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Effect of nutrient management practices on nutrient dynamics and performance of sugarcane*

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Abstract : Field experiment was conducted during 2007-08 on plant crop of sugarcane to study its response to different nutrient management practices. Two sugarcane varieties *viz.,* Co 62175 and Co 86032 were tried with eight nutrient management practices. Among the nutrient management practices, five were organic in nature, two integrated and the rest was only through chemical fertilizers. The uptake of major nutrients *viz.,* Nitrogen, phosphorus and potassium (NPK) was studied at 6 months, 9 months and at harvest of plant crop of sugarcane. The paradigm indicated that NPK uptake was higher with Co 62175 compared to Co 86032 in all the stages of crop growth. Among the nutrient management practices, significantly higher nitrogen (463.05 kg ha^{-1}) and phosphorus (34.26 kg ha^{-1}) uptake was registered with recommended package of practices (RPP) at harvest stage and potassium uptake (239.34 kg ha^{-1}) at 6 months stage. Higher uptake resulted in higher sugarcane production across varieties and nutrient management practices. The residual soil fertility indicated significantly higher available soil nitrogen with N_3 (332.52 kg ha^{-1}).

Key words : Integrated nutrient management, Nutrient uptake, Residual soil fertility, Varieties

Introduction

Sugarcane, a complex hybrid of *Saccharum* spp., is one of the important commercial crops of industrial importance next only to cotton. Sugarcane occupies a pivotal position in the agricultural economy of India. As an instrument of agrarian reform and economic emancipation, sugarcane is second to none. This is so because it is a labour intensive crop and provides livelihood to millions through an organized industry that it carries with it in the rural India. In India, it is cultivated on an area of 4.94 million hectares in 2011 with a production of 339.17 million tonnes with an average productivity of 68.6 tonnes /ha, though, there is a wide variation with productivity across different regions (Anon., 2011). Karnataka is a leading sugarcane growing state with high sugarcane production potentialities particularly in the sugarcane growing Cauvery command area. In the state, it is cultivated on four lakh hectares area with productivity of 90 tonnes ha^{-1} which is well above the national average. However, there is still a lot of scope for increasing the productivity as compared to neighbouring Tamil Nadu state, where the productivity (109 t ha^{-1}) is highest in the country. It is because of the fact that the water management and nutrient management is done judiciously for the crop and over irrigation is main cause for lower productivity in Karnataka. As sugarcane is a long duration crop it is a heavy feeder of nutrients. On an average a tonne of sugarcane removes 5, 1.15 and 5.25 kg of N, P_2O_5 and K_2O respectively from soil. Soil alone cannot supplement such a huge quantity of nutrients required. Hence, nutrient demand has to be met at different stages of crop growth in a steady pace. In this regard, organic nutrient sources play an important role. Results of long term experiments conducted for 40 years on the effect of manuring in sugarcane in different cropping systems indicated that yield of unmanured sugarcane decreased considerably in cereal based cropping system and inclusion of legumes like sunnhemp and lucerne in cropping system not only sustained the yield of unmanured sugarcane but also improved the productivity of manured sugarcane. This necessitates the inclusion of organic sources of nutrients in cane cultivation. Organic sources of nutrients not only help in supplementing the nutrients to sugarcane but also maintain favourable physical, chemical and biological soil environment.

Organic sources of nutrients *vis-a-vis* inorganic sources differ in their nutrient release pattern upon which the uptake of these nutrients by sugarcane crop varies. The three major nutrients particularly nitrogen is more dynamic and is in higher demand by a long duration crop like sugarcane. Studies on NPK uptake at different stages of crop growth make sense as to how the uptake of these influences the subsequent growth and yield of sugarcane crop.

