Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 973-978
Received: 04-05-2019
Accepted: 06-06-2019

P Christy Nirmala Mary
Department of Soils and Environment, AC&RI, Madurai, Tamil Nadu, India

R Anitha
Sugarcane Research Station, Cuddalore, Tamil Nadu, India

Correspondence
P Christy Nirmala Mary
Department of Soils and Environment, AC&RI, Madurai, Tamil Nadu, India

Effect of organic manures in comparision with inorganic fertilizers on sustainable sugarcane (*Saccharum officinarum* L) production

P Christy Nirmala Mary and R Anitha

Abstract
Field experiment was conducted at Sugarcane Research Station (Tamil Nadu Agricultural University), Cuddalore to assess the feasibility of various organic modules for sustainable sugarcane production with two varieties *viz.,* CoC (SC) 23 and Co86032 under eight different organic sources and inorganic fertilizers. The results showed that between the two varieties studied, CoC (SC) 23 (V_1) recorded higher germination (77.2%), root length (37.7cm) and wide spread (18.1cm) roots, more number of tillers (122161/ha), higher leaf area (206 cm^2 /leaf), lower specific leaf area (85 cm^2/g) and higher relative water content (77%) irrespective of the treatments. The variety CoC (SC) 23 also produced more number of shoots on 8^{th} month (102160/ ha) than Co 86032, leading to more number of millable cane (84349 /ha). It also produced lengthier canes (198 cm), higher cane yield (59.8t /ha) and sugar yield (6.77 t /ha). Among the eight organic and inorganic fertilizers tried, revised NPK schedule of 300 : 100 : 200kg/ha (T_8) produced deeper (43.0 cm) and wide spread (20.1 cm) roots, more number of tillers (129754/ha), higher leaf area (232cm^2 /leaf), lower specific leaf area (80 cm^2/g) and higher relative water content (86%), irrespective of the varieties. The variety CoC (SC) 23 was found to be more suitable for sustainable sugarcane production under both organic and inorganic fertilizer schedules than Co 86032. Revised NPK 300: 100: 200kg/ha recorded higher cane yield and quality.

Keywords: Cane yield, leaf area, millable cane, organic manures, single cane weight, and sustainable agriculture

1. Introduction
Organic agriculture is a holistic way of farming besides production of high quality promoters without any agrochemicals. Sugarcane is an economically important crop. It provides a rich source of sucrose, alcohol and organic matter waste which is utilized as fertilizer. Sustainable development has caught the imagination and action all over the world for more than a decade. According to the Food and Agriculture Organization (FAO), sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving soil health". The use of inorganic fertilizers does not necessarily lead to better farming than the use of natural and organic methods in agriculture. Due to continuous application of only inorganic fertilizers and plant protection chemicals in agriculture, the soils have been badly degraded. It has destroyed stable traditional ecosystem of the soil. Organic agriculture is definitely more sustainable in the long run, improving soil fertility terrain and drought resistance greatly (Nwaiwu *et al*., 2010) [14]. The use of organic manure has been the need for improving the sustainable productivity of soil. Farm yard manure (FYM) is considered as an important source of macro and micronutrients that increase crop yield. Incorporation allows evenly and uniformly distribution of manure on the field thereby making nutrients uptake by the roots of plant possible at different stages (Gana, 2011) [5]. The water holding capacity of soil containing dewaxed pressmud was high as compared to waxed pressmud (Bhosale *et al*., 2012) [1]. Incorporating pressmud into the soil had increased the sugar yield and cane juice quality (Sarwar *et al*., 2010) [15]. Addition of compost improves soil structure, texture and tilth. Bio fertilizers can reduce the economic and environmental problems which are resulting from use of chemical fertilizers. As a result, biological fertilizers can be recommended for the sake of achieving the higher quality production in sugarcane (Isfahani and Besharati, 2012) [9]. Vermicompost is blackish–brown humus like coarse granular material having electrically charged particles meant for improved adsorption of plant nutrients in the soil. Biocompost can be used along with mineral fertilizers to increase maize growth and dry matter yield (Korai *et al*., 2014) [12]. Organic sources of nutrients *vis-à-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. Balanced dose and timing of applying fertilizer has given significant results for the sugarcane growers (Hussain *et al*., 2015) [7]. There was no significant difference in the effects of nitrogen fertilizer rate and split application on cane yield (George *et al*., 2013) [6]. The application of farmyard manure, poultry manure, and sugarcane filter cake alone or in combination with chemical fertilizers improved the soil organic carbon, nitrogen, and phosphorus and potassium status of soil. The increase in soil microbial-biomass carbon and nitrogen was observed in soils receiving organic manures only or with the combined application of organic manures and chemical fertilizers compared to soils receiving chemical fertilizer alone. Keeping in view, a field experiment was conducted in plant crop to study the comparative performance on effect of different organic manures compared with inorganics on soil health and yield of sugarcane.

