www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(9): 1489-1491

www.thepharmajournal.com
Received: 16-06-2023
Accepted: 18-07-2023

DK Pate
Department of Soil Science & Agricultural Chemistry, N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India

Sonal Tripathi
Department of Soil Science & Agricultural Chemistry, N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India

SN Makwana
Research fellow, Office of the Directorate of Research and Dean P.G. Studies, Anand Agricultural University, Anand, Gujarat, India

JR Vala
Department of Agronomy, N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India

Corresponding Author:
DK Pate
Department of Soil Science & Agricultural Chemistry, N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India

Effect of biogas slurry on growth of sugarcane under South Gujarat condition

DK Pate, Sonal Tripathi, SN Makwana and JR Vala

Abstract
A field experiment was carried out at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari (Gujarat) during the rabi seasons of 2021–2022 and 2022–2023 to investigate the impact of biogas slurry on sugarcane growth under south Gujarat conditions. The treatments, *viz*., T_1: 100% RDF + 10 t/ha biocompost; T_2: STCR-based fertilizer + 2.5 t/ha LBGS (liquid biogas slurry); T_3: soil test-based fertilizer + 2.5 t/ha LBGS (liquid biogas slurry); T_4: 100% RDF + 2.5 t/ha LBGS (liquid biogas slurry); T_5: 100% RDF + 5 t/ha LBGS (liquid Biogas slurry); T_6: 100% RDF + 7.5 t/ha LBGS (liquid Biogas slurry); and T_7: 100% RDF + 10 t/ha LBGS (liquid Biogas slurry) were applied to the sugarcane crop in the *rabi* season and replicated four times in randomised block design. Germination percentage at 30 DAP and 45 DAP as influenced by different treatments did not exert any significant effect during both the years of experimentation and the pooled study. Tillers per plant at 180 DAP, numbers of internodes per cane and cane girth were not significantly affected due to different treatments at harvest during individual years and in pooled analysis.

Keywords: Sugarcane, biogas slurry, growth, biocompost

Introduction
One of India's most significant cash crops, sugarcane is essential to both the agricultural and industrial industries of the nation. Sugarcane is a crucial component of the Indian agricultural industry, increasing national income through excise duty and subsidies to cane growers. With a production of 430.50 million tonnes and a productivity of 84.44 tonnes per hectare, India is the world's greatest producer of sugar. Sugarcane is grown on an area of 50.98 lakh hectares. With an average productivity of 78.31 tonnes/ha, Gujarat produced 17.44 million tonnes of cane in total across an area of 2.23 lakh hectares (Anon., 2022) [1]. Sugarcane is an important cash crop in South Gujarat and as such, most sugarcane growers depend on it for their cash requirements. Hence, adequate net profit is important so that they stick around and continue sugarcane farming. Thus, there is a need to economize on sugarcane farming to improve its profitability. The Indian sugar industry is also a major sector to create employment, probably accounting for 7.5% of the Indian economy and plays a leading role in the global market as the world's second largest producer after Brazil, producing nearly 15% and 25% of global sugar and sugarcane, respectively. Biogas slurry is a by-product of biogas production generated from cattle dung. Biogas slurry is a by-product of anaerobic digestion that is produced from biogas plants and also produces biogas (combustible methane gas) that is used for cooking, lighting and running engines. The biogas slurry has 93% water and 7% dry matter, of which 4.5% is organic matter and 2.5% is inorganic matter. The digested biogas slurry also contains phosphorus, potassium, zinc, iron, manganese and copper, many of which are depleted from the soil due to intensive agricultural practices (Kumar *et al*., 2015) [2].

Materials and Methods
A field experiment was conducted in plots No. B-6 and B-11 of College Farm, Navsari Agricultural University, Navsari throughout the seasons of 2021-2022 and 2022-2023.The campus of the Navsari Agricultural University is situated at an altitude of 10 metres above mean sea level, at 20° 57' N latitude and 72° 54' E longitude. The location is 12 kilometres to the east of the famous historical site "Dandi" on the Arabian coast. The soil of the experimental sites is classified under the order "Inceptisols" according to the 7th Approximation, which includes members of the fine, montmorillonitic, isohyperthemic great soil group of Vertic Ustrochrepts and Jalapore series. Locally, these soils are referred to as "deep black soils." Dry soil is a dark brown, clay-like substance.

