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Impact of organic manures on soil health, yield and quality of pit planted sugarcane

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Abstract
An experiment was conducted at Organic Farm, Navsari Agricultural University, Navsari to study the effect of different proportion of organics on productivity of pit planted sugarcane during three consecutive years of 2013, 2014 and 2015. The experiment was conducted at fixed plot site with 8 set of organics treatments and 1 inorganic treatment as control (250:125:125 kg NPK/ha) arranged outside the experimental plot, laid down in randomized block design replicated thrice. Significantly higher millable cane height, number of internodes/ millable cane and single millable cane weight were recorded when crop nourished with 50% RDN each of vermi compost and castor cake. Further, application of vermi compost (50% RDN) along with neem cake or castor cake (50% RDN) were found equally effective and recorded significantly higher millable cane and trash yields. In organics *vs* inorganic analysis, application of 100 per cent RDF through inorganic fertilizers recorded significantly higher values of growth and yield parameters and yields of sugarcane crop. For producing higher and profitable cane yield of sugarcane, the crop should be fertilized with 100% RDF (250:125:125 NPK kg/ha) under south Gujarat condition. Further, it is also inferred that for organic production of sugarcane crop, application of 50% RDN through vermi compost and remaining 50% RDN either through castor cake or neem cake was found remunerative.

Keywords: Banana pseudostem waste, bio compost, castor cake, fertilizers, neem cake, sugarcane, vermicompost

Introduction
Agriculture is life and blood of our country's economy. It was highly gratifying that India achieved self-reliance in food production in the shortest span of time in the world, but despite everything, our traditional agro-eco system suffered a great setback, especially owing to the indiscriminate use of fertilizers, insecticides, fungicides and herbicides. Further, intensive agriculture and excessive use of chemicals during the green revolution have resulted in deterioration of soil health and productivity. Moreover, in present agriculture, unfortunately, due to use of inorganic fertilizers alone and scarce use of organic manures, the cultivable lands are rapidly depleted in organic carbon content and becoming unfertile and created the problems of multiple nutrient deficiencies. This is one of the main causes of low productivity of sugarcane in Gujarat. There is an urgent need to take a holistic view of this problem to curb its negative impact. A growing numbers of studies showed that organic farming leads to higher soil quality and more soil biological activities than conventional farming. Infect, organic farming methods can produce equally good or higher yields than conventional methods.

Sugarcane (*Saccharum officinarum* L.), an important cash crop cultivated from 8ºN to 30ºN latitude covering variety of climate and soil of India, having the second largest sugar production in the world. Sugar industry is the second largest agro based industry after textile industry located in rural areas of India. About 50 million sugarcane farmers, their dependents and large mass of agricultural labourers are involved in sugarcane cultivation, harvesting and ancillary activities and constituting 7.5 per cent of the rural population. Besides, about 0.5 million skilled and semi skilled workers, mostly from the rural areas are engaged in the sugar industry. The industry not only generates power for its own requirement but surplus power for export to the gird based on by product bagasses. It also produced ethanol, an eco-friendly and renewable energy for blending with petrol. Sugarcane is generally planted in furrow in single rows and pair row with deep trenches. In another system of planting, called pit or ring planting system, cane setts are placed horizontally in circular pits.

This method prevents crop lodging, improves the nutrient use efficiency through localized placement, and helps to maintain multiple ratoons. The crop under pit system primarily consists of mother shoots that are thicker and heavier. The yield advantage of pit method over conventional furrow method has been documented by Yadav and Kumar (2005) [16]. Keeping in view, a field experiment was designed to find out the best suitable proportion of organic manures on productivity of pit planted sugarcane crop.