2. Materials and methods

The study was carried out at the experimental farm of Sugarcane Research Station (Tamil Nadu Agricultural University), Cuddalore, Tamil Nadu, India in one plant crop. The mean maximum and minimum temperature of the location was 31.7º C and 24.1ºC respectively. The mean annual rainfall was 1200 mm. The soil of the experiment field was sandy clay loam, with low available nitrogen (186.84 kg ha^{-1}), medium in available phosphorus (16.5 kg ha^{-1}) and medium in available potash (265 kg ha^{-1}). The pH of the soil is 7.2. The experimental was laid out in split plot design with two varieties viz., CoC (SC) 23 and Co86032 and eight treatments include T_1 - FYM @ 12.5t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP, T_2 - Pressmud @ 37.5t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP, T_3 - Vermicompost @ 2.5t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP, T_4 - Sugarcane trash compost @ 5t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP, T_5 - Green manure as intercrop and *in situ* incorporation, phosphorus solublising bacteria @ 10kg/ha, Vesicular Arbuscular Mycorrihza @ 5t/ha, T_6 - Panchakavya 3% sett treatment and 3% foliar spray, T_7 - Recommended dose of NPK @ 275:62.5:112.5 kg/ha and T_8 - Revised dose of NPK @ 300:100:200 kg/ha and replicated thrice.

2.1 Observations

Germination (%): At the completion of germination after 30 days of sowing, the number of seedlings emerged in each plot were counted and then converted into percentage by using the following formula: Germination (%) = Number of germinated buds /Total number of buds X 100; Plant height (cm): The height of 25 randomly selected plants was measured in centimeters from the surface of soil to the tip of the flag leaf; Tillers $plant^{-1}$: Number of the tillers $plant^{-1}$ was recorded after crop emergence and completion of germination; Stem girth (cm): The stem girth of 25 randomly selected plants was measured in centimeters by Vernier caliper from bottom, mid and top portion and averages of the three data were used for statistical analysis; Millable canes (000 ha^{-1}): A millable cane refers to the cane that has attained full height and thickness at its physiological maturity and is ready to harvest for processing. Number of millable canes in each plot was counted at harvest and then converted into number of millable canes per hectare; Cane yield (t ha^{-1}): The whole plot was harvested and leaves were removed and cane was cut from the top and the cane of the plot was weight in kg on spring balance and computed for hectare ; Leaf area: To record leaf area 25 plants from each treatment were randomly selected, removed from the soil and leaf area was measured manually by using the formula described by Hunt (1978) [8]. LA= Leaf length x Leaf width x CF (0.75); The juice quality was assessed in terms of polarization, brix and purity. Polarization (refers to the sucrose content) was determined as described by Blackburn (1984) [3].

3. Results and discussion

3.1. Nutrient Content of Manures

The data on the nutrient content of organic manures viz., farm yard manure, pressmud, vermicompost and sugarcane trash compost are given in Table.1.

Table 1: Nutrient content of manures

Nutrients	Farm Yard Manure	Pressmud	Vermicompost	Sugarcane Trash compost
Organic carbon	23.32	22.00	27.32	24.27
Nitrogen (%)	1.03	0.90	1.9	1.20
Phosphorus (%)	0.6	0.57	0.8	0.80
Potassium (%)	0.80	0.50	0.4	0.78
Calcium (%)	0.68	0.05	0.10	1.73
Magnesium (%)	0.62	0.07	0.02	0.92
Sulphur (%)	0.13	0.17	.22	0.20
Iron (mg/kg)	900	820	1200	1500
Zinc(mg/kg)	120	140	100	190
Copper (mg/kg)	180	82	48	203
Manganese(mg/kg)	92	80	50	93

3.1.1. Pressmud

The N, P and K contents of the press mud were 0.90, 0.57 and 0.50 per cent respectively. The total organic carbon, calcium, magnesium and sulphur contents were 22.00, 0.05, 0.07 and 0.17 per cent respectively. The total iron, zinc, copper and manganese contents were 820, 140, 82 and 80 mg/kg respectively.

