Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 6, Issue, 08, pp.8214-8216, August, 2014

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

NUTRIENT MANAGEMENT THROUGH NPK BRIQUETTES FOR SUGARCANE RATOON

Deshmukh, S. U., *Potdar, D. S. and Pawar, S. M.

Central Sugarcane Research Station, Padegaon-415521, Tal-Phaltan, (M.S.), India

ARTICLE INFO

Article History:
Received 09th May, 2014
Received in revised form
30th June, 2014
Accepted 10th July, 2014
Published online 31st August, 2014

Key words:
Briquette,
Fertilizer use efficiency,
Soil health.

ABSTRACT

A field experiment was conducted at the Central Sugarcane Research Station, Padegaon, Dist. Satara (M.S.) to study the effect of briquette on sugarcane ratoon for cane yield, nutrient uptake and soil health during 2009-10 to 2011-12 for three years. The results indicated that application of 100 % RD NPK through briquette recorded significantly highest cane yield and CCS yield and it was at par with application of 75 % RD NPK through briquettes. The same treatments 100 % RD NPK through briquette and 75 % RD NPK through briquette recorded improvement in soil health after completion of three years. The highest fertilizer use efficiency of N, P and K fertilizers were recorded in the treatment 100 % RD NPK through briquettes. The % increase in fertilizer use efficiency of briquettes over non briquettes was highest in 75 % RD NPK through briquettes. The application of 75 % RD NPK through briquettes recorded higher cane yield of sugarcane ratoon, higher B:C ratio with improvement in soil health.

INTRODUCTION

The sugarcane is long durational and high yielding crop, gives response to fertilizer application. The high cost of manuring and fertilization is a basic problem in sugarcane cultivation. These difficulties need to be tackled by increasing use efficiency of the fertilizers without sacrificing the cane yield. Significant improvement in cane yield in all growth characters and cane yield of sugarcane were noted due to briquette form over non briquette form (More *et al.,* 2004). Increase in fertilizer use efficiency by using of briquettes over non briquette fertilizers for sugarcane is also noted by More *et al.* (2012). In view of this, the present investigation was undertaken to increase the fertilizer use efficiency and assess the possibility of saving of fertilizers through briquette in sugarcane ratoon without reduction in yield.

MATERIALS AND METHODS

A field experiment was conducted during 2009-10 to 2011-12 for three years at Central Sugarcane Research Station, Padegaon (M.S.) on medium deep black soil (Inceptisol) in randomized block design, with eight treatments and three replications. The ratooning and harvesting dates of sugarcane ratoon for three years of experimentation were given in Table 1.

Corresponding author: Potdar, D. S.
Central Sugarcane Research Station, Padegaon-415521, Tal-Phaltan, (M.S.), India.

The treatments are Absolute control (No fertilizer), 100% NPK RD through straight fertilizer by Conventional method of fertilizer application, 100% NPK RD through straight fertilizer by crow bar, 100% NPK RD through briquette by crow bar, 75% NPK RD through straight fertilizer by crow bar, 75% NPK RD through briquette by crow bar, 50% NPK RD through straight fertilizer by crow bar and 50% NPK RD through briquette by crow bar. The recommended dose for ratoon sugarcane is 250: 115: 115 kg N, P_2O, K_2O/ha. and application is in two equal splits, 50 % at the time of ratooning and remaining 50 % 135 days after ratooning. The briquettes are prepared by using Urea, DAP and MoP and weight of each briquette is 2.60 gm. Briquettes are applied by Crow bar at 10 cm deep, 10 to 15 cm from the stool keeping 30 cm spacing between two holes.

Table 1. Yearwise ratooning and harvesting dates

Year	Date of Ratooning	Date of Harvesting
First	2.1.2009	29.2.2010
Second	25.1.2010	30.2.2011
Third	15.1.2011	16.2.2012

The initial and after harvest soil samples were analyzed for pH and EC in 1:2.5 soil: water suspension, organic carbon by Walkly and Black Wet Oxidation method as described by Nelson and Sommers (1982). The available N of soil was estimated by alkaline permanganate method (Subbiah and Asija, 1956), available P as per Olsen *et al.* (1954) and the available K was determined by flame photo metry (Knudsen *et al.*, 1982). Cane juice quality was determined using procedure outlined by Spencer and Meade (1964) and

commercial cane sugar (CCS) content was calculated. The data obtained on chemical properties of soil, uptake of nutrients by plant, quality of juice and yield of sugarcane were analysed statistically by using standard methods of analysis of variance (Panse and Sukhatme, 1978).