Materials and Methods

A field experiment was conducted during 2013, 2014 and 2015 at organic farm, Navsari Agricultural University on deep black soil. The soil of experiment field was deep black with organic carbon (0.55%), pH (7.65), EC (0.425 dS/m), Available N (247 kg/ha), available P_2O_5 (41.5 kg/ha) and Available K_2O (310 kg/ha). The experimental plots were prepared by deep ploughing, harrowing and levelling. The pits of 0.6 m x 0.6 m x 0.45 m were dug out with the help of tractor drawn agar at spacing of 2.4 m (between two rows) x 1.2 m (Between two pits) and well decomposed fine textured farm yard manure @ 10 kg/pit was applied at planting time. The experiment was laid out in randomised block design, keeping with eight organic combinations and one chemical fertilizer (outside the organic farm) treatments with three replications. All the organics on N equivalent basis are applied in basal in pit at the time of planting except banana pseudostem waste. Banana pseudostem waste was filled in pit along with dung @ 0.5 kg/pit (as slurry) a week prior to planting of sugarcane. The treatment receiving inorganic fertilizers (250-125-125 NPK kg/ha) i.e., N, P and K were applied through urea, single super phosphate and muriate of potash, respectively. The full dose of phosphorus and potash and 15% nitrogen was applied at basal. Remaining nitrogen 30% at 45 days after planting, 20% at 90 days after planting and 35% at 135 days after planting was top dressed respectively. Beside uniform dose of Biofertilizers having 10^8 viable counts of *Azotobacter*, PSB and *Acetobacter* were applied @ 5 kg/ha each to all the treatments at the time of planting and earthing up of sugarcane.

Result and Discussion

Yield attributes and yield

Application of 50% RDN through vermi compost and 50% RDN through castor cake (T_3) recorded significantly higher millable cane height, no. of internodes per millable cane and single millable cane weight as compared to 25% RDN through bio compost + 50% RDN through castor cake and 25% RDN through banana psuedostem waste. However, application of 50% RDN through vermi compost and 50% RDN through neem cake was found equally effective in comparison to 50% RDN through vermi compost and 50% RDN through castor cake. The increase in millable cane height, no. of internodes per millable cane and single millable cane weight with the 50% RDN through vermi compost and 50% RDN through castor cake was to an extent of 25.21, 31.16 and 22.22 per cent over 25% RDN through bio compost, 50% RDN through castor cake and 25% RDN through banana psuedostem waste, respectively. This may be due to short supply of nutrient at early growth stage with use of high C: N ratio material like banana psuedostem waste and bio compost which cause immobilization of nutrient in early growth stage, which can be affected growth and development of crop. Beside, castor cake and vermi compost having low C: N ratio contributed quick nutrient to plant at early growth stage. The similar findings were confirmed with Patel (2006) [7] and Jadhav (2001) [5].

In organic vs inorganic-control analysis, treatments receiving recommended dose of fertilizer *i.e*., 250:125:125 N: P_2O_5: K_2O kg/ha for sugarcane recorded significantly higher values of all these parameters as compared to organic treatments mean. This was higher to the tune of 13.43, 17.89 and 16.20 per cent as compared to organic treatment mean, respectively. The possible reason might be due to the higher requirement of nutrition to sugarcane crop which fulfil by application of 100 per cent RDF through inorganic fertilizer. Application of NP might have accelerated the synthesis of chlorophyll and amino acids which are associated with major photosynthetic processes of plants which convert in to growth and development of plant. This result is in close agreement with those reported by Patel (2006) [7] and Patel and Patel (2010) [8].

Sugarcane being an exhaustive crop needs heavy application of fertilizers to apply good growth and higher yields. Vermi compost, castor cake and neem cake also play an important role in growth and yield of sugarcane. In the present investigation, application of 50% RDN through vermi compost and 50% RDN through castor cake recorded 23.81 and 32.17 per cent higher millable cane and trash yield of sugarcane as compared to 25% RDN through bio compost, 50% RDN through castor cake and 25% RDN through banana psuedostem waste. However, application of 50% RDN through vermi compost and 50% RDN through neem cake was found equally effective in comparison to 50% RDN through vermi compost and 50% RDN through castor cake. This might be due to use of vermi compost with castor cake or neem cake having narrow C: N ratio gave immediate and quick supply of plant nutrients to tillers and steady supply of plant nutrients throughout the growth periods. Evidences have shown that the chemical composition of the applied organic matter with particular reference to C: N ratio plays an important role on the mineralization rate, being the highest for the narrow C: N ratio and vice versa. The low responses of sugarcane to the mixed banana psuedostem waste could be inferred to the slow mineralization rate and to lack in the potential of nutrient supply during the stages of growth development. Senesi *et al.* (1992) [11] compared the quality of humic acids present in vermicompost, with those found in natural soils, using spectroscopic analysis procedures. They demonstrated that the metal-humic acid-like substances containing appreciable amounts of iron and copper, present in organic materials processed by earthworms, are similar to the humic acids common in soils and other sources irrespective of the nature of the parent material. This indicated that vermicomposting can produce considerable amounts of humic acid and as far as their metal complication properties and behavior are concerned.