3.1.2. Farm Yard Manure

The farm yard manure sample had registered the organic carbon, nitrogen, phosphorus and potassium contents of 23.32, 1.03, 0.62 and 0.80 per cent respectively. The calcium, magnesium, sulphur contents were 0.68, 0.62 and 0.13 per cent respectively. The total iron, zinc, copper and manganese were 900, 120,180 and 92 mg $kg^{-1.}$

3.1.3. Sugarcane Trash Compost

The sugarcane trash compost registered the organic carbon, nitrogen, phosphorus and potassium contents of 24.27, 1.20, 0.80 and 0.78 per cent, respectively. The total calcium, magnesium and sulphur contents were 1.73, 0.92 and 0.20 per cent respectively. The total iron, zinc, copper and manganese contents were 1500,190, 203 and 93 mg kg^{-1} respectively.

3.1.4. Vermicompost

The vermicompost sample had registered the organic carbon content, nitrogen, phosphorus and potassium contents of 27.32, 1.9, 0.8, 0.4 per cent respectively**.** The total calcium, magnesium and sulphur contents were 0.10, 0.02 and 0.22 per cent respectively. The total iron, zinc, copper and manganese contents were 1200,100, 48 and 50 mg kg^{-1} respectively.

3.2 Effect of Treatments on Growth Characters of Sugarcane

3.2.1 Germination

The data indicated that difference in treatments were significant for germination (Table 2). Among the two varieties studied, CoC(SC) 23 (V_1) recorded higher germination of 77.2% irrespective of the treatments followed by Co86032 (61.9%). Similarly, application of pressmud 37.5 t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP (T_2) recorded higher germination of 72.7% irrespective of the varieties while minimum in T_1 (64.8%). T_2 and T_5 were statistically at par with each other. CoC(SC) 23 under pressmud application recorded higher germination of 80.6%. These results are also supported by Bokhtiar and Sakurai (2005) [4]. Singh and Srivastava (2011) [16] concluded that the supply of nutrients through organics in sugarcane supports the crop growth equally well as that with recommended dose of nutrients supplied solely through chemical fertilizers.

Table 2: Effect of Treatments on Growth Characters of Sugarcane

Treatments	Germination (%)			Tiller production (/ha)			Shoot count (/ha)			Relative Water Content (%)		
	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean
T_1- FYM @ 12.5t/ha	72.5	57.0	64.8	120500	110100	115300	99800	88800	94300	73	69	71
T_2 - Pressmud @ 37.5t/ha	80.6	64.7	72.7	123500	116200	119900	101300	95000	98200	80	77	79
T_3 - Vermicompost @ 2.5t/ha	78.5	61.7	70.1	121300	114000	117600	100700	90200	95400	75	73	74
T_4 - Sugarcane trash compost @ 5t/ha	77.2	60.4	68.8	117500	107800	112600	98100	85400	91800	72	68	70
T_5 - Green manure, PSB @ 10kg/ha, VAM @ 5t/ha	79.2	64.7	72.0	114600	105600	110100	96400	83700	91800	70	65	68
T_6 - Panchakavya	78.4	61.1	69.8	109100	100300	104700	94400	80700	87500	69	62	66
T_7 - Recommended dose of NPK	73.9	60.0	67.0	132800	120000	126400	110000	97800	104400	85	80	83
T_8 - Revised dose of NPK	77.0	65.2	71.1	137900	121200	129800	115600	100700	108100	88	84	86
Mean	77.2	61.9		122200	111900		102200	90700		77	72	
	SE d	CD (p=0.05)		SE d	CD (p=0.05)		SEd	CD (p=0.05)		SEd	CD (p=0.05)	
V	0.4196	0.8570		1048	2141		1289.6	2633.8		1.03	2.11	
T	0.8392	1.7139		2097	4282		2579.3	5267.6		2.07	4.22	
V X T	1.1868	2.4239		2965	6056		3647.6	7449.5		2.92	5.67	