RESULTS AND DISCUSSION

Yield and yield contributing characters

The pooled data on yield and yield contributing characters were presented in Table 2. The highest yields of cane (112.41 t ha^{-1}) and CCS (15.70 t ha^{-1}) were recorded with 100 % recommended dose of NPK through briquettes (T_4). It was, however, at par with treatment T_6 applied with the 75% recommended dose of NPK through briquettes (107.02 and 14.81 t ha^{-1}). These results are in conformity with Kadam (1986) and Banger and Sharma (1992). In case of yield contributing parameters, application of 100 % recommended dose of NPK through briquettes (T_4) recorded significantly highest NMC (101.06 '000' ha^{-1}) and the treatment T_6 i.e. 75% recommended dose of NPK through briquettes recorded significantly highest AWC (1.13 kg) and it was at par with T_3. The CCS % was not significantly influenced by the treatments.

Nutrient uptake, soil chemical properties and nutrient use efficiency

The data on soil nutrient status after harvest of ratoon crop (Table 3) shows that the treatment T_4, i.e. 100 % recommended dose of NPK through briquettes recorded highest organic carbon content (0.78 %), available N and P (324.85 and 37.76 kg ha^{-1} respectively).

Table 2. Yield and yield contributing characters (Pooled mean)

Treatments	Cane yield (t ha^{-1})	CCS yield (t ha^{-1})	NMC ('000' ha^{-1})	ACW (Kg)	CCS %
T_1. Control (No fertilizer)	51.55	7.01	71.62	0.67	13.65
T_2. 100% NPK RD straightfertilizers by conventional method.	98.62	13.66	90.90	1.08	13.88
T_3. 100% NPK RD straight fertilizers by crow bar	96.34	13.35	92.07	1.02	13.88
T_4. 00% NPK RD briquette by crow bar	112.41	15.70	101.06	1.11	13.98
T_5. 75% NPK RD straight fertilizers by crow bar	86.73	12.05	80.73	1.06	13.92
T_6. 75% NPK RD briquette by crow bar	107.02	14.81	96.83	1.13	13.89
T_7. 50 % NPK RD straight fertilizers by crow bar	75.05	10.44	81.14	0.93	13.91
T_8. 50 % NPK RD briquette by crow bar	82.88	11.74	87.40	0.93	14.18
SE±	3.39	0.50	1.16	0.03	0.16
CD at 5%	10.29	1.50	3.50	0.08	NS

Table 3. Soil parameters at harvest and nutrient uptake (Pooled mean)

Tr. No.	Soil pH	Soil EC (dSm^{-1})	Organic carbon (%)	Available soil N	Available soil P	Available soil K	N uptake	P uptake	K uptake
						(kg ha^{-1})			
T_1	7.81	0.21	0.60	261.85	21.53	247.20	121.59	37.07	137.27
T_2	7.38	0.23	0.77	323.55	31.43	302.32	214.95	64.96	225.66
T_3	7.58	0.20	0.74	309.99	37.68	288.19	306.76	60.72	339.99
T_4	7.52	0.20	0.78	324.85	37.76	318.73	330.00	78.88	366.27
T_5	7.76	0.20	0.70	313.30	27.46	332.72	175.62	51.79	207.95
T_6	7.57	0.25	0.72	320.49	27.54	291.31	240.63	61.35	292.08
T_7	7.70	0.25	0.74	304.69	20.00	289.80	170.10	41.74	199.88
T_8	7.66	0.22	0.73	310.64	21.19	268.26	181.24	45.48	237.81
SE±	0.07	0.04	0.03	4.49	3.19	9.11			
CD at 5%	0.22	NS	0.08	13.62	9.69	27.63			

Table 4. Effect of different treatments on Nutrient use efficiency (Pooled mean)

Tr.No.	Nutrient use efficiency (%)				% Increase of nutrient use efficiency of briquette over non briquette form of fertilizers			
	NUE	PUE	KUE	Mean	NUE	PUE.	KUE	Mean
T_1	--	--	--	--	--	--	--	--
T_2	43.43	42.93	39.17	41.84	--	--	--	--
T_3	60.36	38.95	59.62	52.98	--	--	--	--
T_4	63.16	53.01	62.52	59.56	4.42	26.53	4.63	11.86
T_5	30.77	28.43	33.99	31.06	--	--	--	--
T_6	49.47	39.58	53	47.35	37.81	28.18	35.87	33.95
T_7	28.52	11.19	31.32	23.68	--	--	--	--
T_8	32.91	18.5	42.28	31.23	13.35	39.51	25.91	26.26
Mean	--	--	--	--	18.53	31.41	22.14	24.02

NUE – Nitrogen use efficiency, PUE- Phosphorus use efficiency,
KUE – Potassium use efficiency

Table 5. Economics (Pooled mean)