Material and methods

A field experiment was carried out to study the effect of organic sources of nutrients on growth and yield of sugarcane. The trial was laid out in split plot design with the two sugarcane varieties *viz.,* Co 62175 and Co 86032 as main plot treatments and eight combinations of different sources of nutrients as sub plot treatments. The experimental site is situated at 12º 18' and 13º 04' north latitude and 76º 79' and 77º 20' east longitude at an altitude of 695 metre above sea level in the agro-climatic zone -6 (Southern dry zone) of region III. The soil of the experimental site belongs to the order Alfisols, sub order Ustalf, great group Hapluspalf and family Isohyper thermic and udic. Texturally the soils were sandy clay loams. The soils were neutral in reaction (7.1 pH), low in salt contents(0.25 ds m^{-1}). Also, they were low in organic carbon(4 g kg^{-1}), available nitrogen (168 kg ha^{-1}), medium in available phosphorus(25.60 kg ha^{-1}) and low in available potassium (78 kg ha^{-1}).

The organic nutrient sources *viz.,* press mud, farm yard manure, vermicompost and neem cake were analysed for their

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nutrient content before application for making N equivalent nutrient application. Sowing of intercrop *viz.,* french beans was taken up three days after the planting of sugarcane. Three rows of french beans were sown in between the sugarcane rows. French beans was used at the rate of 50 kg ha^{-1} for sowing. The green manure crop *Crotolaria juncia* (Sunnhemp) was sown in between the rows of sugarcane by broadcasting the seeds (@ 75 kg ha^{-1} to cover the space in between. Nitrogen, phosphorus and potassium were applied in the form of urea, single super phosphate, and muriate of potash, respectively. Fertilizers were applied to nutrient management treatments N_6, N_7 and N_8 as per the treatment and nutrients were supplemented through organic sources in treatments N_1 to N_5. All the organic sources were applied to plant crop as basal dose and fertilizer nutrients were applied as per recommendation. *i.e.* nitrogen as basal (10%), 6 weeks (20%), 10 weeks (30%) and 14 weeks (40%) after planting and entire phosphorus and potassium were applied as basal dose. Biofertilizers *viz., Azotobacter* (@ 2.5 kg ha^{-1} and phosphate solubilizing microorganisms (@ 10 kg ha^{-1} were applied along with the organic manures at the time of application of organic manures. The treatment details are as under.

Nitrogen, phosphorus and potassium in index tissues *viz.,* 3-6 leaf blades were determined at 6th month, 9th month and at harvest. The index tissues *i.e.,* 3-6 fully opened leaves from the top samples taken at different stages of growth were dried, powdered and used for estimation of nitrogen by Microkjeldhal distillation method (Jackson, 1973), phosphorus by Vanedo molybdo phosphoric yellow colour method, (Jackson, 1973) and Potassium by Flame photometre (Jackson, 1973).

Treatment details

N_1	Pressmud (150 kg N equivalent/ha)	Sunnhemp (50 kg N equivalent/ha)	Biofertilizers (50 kg N equivalent/ha)	
N_2	Pressmud (100 kg N equivalent/ha)	Farmyard manure (100 kg N equivalent/ha)	Biofertilizers (50 kg N equivalent/ha)	
N_3	Pressmud (75 kg N equivalent/ha)	Farmyard manure (75 kg N equivalent/ha)	Frenchbean as intercrop (50 kg N equivalent/ha)	Biofertilizers (50 kg N equivalent/ha)
N_4	Pressmud (87.5 kg N equivalent /ha)	Farmyard manure (87.5 kg N equivalent/ha)	Neem cake (25 kg N equivalent/ha)	Biofertilizers (50 kg N equivalent/ha)
N_5	Pressmud (87.5 kg N equivalent /ha)	Farmyard manure (87.5 kg N equivalent/ha)	Vermicompost (25 kg N equivalent/ha)	Biofertilizers (50 kg N equivalent/ha)
N_6	50% N equivalent through organic and 50% NPK through chemical fertilizers			
	Pressmud (75 kg N equivalent/ha)	Chemical fertilizer (125 kg N, 50 kg P and 62.5 kg K_2O/ha)	Biofertilizers (50 kg N equivalent/ha)	
N_7	Recommended package of practices			
	Chemical fertilizers (250 kg N : 100 kg P_2O_5 : 125 kg K_2O/ha)		Farmyard manure (25 t/ha)	
N_8	Chemical fertilizers alone (250 kg N : 100 kg P_2O_5 : 125 kg K_2O/ha)			