3.2.2 Tiller Production

Significant changes in tiller population dynamics across the growing period from tillering stage to mature stage of sugarcane due to different organic and inorganic fertilizer application was observed. Between the two varieties, V_1 (CoC (SC) 23) recorded more tillers (122200/ha). Irrespective of the varieties, T_8 (revised NPK 300: 100: 200kg/ha) recorded more tillers (129800/ha) and on par with T_7 while minimum (104700/ha.) in T_8 (Panchkaviya 3% sett treatment and 3% foliar spray). Similar results were also reported by Bindumathi (2008) [2] in dryland vegetable crops with panchakavya application. Among the various treatments, V_1T_8 (CoC (SC) 23 in revised NPK 300: 100: 200kg/ha) recorded more number of tillers (137900/ha). The results are presented in Table.2.

3.2.3 Shoot Count

Statistically significant differences for shoot count among various treatments were confirmed (Table 2). Between the two varieties, CoC (SC) 23 (V_1) recorded more number of shoots (102200/ha). Among the various organic and inorganic tried, revised NPK @ 300: 100: 200kg/ha (T_8) recorded higher shoot count (108100/ha) irrespective of the varieties, while minimum in T_6 (87500/ha). Similar results were also reported by Soomro *et al.* (2013) [17] that lower rates or individual application of organic nutrient sources recorded less value of all agronomic traits and also due to non availability of nutrients as no fertilizer was applied. T_7 and T_8 were statistically at par with each other. Over all, CoC (SC) 23 in revised NPK @ 300: 100: 200kg/ha (V_1T_8) recorded more number of shoots (115600/ha) followed by (V_1T_7)

3.2.4. Number of Millable Canes (NMC)

The data pertaining to number of millable cane elucidated that all treatments varied significantly among each other (Table 4). Between the two varieties, CoC (SC) 23 produced more NMC (84300/ ha) at harvest. Among the eight treatments, revised NPK 300: 100: 200kg/ha recorded higher NMC of 90700/ha, irrespective of the varieties and followed by recommended dose of fertilizers (85700/ha.) and pressmud (82400/ha.) Over all, CoC (SC) 23 in revised NPK 300: 100: 200kg/ha recorded higher NMC (97000 /ha). These results are similar to the findings of Hussain *et al.* (2015) [7] proved that higher tillering gave rise to higher number of millable canes with application of fertilizers.

3.3 Effect of Treatments on Physiological Traits of Sugarcane

3.3.1. Root Characters

The variety CoC (SC) 23 produced lengthier roots (37.7cm root depth) with more horizontal spread (18.1cm), irrespective of the treatments at 90 DAP. Similarly, revised NPK @ 300:

100: 200kg/ha produced deeper roots (43.0 cm) with greater horizontal spread (20.1cm) irrespective of the varieties and this was followed by recommended dose of fertilizers (T_7) and pressmud (T_2). Soomro *et al.,* (2013) [17] concluded that integrated nutrient management recorded 25% saving in inorganic fertilizers with application of FYM and or press mud. Over all, CoC (SC) 23 in revised NPK 300: 100: 200kg/ha performed better with regard to root characters (45.1 cm deeper roots with 20.3cm lateral spread). The data are presented in Table 3.

3.3.2. Leaf Characters

The leaf physiological characters studied on 90 DAP. Between the two varieties, CoC(SC) 23 recorded higher leaf area (206 cm^2/leaf), lower SLA (85 cm^2/g) and higher RWC (77%). Among the treatments, revised NPK 300: 100: 200kg/ha (T_8) recoded higher leaf area (232 cm^2/leaf), lower SLA (80cm^2/g) and higher RWC (86%) and on par with T_7. While T_6 recorded the lowest values. Over all, CoC(SC)23 in revised NPK @ 300 : 100 : 200kg/ha recorded more leaf area (250 cm^2/leaf), lower SLA (75 cm^2/g) and higher RWC (88%) (Tables 3 and 4). These results are in conformity with that obtained by Kowsar Jan and Boswal, (2015) [13] in bread wheat (*Triticum aestivum* L).

3.4 Effect of Treatments on Yield Attributes of Sugarcane

Between the two varieties, CoC (SC) 23 recorded longer canes (198 cm), but Co86032 produced thick (1.7cm girth) and heavy canes (0.85 kg single cane weight) at harvest. Similarly, revised NPK 300: 100: 200kg/ha produced lengthier canes of 207cm, with more thickness of 2.2 cm girth and more single cane weight of 1.04 kg, irrespective of the varieties. Over all, CoC (SC) 23 in revised NPK 300: 100: 200kg/ha recorded lengthier canes of 212 cm, but Co86032 in revised NPK 300: 100: 200kg/ha produced thick (2.3cm girth) and heavy canes (1.15 kg single cane weight). The data are presented in Table 4.