The earlier study made by Chaudhary and Sinha (2001) [3] and Patel and Patel (2010) [8] reported that the application of castor cake and neem cake in combination to vermi compost significantly influenced the growth and yield of sugarcane. Because, they carry of all the essential nutrients and their incorporation in to the soil released the nutrient slowly through microbial mediation, it leads to their adequate availability throughout the growing season, resulting in improve cane productivity. Soil ameliorating effect of addition of organic resources manures must have further contributed to improved cane yield as reported by Srivastava *et al.* (2008) [13]. Moreover, application of castor cake and neem cake, both concentrated organic manures which fight against soil born pest and diseases.

In inorganic-control *Vs* organic analysis, treatments receiving recommended dose of fertilizer *i.e*., 250:125:125 N: P_2O_5: K_2O kg/ha for sugarcane recorded significantly higher millable canes and trash yield as compared to organic treatments mean. The corresponding millable cane and trash yield tended to increase in tune of 19.83 and 26.39% as compared to organic treatments mean, respectively. This may be due to more absorption of nutrient helped to improve the yield attributes and ultimately convert in to cane yield. Secondly, sugarcane is a heavy feeder crop required large quantity of plant nutrients that can be supplied through fertilizers at critical stage. This finding is supported by Thakur *et al*. (2007) [14] and Virdia and Patel (2010) [15].

Quality

The quality parameters *viz*., sucrose per cent in juice and cane, purity per cent, CCS per cent and CCS yield were determined after harvest of sugarcane. The effect of organic treatments was found non significant on all the quality parameters of plant crops. But when we compared with Inorganic-control, all quality parameters *i.e*., sucrose content in juice and cane, Purity (%), CCS (%) and CCS yield (t/ha) were found significantly higher due to organic treatments than inorganic-control. It means that combined application of organic manures hold good promise. This higher sucrose content can be closely related to K content of cane. An improvement in quality of produce with the use of organics alone could be attributed to the better physical, biological and chemical conditions of soil with organics than RDF alone. Similarly, earlier workers Bangar *et al.* (2000) [2] and Patel and Patel (2010) [8] also reported an improvement in quality of sugarcane with the use of organics alone or in combination with fertilizers.

Uptake

Application of 50% RDN through vermi compost and 50% RDN through castor cake recorded higher uptake of N, P, K, Fe, Mn and Zn by cane and trash compared to 25% RDN through bio compost + 50% RDN through castor cake and 25% RDN through banana psuedostem waste. However, application of 50% RDN through vermi compost and 50% RDN through neem cake was found equally effective in comparison to 50% RDN through vermi compost and 50% RDN through castor cake. 25% RDN through bio compost + 50% RDN through castor cake and 25% RDN through banana pseudostem waste recorded lower uptake of N, P, K, Fe, Mn and Zn which might be due to insufficient quantity of nutrients at the initial stage of the crop growth period. The slow release of nutrients from banana pseudostem waste becomes available only in the later stages and thus, making the crop suffers in the early growth period. On the contrary, an important feature of vermi composts during the processing at the various organic wastes by earthworms is that many of the nutrients that they contain are changed to forms that are more readily taken up by plants, such as nitrate or ammonium nitrogen, exchangeable phosphorus and soluble potassium, calcium and magnesium (Edwards, 1982) [4]. In support to this finding by Jadhav *et al*. (1997) [6] observed considerable increase in the uptake of major and secondary nutrients such as N, P, K, Ca and Mg by rice under vermi compost treatment than FYM. Application of 50% RDN through castor cake or neem cake with vermi compost gave higher nutrient uptake which might be due to the combination low C:N ratio, resulted in higher biological process and increased microbial activity and soil enzymatic activity helping in degradation of organics resulting in better availability of major and micronutrients throughout the crop growth period.