Results and discussion

The data on nitrogen uptake by the crop at different stages are provided in Table 1. Among the nutrient management practices, RPP registered significantly higher nitrogen uptake (159.64 kg ha^{-1}) followed by N_6 (122.94 kg ha^{-1}) over rest of the practices. The chemical fertilizers alone recorded lowest uptake (71.65 kg ha^{-1}). Among the organic nutrient management practices, N_4 registered the lowest uptake. The interaction effect of varieties and nutrient management practices significantly influenced the uptake. The interaction effect organic sources nutrients and varieties were at par indicating the non response of varieties to organic nutrients. The RPP with Co 62175 variety of sugarcane recorded significantly higher uptake of nitrogen (181.40 kg ha^{-1}) compared to N_6. More *et al.* (2007) reported that uptake of N was significantly higher when 100 per cent recommended dose of nitrogen was applied to sugarcane. Manimaran and Kalyanasundaram (2006) reported that greater availability of nitrogen through sunnhemp, biofertilizers and inorganic nutrients increased the nitrogen uptake by sugarcane. Singh *et al.* (2007) also reported the highest N uptake when press mud was applied as source of nutrients (227.7 kg ha^{-1}). All the combinations with Co 62175 recorded significantly higher uptake. RPP recorded the higher uptake (433.96 kg ha^{-1}) followed by 50 per cent N through press mud and 50 per cent N through fertilizers (371.87 kg ha^{-1}). The nutrient uptake was highest with RDF (Patel *et al.,* 2009). Among the organic sources of nutrients, all the sources were at par except the N_4 combination where neem cake was used as an additional source. The nutrient management practices significantly influenced the uptake of nitrogen. Significantly higher N uptake was recorded with RPP (463.05 kg ha^{-1}) followed by N_6 (379.81 kg ha^{-1}. Plant N uptake (227.7 kg ha^{-1}) was highest in pressmud treatment (Singh *et al.,*2007). The chemical fertilizers alone recorded the lowest uptake. Singh *et al.* (2007) reported

Table 1. Nitrogen uptake (kg ha^{-1}) as influenced by nutrient management practices in plant crop of sugarcane

	Nutrient management practices (N)	N uptake at 6 months		Mean	N uptake at 9 months		Mean	N uptake at harvest		Mean
		Varieties			Varieties			Varieties		
		Co 62175	Co 86032		Co 62175	Co 86032		Co 62175	Co 86032	
N_1	Pressmud + sunnhemp + biofertilizers	108.92	91.49	100.12	317.10	255.40	286.25	324.72	274.52	299.02
N_2	Pressmud + FYM + biofertilizers	114.90	104.31	109.61	334.06	294.73	314.40	345.21	303.94	324.57
N_3	Pressmud + FYM + French beans + biofertilizers	121.46	105.10	113.28	313.01	303.24	308.12	335.69	317.81	326.75
N_4	Pressmud + FYM + neem cake + biofertilizers	90.35	78.95	84.65	261.72	224.09	242.91	249.25	230.77	240.01
N_5	Pressmud + FYM + vermicompost + biofertilizers	101.97	84.15	93.06	308.70	260.25	284.48	322.72	282.35	302.54
N_6	50% N through pressmud + 50% N through fertilizers + biofertilizers	137.93	107.95	122.94	403.25	340.48	371.87	409.67	349.95	379.81
N_7	Recommended package of practices	181.40	137.87	159.64	479.16	388.76	433.96	523.45	402.64	463.05
N_8	100% NPK through fertilizers only	76.97	66.33	71.65	189.43	152.30	170.87	179.77	141.61	160.69
	Mean	116.73	97.10	-	325.81	277.25	-	336.31	287.95	-
		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%	
	Varieties (V)	3.69	NS		11.70	NS		13.65	NS	
	NMP (N)	3.15	9.12		10.96	31.77		8.80	25.50	
	V x N	4.45	12.89		15.50	NS		12.44	36.06	
	N x V	5.56	NS		18.63	NS		17.93	51.98	