3.5 Effect of Treatments on Yield and Quality Parameters of Sugarcane

Statistically significant differences for yield quality parameters among various treatments were confirmed (Table.5.). Between the two varieties, CoC(SC)23 recorded higher cane yield (60t /ha) irrespective of the treatments and Co 86032 recorded more CCS of 11.5%. The results indicated that highest tillering and highest cane count produced maximum cane yield. Keshavaiah *et al*., (2012) [11] also found that sugarcane varieties significantly differed with respect to cane yield. Variety Co 62175 recorded significantly higher cane yield (149.40 t/ha) as compared to Co86032 (130.05 t ha^{-1}) in Karnataka. Among the eight treatments, the revised NPK 300: 100: 200kg/ha produced higher cane yield (79 t/ ha), CCS (12.5%) and sugar yield (9.9t /ha) irrespective of the varieties. These results are also supported by Viator *et al.* (2002) [18] that inorganic fertilizer increased cane yield while comparing organic manures. Over all, CoC (SC) 23 with revised NPK 300: 100: 200kg/ha produced more cane yield (80 t/ ha) followed by CoC (SC) 23 with recommended NPK (75 t/ha.) and CoC (SC) 23 with pressmud @ 37.5t/ha (69 t/ha.). Bokhtiar and Sakurai, (2005) [4] suggested that press mud and FYM incorporation are extremely important for maximizing and sustaining productivity of sugarcane and maintaining fertility status of the soils. Recommended inorganic fertilizer alone produced the highest number of millable cane stalks which was closely associated by press mud application. The results are in conformity with the findings of Kamini Kumara *et al*. (2005) [10]. The yield of sugarcane increased with increasing levels of organics and resulted in built up of organic carbon, nitrogen levels and micronutrients which accelerated faster rate of decomposition of crop residue Among the two varieties, CoC (SC) 23 performed well in increasing the cane yield compared to Co86032 (Table.5.).

Table 3: Effect of Treatments on Physiological Characters of Sugarcane Varieties

T. No	Treatments	Root length or root depth (cm)			Root spread (cm)			Leaf area (cm^2/leaf)			Specific Leaf Area (cm^2/g)		
		Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean
T_1	FYM @ 12.5t/ha	36.5	32.0	34.3	17.6	17.3	17.5	192	180	185	86	94	90
T_2	Pressmud @ 37.5t/ha	40.0	36.7	38.4	18.4	18.0	18.2	227	198	213	82	89	86
T_3	Vermicompost @ 2.5t/ha	39.7	34.5	37.1	18.0	17.7	17.9	200	187	194	83	91	87
T_4	Sugarcane trash compost @ 5t/ha	34.3	33.1	33.7	17.1	16.5	16.8	185	176	181	88	95	92
T_5	Green manure, PSB @ 10kg/ha, VAM @ 5t/ha	31.8	31.8	31.8	16.7	16.1	16.4	178	171	174	92	96	94
T_6	Panchakavya	30.9	31.3	31.1	16.5	15.8	16.2	174	165	170	93	97	94
T_7	Recommended dose of NPK	43.2	38.4	40.8	19.8	19.6	19.7	243	209	226	78	86	82
T_8	Revised dose of NPK	45.1	40.9	43.0	20.3	19.9	20.1	250	214	232	75	84	80
	Mean	37.7	34.8		18.1	17.6		206	188		85	94	
		SE d	CD (p=0.05)		SE d	CD (p=0.05)		SEd	CD (p=0.05)		SEd	CD (p=0.05)	
	V	0.79	1.61		0.66	1.34		1.77	3.61		1.02	2.08	
	T	1.57	3.21		1.31	2.68		3.53	7.22		2.04	4.16	
	V X T	2.23	4.55		1.85	3.79		5.00	10.21		2.88	5.88	