In control *vs* organic analysis, the uptake of N, P_2O_5 and K_2O by cane and uptake of N, P_2O_5, K_2O and Mn by sugarcane trace were comparatively higher with 100% RDF through inorganic than organics mean. This evidence directly related to higher content of major and micronutrient in sugarcane plant part and also higher dry matter yield of cane and trash. Similar results were recorded by Virdia and Patel (2010) [15] and Patel and Patel (2010) [8].

Soil health

The content of available nutrients in soil were affected due to different organic treatments. In all the cases, application of 50% RDN through vermi compost and 50% RDN through castor cake or 50% RDN through neem cake maintained significantly higher status of available major (N, P2O5 and K_2O) as well as micro nutrients (Fe, Mn and Zn) as compared to 25% RDN through bio compost + 50% RDN through castor cake and 25% RDN through banana psuedostem waste. This might be due to higher nutrients were added directly through vermi compost in combination with castor cake or neem cake. The availability of these elements might have improved due to amendment of vermi compost which might have facilitated better microbial transformation. The overall improvement in soil fertility ultimately reflected on the yield of sugarcane which was significantly higher either with application of 50% RDN through vermi compost and 50% RDN through castor cake or 50% RDN through neem cake. Similar findings were also reported by Thakur *et al* (2007) [14].

In organics vs inorganic-control analysis, almost in all cases, organic treatments maintained significantly higher status of available major (N, P_2O_5 and K_2O) as well as micro nutrients (Fe, Mn and Zn) as compared to inorganic-control from initial levels of respective elements. This may fact that organic manures treated plots release organic acids during microbial decomposition of organic matter which might have helped in the solubility of native nutrients, thus increased the available nutrient pool in the soil. Secondly, the complex organic anions chelate Al^{+3}, Fe^{+3} and Ca^{+3} and thus decrease the cationic macro and micronutrients as well as phosphate precipitating power of these cations and there by increase in availability (Reddy *et al.*, 1990) [10]. Similar results were reported by Pawar (1996) [9] with vermi compost and Babhulkar *et al.* (2000) [1] with FYM. Further, the build up of soil available nitrogen of soil may also be attributed to the greater multiplication of microbes due to addition of organic matter for the conversion of organically bound nitrogen to inorganic from and helped in the mineralization of soil nitrogen leading to buildup of higher available nitrogen. Similarly, greater mobilization of native soil phosphorus by reducing the capacity of soil mineral to fix phosphorus and increased its availability through release of organic acid. The organic matter framed a protective covered on $CaCO_3$, thus reduces the phosphate fixing capacity of soil, hence, increased available phosphorus status of soil (Thakur *et al.* 2007) [14]. Looking to the overall performance of organics, collectively might have resulted in higher availability of the remaining major and micro nutrient of soil. More or less similar result was reported by Patel (2006) [7] and Patel and Patel (2010) [8].

Application of organics significantly improved organic carbon content of soil irrespective of its sources and superior than inorganic control. Because, direct addition of large quantity of organic matter in soil. Contrary to this, soil pH and EC was not altered significantly due to various organic treatments. The role of organic matters in maintaining physico-chemical properties of soil were also reported by Sharma *et al.* (2006) [12] and Virdia and Patel (2010) [15].

Table 1: Performance of yield attributes, yield and economics of pit plated sugarcane under organic farming (pooled)