Tr. No.	Yield (t ha^{-1})	Gross monetary returns (Rs. ha^{-1})	Culti.cost (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B : C Ratio
T_1	51.55	95367.5	--	--	--
T_2	98.62	182447	37259	145188	3.90
T_3	96.34	178229	38579	139649	3.62
T_4	112.41	207959	33861	174098	5.14
T_5	86.73	160451	36168	124283	3.44
T_6	107.02	197987	30169	167818	5.56
T_7	75.05	138843	33756	105087	3.11
T_8	82.88	153328	26477	126851	4.79
SE ±	3.39	6275.07	--	6275.07	0.037
CD at 5 %	10.29	19033.29	--	19033.29	0.11

Similar observations were also reported by Talekar and Dongale (1993). The same treatment 100 % recommended dose of NPK through briquettes recorded highest uptake of NPK. The data on nutrient use efficiency was presented in table 4. The data revealed that the maximum nutrient use efficiency of N,P and K (63.16, 53.01 and 62.52 % respectively) were recorded in the treatment $T_{4,}$ i.e. 100 % recommended dose of NPK through briquettes and the % increase of NUE of briquette over non briquette form was maximum in treatment $T_{6,}$ i.e. 75 % recommended dose of NPK through briquettes (37.81, 28.18 and 35.87 % respectively).

Economics

The data on economics reported in table 5 indicated that, application of 100 % recommended dose of NPK through briquettes (T_4) gave highest monetary returns and net return. (Rs.2, 07,959 and 1,74,098 ha^{-1} respectively). However, the B:C ratio (5.56) was highest in 75 % recommended dose of NPK through briquettes (T_6) indicating saving of 25 % recommended dose of NPK fertilizers.

Conclusion

Application of 75 % recommended dose of NPK through briquettes in two equal splits i.e. 50 % at the time of ratooning and 50 % at 135 days after ratooning for sugarcane ratoon is found better for higher cane and CCS yield and B:C ratio with saving of 25 % NPK RD besides the maintenance of soil fertility. The sugarcane is long durational and high yielding crop, gives response to fertilizer application. The high cost of manuring and fertilization is a basic problem in sugarcane cultivation. These difficulties need to be tackled by increasing use efficiency of the fertilizers without sacrificing the cane yield. Significant improvement in cane yield in all growth characters and cane yield of sugarcane were noted due to briquette form over non briquette form (More *et al.,* 2004). Increase in fertilizer use efficiency by using of briquettes over non briquette fertilizers for sugarcane is also noted by More *et al.* (2012). In view of this, the present investigation was undertaken to increase the fertilizer use efficiency and assess the possibility of saving of fertilizers through briquette in sugarcane ratoon without reduction in yield.

REFERENCES

Banger, K.S. and Sharma, S.R. 1992. Comparative efficiency of prilled urea and super granules with different levels of nitrogen in sugarcane (*Saccharium offcinarium* L.) production. *Indian J. Agron.* 37(4) : 872 - 873.

Kadam, R.H. 1986. Effect of forms and levels of urea on nitrification rates, yield and quality of seasonal sugarcane (*Saccharium offcinarium* L.) Var. Co. 7219 under different irrigation levels. Ph.D.Thesis, MPKV, Rahuri.

Knudesn, D.; Peterson, G. A. and Pratt, P. F. 1982. Lithium, Sodium and Potassium in 'Methods of soil analysis' Part-2. Chemical and Microbiological properties. Agronomic Monograph No.9 (Amer. Soc. of Agron., Inc, Medison, Wisconsin, USA) , : 225-238.

More, N.B., Deshmukh, S.U. and Pol, K.M. 2012. Effect of NPK briquette on yield and quality of sugarcane. *J. Agric. Res. Technology* 37(3) : 353 – 358.

More, N.B.; Pharande, A.L. and Bhoi, P.G. 2004. Effect of NPK fertilizer briquette on yield and quality of sugarcane in swell-shrink soils of Maharashtra. *Indian J. Sugarcane Techno*.19 (1 & 2) : 27 – 34.

Nelson, D.W. and Sommers, L.E. 1982. Total carbon and organic matter. In "Methods of soil analysis" Page A.L.(Ed.), II American Society of Agronomy, (Amer. Inc, Medison, Wisconsin, USA), : 559 - 577.

Olsen, S. R.; Coles, C.V.; Watanabe, F.S. and Dean, L. N. 1954.Estimation of available phosphrous in soil by extraction with sodium by carbonate. USDA Circular: 939.

Panse, V. G. and Sukhatme, P. V. 1978. Statistical methods for agricultural workers. ICAR Pub. New Delhi.

Spencer, E. F. and Meade G. P. 1964.Cane sugar handbook, 9th Ed. John Willey and Sons, Inc., New York.

Subbiah, B. V.; and Asija, G. L. 1956. A rapid procedure for the estimation of available nitrogen in soil. *Current Science*, 25:259-260.

Talekar, J.K. and Dongale, J.H. 1993. Comparative study on fertilizer placement behind plough and surface broadcasting for transplanted rice. *J. Indian Soc. Soil Sciences* 41 (2): 372 – 373.

****