Table 4: Effect of Treatments on Yield Attributes of Sugarcane

Tr. No	Treatments	NMC (/ha)			Cane length (cm)			Cane girth (cm)			Single Cane weight (kg)		
		Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean
T_1	FYM @ 12.5t/ha	82100	67000	74700	194	182	188	1.3	1.6	1.5	0.71	0.79	0.75
T_2	Pressmud @ 37.5t/ha	88000	77000	82400	201	193	197	1.6	1.9	1.8	0.80	0.93	0.87
T_3	Vermicompost @ 2.5t/ha	84100	72100	78100	197	187	192	1.4	1.8	1.6	0.75	0.84	0.80
T_4	Sugarcane trash compost	79100	67500	73300	192	175	184	1.3	1.4	1.4	0.67	0.76	0.72

	@ 5t/ha												
T_5	Green manure, PSB @ 10kg/ha, VAM @ 5t/ha	77600	67000	72300	190	177	184	1.2	1.3	1.3	0.62	0.73	0.67
T_6	Panchakavya	76100	64600	70400	188	170	179	1.2	1.3	1.3	0.57	0.61	0.59
T_7	Recommended dose of NPK	91000	80400	85700	209	198	204	1.9	2.1	2.0	0.88	1.02	0.95
T_8	Revised dose of NPK	97000	84400	90700	212	202	207	2.0	2.3	2.2	0.93	1.15	1.04
	Mean	84300	72500		198	186		1.5	1.7		0.74	0.85	
		SE d	CD (p=0.05)		SE d	CD (p=0.05)		SEd	CD (p=0.05)		SEd	CD (p=0.05)	
	V	899.7	1837.5		0.77	1.58		0.05	0.09		0.01	0.02	
	T	1799.4	3675.0		1.54	3.15		0.09	0.19		0.02	0.04	
	V X T	2544.8	5197.2		2.18	4.46		0.13	0.26		0.03	0.06	

Table 5: Effect of Treatments on Cane Yield, CCS (%) and Sugar Yield (t/ha).

T. No	Treatments	Cane Yield (t/ha)			CCS %			Sugar Yield (t/ha)		
		Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean	Co C (SC) 23	Co 86032	Mean
T_1	FYM @ 12.5t/ha	57	50	54	10.9	11.4	11.2	6.2	5.7	6.0
T_2	Pressmud @ 37.5t/ha	69	64	67	11.5	11.9	11.7	7.9	7.6	7.8
T_3	Vermicompost @ 2.5t/ha	62	56	59	11.3	11.6	11.5	7.0	6.6	6.8
T_4	Sugarcane trash compost @ 5t/ha	51	48	50	10.7	11.0	10.9	5.5	5.3	5.4
T_5	Green manure, PSB and VAM	45	42	44	10.6	10.8	10.7	4.7	4.6	4.7
T_6	Panchakavya	39	33	36	10.4	10.7	10.6	4.1	3.5	3.8
T_7	Recommended dose of NPK	75	71	73	11.9	12.3	11.8	8.9	8.7	8.8
T_8	Revised dose of NPK	80	78	79	12.2	12.8	12.5	9.8	10.0	9.9
	Mean	60	55		11.2	11.5		6.8	6.5	
		SE d	CD (0.05)		SE d	CD (0.05)		SE d	CD (0.05)	
	V	0.83	1.69		0.09	0.19		0.10	0.21	
	T	1.66	3.38		0.19	0.38		0.21	0.43	
	V X T	2.34	4.78		0.26	0.53		0.30	0.60	

4. Conclusion

The variety CoC (SC) 23 is found to be more suitable for sustainable sugarcane production under both organic and inorganic fertilizer schedules than Co 86032 in coastal areas of Tamil Nadu. CoC (SC) 23 recorded higher cane yield irrespective of the treatments and Co 86032 recorded more CCS (%). Revised NPK 300: 100: 200 kg / ha recorded higher cane yield and quality than the other levels and types of fertilizers, irrespective of the varieties studied followed by pressmud @ 37.5t/ha – 50% as basal and 50% as top dressing in 4 equal splits on 30, 60, 90 and 120 DAP. Long term studies with the employment of pressmud and other organic sources may prove the worth in soil properties management. This study suggests that organic farming, through its use of manures recorded lower yield but supports the enhancement of soil health that are more complex than those that result from the use of synthetic fertiliser. The results of this experiment would be useful in designing efficient nutrient management techniques and also to evaluate the performance of sugarcane in organic and inorganic system of planting.