Treatments	Millable cane height (cm)	No. of internodes per millable cane	No. of millable canes /ha	Single millable cane weight (kg)	Yield (t/ha)		Net Benefit (Rs./ ha)	Cost: Benefit ratio
					Millable cane	Trash		
Organic manures								
BC + CC (50 + 50% RDN)	281	25.8	78685	1.51	119	20.45	163839.12	2.93
BC + NC (50 + 50% RDN)	279	25.0	78616	1.50	117	19.96	159341.63	2.83
VC + CC (50 + 50% RDN)	298	28.2	84164	1.54	130	23.17	161279.64	2.45
VC + NC (50 + 50% RDN)	294	27.0	84894	1.51	128	22.68	155753.15	2.37
BC + CC + BPW (25 + 50 + 25% RDN)	238	21.5	83373	1.26	105	17.53	131401.96	2.47
BC + NC + BPW (25 + 50 + 25% RDN)	256	23.0	81817	1.33	109	18.06	137047.47	2.50
VC + CC + BPW (25 + 50 + 25% RDN)	252	22.5	86040	1.28	110	18.30	127675.72	2.24
VC + NC + BPW (25 + 50 + 25% RDN)	246	23.5	78046	1.42	110	19.64	126328.23	2.21
Mean	268	24.6	81954	1.42	116	19.97		
S. Em. ±	9.36	0.92	3082	0.04	3.5	0.72		
C. D. at 5%	27.12	2.67	NS	0.11	10.2	2.07		
100% RDF (250:125:125 NPK kg /ha)	304	29.00	84267	1.65	139	25.24	197143.68	3.46
Control vs rest								
S. Em. ±	6.68	0.66	2214	0.03	7.4	0.51		
C. D. at 5%	19.25	1.91	NS	0.08	8.4	1.47		

BC: Bio Compost; CC: Castor Cake; NC: Neem Cake; VC: Vermi Compost; BPW: Banana Psuedostem Waste; RDN: Recommended Dose of Nitrogen; RDF: Recommended Dose of Fertilizer
* Data on pooled basis

Table 2: Nurtients uptake by cane and trash as influenced by pit plated sugarcane under organic farming (pooled)

Treatments	Uptake by cane						Uptake by trash					
	N (kg/ha)	P_2O_5 (kg/ha)	K_2O (kg/ha)	Fe (g/ha)	Mn (g/ha)	Zn (g/ha)	N (kg/ha)	P_2O_5 (kg/ha)	K_2O (kg/ha)	Fe (g/ha)	Mn (g/ha)	Zn (g/ha)
Organic manures												
BC + CC (50 + 50% RDN)	94.04	15.50	69.20	2890.11	569.26	527.85	61.85	7.27	37.92	2256.85	478.35	173.33
BC + NC (50 + 50% RDN)	91.74	15.43	65.63	2883.30	554.50	522.48	61.87	7.16	37.51	2221.22	460.02	166.90
VC + CC (50 + 50% RDN)	112.62	17.89	85.78	3559.25	681.77	679.39	76.33	8.67	48.17	2685.60	573.51	208.39
VC + NC (50 + 50% RDN)	106.43	17.26	81.21	3484.22	662.44	621.75	74.54	8.44	45.77	2595.18	545.55	198.86
BC + CC + BPW (25 + 50 + 25% RDN)	79.04	14.20	56.77	2649.95	488.63	458.70	54.08	6.37	33.69	1960.51	411.74	150.29
BC + NC + BPW (25 + 50 + 25% RDN)	84.88	13.97	62.40	2777.19	498.30	472.58	56.13	6.56	33.72	2003.30	423.11	157.01
VC + CC + BPW (25 + 50 + 25% RDN)	83.41	14.36	61.08	2868.89	512.12	484.60	57.09	6.63	33.69	2063.65	411.68	138.87
VC + NC + BPW (25 + 50 + 25% RDN)	80.91	14.32	57.32	2742.34	494.74	461.71	60.31	7.27	36.94	2202.37	460.55	151.28
Mean	91.63	15.36	67.42	2981.91	557.72	528.63	62.77	7.30	38.43	2248.59	470.56	168.12
S. Em. ±	4.73	1.00	4.76	163.07	36.30	29.74	2.89	0.33	2.08	133.78	29.33	13.00
C. D. at 5%	14.35	NS	14.44	494.61	110.11	90.21	8.76	0.99	6.31	405.78	88.95	39.44
100% RDF (250:125:125 NPK kg /ha)	125.08	20.37	99.32	2953.10	623.50	565.15	85.34	9.63	55.20	2489.34	558.52	168.30
Control vs rest												
S. Em. ±	4.91	1.04	4.74	166.93	40.06	32.08	3.02	0.35	2.27	135.47	15.26	13.41
C. D. at 5%	14.26	3.01	13.78	NS	NS	NS	8.77	1.01	6.60	NS	43.97	NS