higher N uptake (227.7 kg ha^{-1}) with press mud cake application. Nitrogen uptake (136 kg ha^{-1}) by sugarcane increased significantly up to 4 t of press mud ha^{-1} and (225 kg N ha^{-1}) (Tiwari *et al.,* 1998). Among the organic nutrient management practices, N_4 and N_1 recorded the lower uptake and rest were at par. However, the interaction of nutrient management practices and varieties was significant. The RPP with Co 62175 variety did record significantly higher uptake of nitrogen at harvest (523.45 kg ha^{-1}) followed by 50 per cent N through press mud and 50 per cent N through fertilizers (409.67 kg ha^{-1}). All the organic combinations were at par except the N_4 treatment. Similar trend was observed with the interaction effects of Co 86032 with nutrient management practices. However, Co 62175 with various combinations of NMP recorded higher N uptake compared to Co 86032. The nitrogen uptake progressively increased from 6th month and peaked as the crop reached the harvest stage. In general, uptake of NPK was increased due to organic matter used by 320, 47.3 & 348 kg ha^{-1} of N $P_2O_5K_2O$ respectively (Bhalerao *et al.,* 2005). Saini *et al.* (2006) also reported the highest uptake of NPK when 100 per cent NPK was supplied along with 25 per cent additional N through FYM with biofertilizers.

Table 2. Phosphorus uptake (kg ha^{-1}) as influenced by nutrient management practices in plant crop of sugarcane

	Nutrient management practices (N)	P uptake at 6 months		Mean	P uptake at 9 months		Mean	P uptake at harvest		Mean
		varieties			varieties			varieties		
		Co 62175	Co 86032		Co 62175	Co 86032		Co 62175	Co.86032	
N_1	Pressmud + sunnhemp + biofertilizers	15.24	11.25	13.24	16.62	12.29	14.46	28.09	21.70	24.89
N_2	Pressmud + FYM + biofertilizers	16.42	12.39	14.40	17.94	13.66	15.80	32.38	23.69	28.04
N_3	Pressmud + FYM + French beans + biofertilizers	16.26	12.57	14.41	18.11	13.70	15.90	33.17	24.19	28.68
N_4	Pressmud + FYM + neem cake + biofertilizers	14.03	10.23	12.13	15.43	11.32	13.37	29.34	18.99	24.17
N_5	Pressmud + FYM + vermicompost + biofertilizers	14.68	11.14	12.91	16.10	12.14	14.12	29.17	22.13	25.65
N_6	50% N through pressmud + 50% N through fertilizers + biofertilizers	20.02	13.06	16.54	21.88	14.32	18.10	26.37	25.86	26.12
N_7	Recommended package of practices	24.82	17.36	21.09	27.12	18.87	22.99	34.21	34.31	34.26
N_8	100% NPK through fertilizers only	14.26	10.72	12.49	15.56	11.71	13.63	28.27	20.96	24.61
	Mean	16.97	12.34	-	18.60	13.50	-	30.13	23.98	-
		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%	
	Varieties (V)	0.07	0.21		0.08	0.22		0.13	0.38	
	NMP (N)	0.57	1.65		0.62	1.80		0.56	1.61	
	V x N	0.81	NS		0.88	NS		0.79	2.28	
	N x V	0.76	NS		0.83	NS		0.75	2.16	

