (cm)	7.15	8.375	1.225
5.	Cane weight (gm)	962.9	**1064.2**	101.3
6.	Cane yield (t/ha)	72	100.175	28.175
7.	No of Millable canes (ha^{-1})	74.4	**92.875**	18.475

The data of table 3 revealed that better cane weight (1064.2 cm), Height of cane plant (231.65 cm) and number of Millable canes (92.875 ha^{-1}) in treated plant than control (without PSAP application treatment). Effect of PSAP on number of shoot per cane was found non-significant with maximum value recorded as (10.80 cm) in PSAP treatments.

Table 4: Effects of treatments on available N, P and K (Kg/ha) before and after harvest of sugarcane crop:

Treatments	Available Nutrient (Kg/ha)		
	N	P	K
T_1- 100 % R.D.F. (180:80:80)-Control	270.50	23.8	136.10
T_2- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (4 Foliar spray- 60, 75, 90 & 120 D.A.P.)	272.00	24.2	136.28
T_3- 100 % R.D.F. (180:80:80) + 12.5kg/ha of PSAP (3 Foliar spray- 60, 90 & 120 D.A.P.)	271.6	24.0	137.0
T_4- 50 % R.D.F. of P & K (180:40:40)-Control	267.10	23.0	135.5
T_5- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (4 Foliar spray-60, 75, 90 & 120 D.A.P.)	270.6	23.0	136.0
T_6- 50 % R.D.F. of P & K (180:40:40) + 12.5kg/ha of PSAP (3 Foliar spray-60, 90 & 120 D.A.P.)	270.5	23.5	135.5
S.E.	202	1.28	2.18
C.D. %	NS	NS	NS
Initial Values	265.20	22.10	135.0

The data of table 4 showed that values of Available N, P and K after harvest of sugar cane crop are non-significant compare to initial values of available N, P and K in soil of experimental site.

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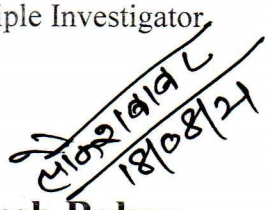
CONCLUSION

On the basis of above study, it is concluded that application of PSAP only through foliar sprays (four prays at 60, 75, 90 and 120 DAP) gave significantly better results with all doses of PSAP than control (without PSAP application treatment). Foliar application of PSAP @ 12.5 kg per hectare at different periods after planting along with 100 per cent recommended dose of NPK (180:80:80) applied in sugarcane cultivation is helpful in improved growth, juice purity and higher net return with improved benefit cost ratio.

Recommended by:

Co-Principle Investigator



Lokesh Babar
Junior Scientific Officer (Agril. Chemistry)

Principle Investigator

Ashok Kumar
Assistant Professor Agril. Chemistry

National Sugar Institute

Ministry of Consumer Affairs, Food and Public Distribution
Department of Food & Public Distribution
Govt. of India
Kanpur (U.P) 208017