BC: Bio Compost; CC: Castor Cake; NC: Neem Cake; VC: Vermi Compost; BPW: Banana Psuedostem Waste; RDN: Recommended Dose of Nitrogen; RDF: Recommended Dose of Fertilizer
* Data on pooled basis

Table 3: Quality of sugarcane influenced by pit plated sugarcane under organic farming (pooled)

Treatments	Brix (%)	Sucrose (%) in Juice	Sucrose (%) in Cane	Purity (%)	Fibre (%)	CCS (%)	CCS Yield (t/ha)
Organic manures							
BC + CC (50 + 50% RDN)	20.78	18.48	13.76	88.99	15.51	11.81	14.06
BC + NC (50 + 50% RDN)	20.54	18.29	13.59	89.12	15.68	11.70	13.88
VC + CC (50 + 50% RDN)	21.54	19.22	14.32	89.18	15.54	12.33	16.22
VC + NC (50 + 50% RDN)	21.31	19.05	14.22	89.39	15.33	12.26	15.85
BC + CC + BPW (25 + 50 + 25% RDN)	20.14	17.48	12.97	86.76	15.87	10.82	11.39
BC + NC + BPW (25 + 50 + 25% RDN)	20.71	18.12	13.43	87.45	15.90	11.34	12.47
VC + CC + BPW (25 + 50 + 25% RDN)	20.34	17.73	13.16	87.15	15.82	11.04	12.35
VC + NC + BPW (25 + 50 + 25% RDN)	20.74	18.15	13.48	87.50	15.74	11.36	12.45
Mean	20.76	18.32	13.62	88.19	15.68	11.58	13.58
S. Em. ±	0.64	0.63	0.52	1.09	0.71	0.52	0.75
C. D. at 5%	NS	NS	NS	NS	NS	NS	2.27
100% RDF (250:125:125 NPK kg /ha)	19.87	15.71	11.50	79.29	16.78	8.42	11.76

Control vs rest							
S. Em. ±	0.76	0.64	0.52	1.50	0.76	0.53	0.78
C. D. at 5%	NS	1.87	1.52	4.37	NS	1.54	2.27

BC: Bio Compost; CC: Castor Cake; NC: Neem Cake; VC: Vermi Compost; BPW: Banana Psuedostem Waste; RDN: Recommended Dose of Nitrogen; RDF: Recommended Dose of Fertilizer
* Data on pooled basis

Table 4: Physico chemical property of soil influenced by pit plated sugarcane under organic farming (pooled)

Treatments	pH	EC (dS/m)	Organic Carbon (%)	Avail. N (kg/ha)	Avail. P_2O_5 (kg/ha)	Avail. K_2O (kg/ha)	DTPA extractable Fe (mg/kg)	DTPA extractable Mn (mg/kg)	DTPA extractable Zn (mg/kg)
Organic manures									
BC + CC (50 + 50% RDN)	7.45	0.324	0.77	275.08	44.51	321.21	14.72	25.44	0.72
BC + NC (50 + 50% RDN)	7.43	0.328	0.76	273.33	47.46	323.63	15.82	26.95	0.74
VC + CC (50 + 50% RDN)	7.52	0.320	0.78	283.33	53.75	361.03	17.92	28.55	0.83
VC + NC (50 + 50% RDN)	7.46	0.317	0.77	278.96	48.92	355.29	16.71	27.39	0.77
BC + CC + BPW (25 + 50 + 25% RDN)	7.52	0.341	0.73	242.88	42.16	302.41	14.66	23.90	0.66
BC + NC + BPW (25 + 50 + 25% RDN)	7.47	0.343	0.75	253.12	48.38	312.45	15.11	25.71	0.66
VC + CC + BPW (25 + 50 + 25% RDN)	7.46	0.344	0.74	271.63	43.67	351.31	16.62	27.73	0.79
VC + NC + BPW (25 + 50 + 25% RDN)	7.47	0.341	0.73	258.97	48.20	355.01	17.32	27.20	0.74
Mean	7.47	0.332	0.76	267.17	47.13	335.29	16.11	26.61	0.74
S. Em. ±	0.08	0.013	0.02	8.29	1.90	9.53	0.72	0.78	0.03
C. D. at 5%	NS	NS	NS	25.16	5.75	28.92	2.18	2.36	0.10
100% RDF (250:125:125 NPK kg /ha)	7.60	0.346	0.57	240.00	35.32	294.74	9.30	22.03	0.61
Control vs rest									
S. Em. ±	0.08	0.013	0.02	9.54	1.93	10.09	0.76	0.82	0.03
C. D. at 5%	NS	NS	0.06	27.73	5.62	29.34	2.21	2.38	0.10