The data on uptake of phosphorus at 6th month, 9th month and harvest are given in Table 2. The phosphorus uptake at 6 months was significant due to varieties. Co 62175 variety recorded significantly higher uptake (16.97 kg ha^{-1}) compared to Co 86032. Among the nutrient management practices, RPP recorded significantly higher P uptake (21.09 kg ha^{-1}) followed by N_6 which registered higher uptake over all other NMP practices. Among the organic nutrient management practices, N_3 recorded significantly higher uptake (14.41 kg ha^{-1}) and was at par with N_2. The data on uptake of phosphorus at 9 months was significant due to varieties. Variety Co 62175 recorded significantly higher uptake (18.60 kg ha^{-1}) compared to Co 86032. Among the nutrient management practices, RPP recorded in significantly higher P uptake (22.99 kg ha^{-1}) over all the other practices. This was followed by N_6 (18.10 kg ha^{-1}) which was significantly higher over rest of the practices. Among the organic nutrient management practices, N_4 resulted in lower uptake which was at par with chemical fertilizers alone. combinations. The interaction effect of Co 86032 with RPP resulted in significantly higher uptake (34.31 kg ha^{-1}) followed by N_6 which was at par with N_2 and N_3.

The uptake of potassium by the plant crop at 6 months, 9 months and harvest stage are depicted in Table 3. The uptake of potassium at 6 months was significant due to varieties. The Co 62175 variety recorded significantly higher K uptake (185.72 kg ha^{-1}) compared to Co 86032. Among the nutrient management practices, RPP resulted in significantly higher K uptake (239.34 kg ha^{-1}) over other practices followed by N_6.

Among the organic management practices, N_3 resulted in significantly higher uptake which was at par with N_2. The interaction effect was also significant. RPP with Co 62175 resulted in significantly higher K uptake followed by N_6. Among the interaction of Co 62175 with organic management practices, N_2 and N_3 recorded higher k uptake over rest of the treatment combinations. Bhalerao *et al.* (2006) reported the highest uptake of potassium by sugarcane when recommended dose of NPK

Table 3. Potassium uptake (kg ha^{-1}) as influenced by nutrient management practices in plant crop of sugarcane

Nutrient management practices (N)		K uptake at 6 months		Mean	K uptake at 9 months		Mean	K uptake at harvest		Mean
		Varieties			Varieties			Varieties		
		Co 62175	Co 86032		Co 62175	Co 86032		Co 62175	Co 86032	
N_1	Pressmud + sunnhemp + biofertilizers	159.19	124.36	141.78	302.39	230.67	266.53	204.73	151.30	178.02
N_2	Pressmud + FYM + biofertilizers	180.48	133.94	157.21	336.28	254.20	295.24	221.14	166.07	193.61
N_3	Pressmud + FYM + French beans + biofertilizers	182.74	141.07	161.91	339.20	257.40	298.30	222.61	169.19	195.90
N_4	Pressmud + FYM + neem cake + biofertilizers	158.87	118.87	138.87	288.46	210.71	249.59	189.35	138.18	163.76
N_5	Pressmud + FYM + vermicompost + biofertilizers	159.02	117.65	138.34	300.87	225.99	263.44	197.25	148.53	172.89
N_6	50% N through pressmud + 50% N through fertilizers + biofertilizers	211.82	141.85	176.84	408.26	268.06	338.16	268.37	176.26	222.32
N_7	Recommended package of practices	275.27	183.41	239.34	506.78	350.99	428.88	333.25	233.24	283.24
N_8	100% NPK through fertilizers only	158.39	120.99	139.70	290.47	219.07	254.77	190.74	144.18	167.46
	Mean	185.72	135.27	-	346.59	252.14		228.43	165.87	-
		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%	
	Varieties (V)	1.51	4.38		1.65	4.77		0.75	2.17	
	NMP (N)	4.74	13.73		11.22	32.52		7.49	21.71	
	V x N	6.70	19.42		15.87	NS		10.59	NS	
	N x V	6.45	18.69		14.93	NS		9.94	NS	

The nutrient uptake kg ton^{-1} was increased with the increasing levels of either farm yard manure or press mud along with recommended fertilizers (Bhalerao *et al.,* 2006).