5. References

1. Bhosale PR, Chonde SG, Nakade DB, Raut PD. Studies on physico-chemical characteristics of waxed and dewaxed pressmud and its effect on water holding capacity of soil. ISCA J Biological Sci. 2012; 1(1):35-41.
2. Bindumathi M. Evaluation of organic growth promoters on yield of dryland vegetable crops in India. Journal of Organic Systems. 2008; 3(1):23-36.
3. Blackburn F. Sugar-cane. (1st edition). Longman, London and New York. (Tropical Agriculture Series). 1984, 414. ISBN 0-582-46028X.
4. Bokhtiar SM, Sakurai K. Effects of organic manure and chemical fertilizer on soil fertility and productivity of plant and ratoon crops of sugarcane. Archives of Agronomy and Soil Science. 2005; 51(3):325-34.
5. Gana AK. Appropriate method for organic manure application for higher sugarcane yield in Nigeria. Journal of Agricultural. Technology. 2011; 7(6):1549-59.
6. George Achieng O, Samwel Nyandere O, Philip Owuor O, Gordon Abayo O, Chrispine Omondi O. Effects of rate and split application of nitrogen fertilizer on yield of two sugarcane varieties from ratoon crop. Greener Journal of Agricultural Sciences. 2013; 3(3):235-39.
7. Hussain SM, Anwar-ul-Haq, Hussain S, Akram Z, Afzal M, Shabbir I. Best suited timing schedule of inorganic NPK fertilizers and its effect on qualitative and quantitative attributes of spring sown sugarcane (*Saccharum officinarum* L.) Journal of the Saudi Society of Agricultural Sciences. 2015. http://dx.doi.org/10.1016/j.jssas.2015.02.004.
8. Hunt R. Plant Growth Analysis. The Inst. of Bio. Studies in Bio. Edward Arnold (Pub.) Ltd. 1978; 96:8-38.
9. Isfahani FM, Besharati H. Effect of biofertilizers on yield and yield components of cucumber. J Biol. Earth Sci. 2012; 2(2):83-92.
10. Kamini Kumara, Prasad J, Vipin Kumar, Solanki IS. Effect of crop residue and residual zinc on zinc fractions and their contribution to zinc uptake under rice-wheat cropping system in calciorthents. Res. on crops. 2005; 16(2):205-12.
11. Keshavaiah KV, Palled YB, Shankaraiah C, Channal HT, Nandihalli BS, Jagadeesha KS. Effect of nutrient management practices on nutrient dynamics and performance of sugarcane. Karnataka J Agric. Sci. 2012; 25(2):187-92.
12. Korai PK, Memon KS, Genxing Pan, Rajper AA, Jamro GM, Korai SK *et al*. Effect of sugarcane pressmud biocompost on dry matter yield and nutrient uptake in Maize. Journal of Biology, Agriculture and Healthcare. 2014; 4(23):142-46.
13. Kowsar Jan, Boswal MV. Effect of bio-fertilizer and organic fertilizer on physiological characteristics of bread

Wheat [*Triticum aestivum* L]. International Journal of scientific research and management (IJSRM). 2015; 3(2):2073-89.
14. Nwaiwu IU, Ohajianya DO, Lemchi JI, Ibekwe UC, Nwosu FO, Ben-chendo NG *et al*. Economics of organic manure use by food crop farmers in ecologically vulnerable areas of Imo State, Nigeria. Researcher. 2010; 2(11):56-61.
15. Sarwar MA, Ibrahim M, Tahir M, Ahmad K, Zafar Iqbal, Khan Z *et al*. Appraisal of pressmud and inorganic fertilizers on soil properties, yield and sugarcane quality. Pak. J bot. 2010; 42(2):1361-67.
16. Singh KP, Srivastava TK. Sugarcane productivity and soil fertility in plant – ratoon system under integrated and organic nutrient management in sub-tropics. Indian Journal of Sugarcane Technology. 2011; 26(1):10-13.
17. Soomro AF, Tunio S, Oad FC, Rajper I. Integrated effect of inorganic and organic fertilizers on the yield and quality of sugarcane (S*accharum officinarum* L). Pak. J bot. 2013; 45(4):1339-48.
18. Viator RP, Kovar JL, Hallmark WB. Gypsum and compost effects on sugarcane root growth, yield and plant nutrients. Agron. J. 2002; 94:1332-36.