BC: Bio Compost; CC: Castor Cake; NC: Neem Cake; VC: Vermi Compost; BPW: Banana Psuedostem Waste; RDN: Recommended Dose of Nitrogen; RDF: Recommended Dose of Fertilizer
* Data on pooled basis

Conclusion

For producing higher and profitable yield of sugarcane, the crop should be fertilized with 100% RDF (250:125:125 NPK kg/ha). Further, it is also inferred that for organic production of sugarcane crop, application of 50% RDN through vermi compost and remaining 50% RDN either through castor cake or neem cake was found remunerative.

References

1. Babhulkar RM, Wandile WP, Balpande SS. Residual effect of longterm application of FYM and fertilizers on soil properties (vertisols) and yield of soybean. Journal of Indian Society of Soil Scence. 2000; 48(1):89-92.
2. Bangar KS, Parmar BB, Ashok M, Maini A. Extent of association of nitrogen and pressmud cake with growth, yield. nutrient uptake and quality parameters of Sugarcane. Crop Research. 2000; 19(2):255-259.
3. Chaudhary CN, Sinha UP. Effect of concentrated organic manure, nitrogen and sulphur on the productivity and economics of sugarcane (*Saccharam officinarum*). Indian Journal of Agronomy. 2001; 46(2):354-360.
4. Edwards CA. Biology and Ecology of Earthworms. 3medn, Chapman and Hall, London, 1982, 426pp.
5. Jadhav MB. Proceeding DSTA 50th convention. 2001, 86-91.
6. Jadhav SB, Jadhav MB, Joshi VA, Jagatap PB. Organic farming in the light of reduction in use of chemical fertilizers. Proceedings of 43rd Annual Deccan Sugar Technology Association, Pune Part I, 1997, 53-65.
7. Patel GG. Sustenance of soil health and productivity of sugarcane through integrated nutrient management in inceptisols of South Gujarat. Ph.D. thesis submitted to NAU, Navsari (Gujarat), 2006.
8. Patel VS, Patel DD. Bio-organic nutrient management in sugarcane production. Green Farming. 2010; 3(2):85-87.
9. Pawar RB. Dynamics of earthworm soil plant relationship in semi-arid tropics. Ph.D. Thesis, University of Agricultural Sciences, Dharwad, 1996.
10. Reddy TR, Mohan Rao, Rama Rao K. Response of soybean (*Glycine max* (L.) Merrill) to nitrogen and phosphorus. Indian Journal of Agronomy. 1990; 35(3):308-310.
11. Senesi N, Saiz-Jimenez C, Miano TM. Spectroscopic characterization of metal-humic acid-like complexes of earthworm-composted organic wastes. Science of the Total Environment. 1992; 117/118, 111-120.
12. Sharma DK, Kaushik RS, Tripathi S, Joshi HC. Distillery effluent based pressmud compost for nitrogen and phosphorous nutrition in rice-wheat cropping system. 2nd International Rice Conference held during 9-13 October, at New Delhi, 2006, 341p.
13. Srivastava TK, Singh KP, Lal M, Suman A, Kumar P. Productivity and profitability of sugarcane in relation to organic nutrition under different cropping systems. Indian Journal of Agronomy. 2008; 53(4):310-313.
14. Thakur SK, Alam M, Umesh UN. Long term effect of integrated nutrient management on productivity and sustainability of sugarcane in calciorthent. Indian Journal of Sugarcane Technology. 2007; 22(1-2):9-13.
15. Virdia HM, Patel CL. Integrated nutrient management for sugarcane plant ratoon system. Indian Journal of Agronomy. 2010; 55(2):147-151.
16. Yadav RL, Kumar R. On farm comparison of ring-pit and conventional flat planting methods for yield and quality of sugarcane in northwest India. Indian Journal of Agricultural Science. 2005; 75:605-607.