The phosphorus uptake at harvest was significant due to sugarcane varieties. Variety Co 62175 recorded higher uptake (30.13 kg ha^{-1}) compared to Co 86032. Among the nutrient management practices, RPP resulted in significantly higher uptake (34.26 kg ha^{-1}) over others. The uptake of phosphorus was significantly higher with N_3 and N_2 compared to N_6. Rest of the practices were at par. The interaction effect between nutrient management practices and varieties was also significant. Variety Co 62175 with RPP resulted in significantly higher P uptake (34.21 kg ha^{-1}) compared to all other treatment combinations. However, Co 62175 with N_2 and N_3 combinations resulted in significantly higher uptake compared to all other treatment and FYM were used in plant cane. The higher uptake of potassium where press mud applied could be due to the luxirous consumption of potassium by sugarcane (Bhalerao *et al.,* 2006).

The uptake at 9 months was significant due to varieties. Variety Co 62175 recorded significantly higher K uptake (346.59 kg ha^{-11}) compared to Co 86032. Among the nutrient management practices, RPP recorded significantly higher K uptake (428.88 kg ha^{-1}) followed by N_6 over other practices. Among the organic management practices, N_3 resulted in significantly higher K uptake compared to N_4 and N_8.

The uptake of potassium at harvest varied significantly due to sugarcane varieties. Variety Co 62175 recorded significantly higher K uptake (228.43 kg ha^{-1}) compared to Co 86032. Among the nutrient management practices, RPP resulted in significantly higher K uptake (283.24 kg ha^{-1}) over other practices followed

by N_6. Among the organic management practices, N_3 resulted in significantly higher uptake compared to N_4 and N_8. Singh *et al.* (2007) reported that sugarcane is highly nutrient exhaustive crop as evident from nutrient removal as the plant crop at the recommended level of added NPK removed 777.1, 119, 651.6 kg ha^{-1} N P_2O_5 & K_2O respectively.

Sugarcane varieties significantly differed with respect to cane yield (Table 4). Variety Co 62175 recorded significantly higher cane yield (149.40 t/ha) as compared to Co 86032 (130.05 t ha^{-1}). Among the nutrient management practices, 50 per cent N through press mud and 50 per cent N through fertilizers recorded significantly higher cane yield (170.33 t/ha) over all other practices except N_7 (174.82 t ha^{-1}) which was at par with it. Dinesh Kumar *et al.* (1996) also found that application of pressmud (equivalent to 25% RDN) along with 75 per cent of the recommended inorganic fertilizers remained at par with 100 per cent recommended fertilizers in terms of cane and sugar yield. Bokhtiar and Sakurai (2005) from Bangladesh obtained maximum cane yield (119.14 t ha^{-1}) and sugar yield (10.99 t ha^{-1}) with the application of pressmud @ 15 t ha^{-1} and 75 per cent recommended dose fertilizers was made. Durai and Devaraj (2003) and Bhalerao *et al.* (2006) reported that adoption of either organic or inorganic nutrients alone registered comparatively lesser yields. Recommended practice of 12.5 t FYM ha^{-1} + recommended fertilizer + *Azospirillum* recorded highest cane population, cane yield and sugar yield in plant as well as ratoon crop.

Among the organic nutrient management practices, combination of press mud, FYM, French Beans and biofertilizers (N_3) recorded significantly higher (132.02 t ha^{-1}) yield over N_2 and was at par with rest of the practices including the chemical fertilizer alone (N_8) .The interaction effect was also statistically significant. Combination of sugarcane variety Co 62175 and 50 per cent N through press mud and 50 per cent N through fertilizers recorded significantly higher sugarcane yield (187.94 t ha^{-1}) over

Table 4. Sugarcane yield (t ha^{-1}) as influenced by nutrient management practices in plant crop of sugarcane

	Nutrient Management Practices (N)	Varieties		Mean
		V_1 : Co 62175	V_2 : Co 86032	
N_1	Pressmud + sunnhemp + biofertilizers	135.31	118.95	127.13
N_2	Pressmud + FYM + biofertilizers	133.83	118.52	126.17
N_3	Pressmud + FYM + French beans + biofertilizers	137.35	126.69	132.02
N_4	Pressmud + FYM + neem cake + biofertilizers	136.11	121.25	128.68
N_5	Pressmud + FYM + vermicompost + biofertilizers	135.99	119.69	127.84
N_6	50% N through pressmud + 50% N through fertilizers + biofertilizers	187.94	152.72	170.33
N_7	Recommended package of practices	191.65	157.99	174.82
N_8	100% NPK through fertilizers only	137.04	124.63	130.83
	Mean	149.40	130.05	-
		S.Em ±	C.D. @ 5%	
	Varieties(V)	0.94	2.73	
	Treatments (T)	1.73	5.02	
	V x T	2.45	7.10	
	T x V	2.48	7.18	

Table 5. Soil available nitrogen, phosphorus and potassium (kg ha^{-1}) after harvest as influenced by nutrient management practices in plant crop of sugarcane

	Nutrient management practices (N)	Soil N		Mean	Soil P_2O_5		Mean	Soil K_2O		Mean
		Varieties			Varieties			Varieties		
		V_1	V_2		V_1	V_2		V_1	V_2	
N_1	Pressmud + sunnhemp + biofertilizers	284.18	320.21	302.19	36.00	28.33	32.17	59.00	58.00	58.50
N_2	Pressmud + FYM + biofertilizers	323.92	288.66	306.29	42.33	36.33	39.33	59.67	55.00	57.33
N_3	Pressmud + FYM + French beans + biofertilizers	351.04	313.99	332.52	26.67	34.67	30.67	65.33	56.00	60.67
N_4	Pressmud + FYM + neem cake + biofertilizers	294.73	254.22	274.48	35.33	32.67	34.00	59.33	55.00	57.17
N_5	Pressmud + FYM + vermicompost + biofertilizers	221.24	316.10	268.67	24.67	32.33	28.50	60.33	64.00	62.17
N_6	50% N through pressmud + 50% NPK through fertilizer + biofertilizer	179.29	321.97	250.63	24.67	29.33	27.00	68.00	64.00	66.00
N_7	Recommended package of practices	130.56	154.98	142.77	29.67	37.00	33.33	58.00	64.00	61.00
N_8	100% NPK through fertilizers only	162.83	232.27	197.55	21.00	25.00	23.00	58.00	64.00	61.00
	Mean	243.47	275.30	-	30.04	31.96	-	60.96	60.00	-
		S.Em ±	C.D. @ 5%		S.Em ±	C.D. @ 5%		S.E m ±	C.D. @ 5%	
	Varieties (V)	0.53	1.54		2.02	NS		2.09	NS	
	NMP (N)	8.65	25.06		2.08	NS		2.58	NS	
	V x N	12.23	35.44		2.94	8.51		3.65	NS	
	N x V	11.45	33.18		3.41	9.88		4.01	NS	

V_1 : Co 62175 V_2 : Co 86032

rest of the combinations except the RPP (N_7) (191.65 t ha^{-1}). The interaction effect of organic nutrient management practices with Co 62175 was at par with each other. The chemical fertilizer alone with Co 62175 was also at par with all the organic nutrient combinations. Similar trend in interaction effects was observed between Co 86032 and nutrient management practices.

The data on residual soil fertility are depicted in Table 5. Significantly higher soil nitrogen (275.30 kg ha^{-1}) was recorded with Co 86032 variety. Among the nutrient management practices, it was with N_3 (332.52 kg ha^{-1}) and least was with N_7 (142.77 kg ha^{-1}). It was due to the fact that the slow release nature of organic manures that resulted in higher residual fertility. However, the soil P and K were found to be non-significant due to variety or nutrient management practices.

From the results it can be inferred that neither organic nor inorganic sources alone could meet the nutrient requirement of sugarcane crop. Blending of 50 per cent N through press mud and 50 per cent NPK through fertilizers could not only meet the nutrient demand of the crop but was also in commensurate with the uptake of major nutrients NPK. The uptake was higher with Co 62175 variety of sugarcane and among the nutrient management practices, 50 per cent N through press mud and 50 per cent NPK through fertilizers resulted in higher uptake and yield of sugarcane.

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