When the earth is dry, it develops extensive cracks and gets quite hard; when it's moist, it gets plastic and sticky. The soil of the experimental fields was clayey in texture and had electrical conductivity within the safe limit (0.30 and 0.33 dS/m). The soil was low in organic carbon (0.36% and 0.32%), slightly alkaline in reaction (pH 8.13 and 8.20), medium in available nitrogen (293 and 289 kg/ha) and P_2O_5 (56.54 and 50.71 kg/ha), high in available K_2O (490 and 492 kg/ha), DTPA-extractable Fe (40.78 and 41.69 mg/ha), Mn (12.18 and 12.25 mg/kg), Cu (2.80 and 2.76 mg/kg) and DTPA-extractable Zn (2.17 and 2.20 mg/kg) during both years, respectively. The soil was uniform in depth. Thus, the soil was suitable for growing sugarcane crop. The treatments, *viz*., T_1: 100% RDF + 10 t/ha biocompost; T_2: STCR-based fertilizer + 2.5 t/ha LBGS (liquid biogas slurry); T_3: soil test-based fertilizer + 2.5 t/ha LBGS (liquid biogas slurry); T_4: 100% RDF + 2.5 t/ha LBGS (liquid biogas slurry); T_5: 100% RDF + 5 t/ha LBGS (liquid Biogas slurry); T_6: 100% RDF + 7.5 t/ha LBGS (liquid Biogas slurry); and T_7: 100% RDF + 10 t/ha LBGS (liquid Biogas slurry) were applied to the sugarcane crop in the *rabi* season and replicated four times in randomised block design. The crop was was sugarcane (cultivar CoN 05071). The slurry was applied at the time of the sowing. Biocompost was applied treatment-wise to plots 24 hours before the application of chemical fertilizers during planting. Nitrogen, phosphorus, and muriate of potash were applied as per treatments applied at the time of planting. The recommended dose of fertilizer was 250-125-125 N-P_2O_5-K_2O (kg ha^{-1}). STCR equation Fd N = 3.7T – 0.885STV, Fd P_2O_5 = 2.24T-3.97STV, Fd K_2O = 2.67T-0.383STV. Where, Fd = Fertilizer dose (kg/ha); T = Targeted yield of millable cane (150 t/ha); STV = Soil Test Value (kg/ha) (Dalwadi, 1993). STCR based fertilizer 251-149-213 and 253-138-211 during 2021-22 and 2022-23 respectively. Soil test based fertilizer 250-125-94 kg/ha N-P_2O_5-K_2O LBGS was applied at the time of planting. For supplying N, P_2O_5 and K_2O as per the recommended dose and as per treatments, biocompost and liquid biogas slurry were used in both years of the experimental sugarcane plant crop. Biocompost and liquid biogas slurry were brought from the college farm, Navsari Agril. University, Navsari, and private sources, respectively.

Results and Discussion

Germination percentage

According to an analysis of the data (Table 1) indicated that the different treatments tried in the experiment did not exert any significant effect on the germination percentage at 30 DAP as well as at 45 DAP during both years of exprimantation and in pooled study. This indicate that the germination percentage was uniform in both the years throughout their life cycle.

Numerically, higher germination percentage at 30 DAP (60.9, 60.6 and 60.7) and 45 DAP (78.21, 79.08 and 78.64) noticed with application of treatments T_1 (100% RDF + 10 t/ha Biocompost) while an application of Soil test based fertilizer + 2.5 t/ha LBGS (T_3) was found lower germination percentage at 30 DAP (55.4, 55.9 and 55.7) and 45 DAP (70.91, 71.58 and 71.24) during both year in pooled analysis, respectively.

Thus, it was clear that the variation in different growth, yield attributes and yield of sugarcane were not influenced significantly due to germination percentage but affected entirely due to the application of different treatments of sugarcane exercised in this investigation. These findings are consistent with those of Patel and Chaudhari (2018) [5] and Bokhtiar *et al*. (2015) [3].

Table 1: Germination percentage as influenced by different treatments in sugarcane

Treatments		Germination percentage					
		30 DAP			45 DAP		
		2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
T_1	100% RDF + 10 t/ha Biocompost	60.9	60.6	60.7	78.21	79.08	78.64
T_2	STCR based fertilizer + 2.5 t/ha LBGS	57.2	56.9	57.1	74.37	73.19	73.78
T_3	Soil test based fertilizer + 2.5 t/ha LBGS	55.4	55.9	55.7	70.91	71.58	71.24
T_4	100% RDF + 2.5 t/ha LBGS	58.2	56.8	57.5	72.07	71.83	71.95
T_5	100% RDF + 5 t/ha LBGS	58.1	58.3	58.2	71.45	73.20	72.33
T_6	100% RDF + 7.5 t/ha LBGS	58.6	58.1	58.4	73.91	72.41	73.16
T_7	100% RDF + 10 t/ha LBGS	58.9	60.4	59.6	77.33	77.21	77.27
S.Em. (±)		1.9	2.4	1.5	2.59	2.19	1.69
C.D. (P = 0.05)		NS	NS	NS	NS	NS	NS
C.V. (%)		6.56	8.19	7.42	7.01	5.91	6.48
Year							
S.Em. (±)		0.82			0.90		
C.D. (P = 0.05)		NS			NS		
Y × T							
S.Em. (±)		2.16			2.40		
C.D. (P = 0.05)		NS			NS		

Number of tillers per plant and numbers of internodes per cane

Table 2 contains information on the numbers of tillers per plant at 180 DAP and the number of internodes per cane affected by various treatments. A perusal data revealed that number of tillers per plant at 180 DAP and numbers of internodes per cane were not affected significantly due to different treatments at harvest during individual year and in pooled analysis. Numerically, higher number of tillers per plant at 180 DAP (5.48, 5.56 and 5.52) and number of internodes per cane (28, 29 and 28) WAS recoded with application of 100% RDF + 10 t/ha Biocompost (T_1) during both years and in pooled analysis.

An application of Soil test based fertilizer + 2.5 t/ha LBGS (T_3) was showed lower number of tillers per plant at 180 DAP (4.71, 4.96 and 4.83) during both years and in pooled analysis. Numerically, lower internodes per cane was found in treatments T_2 (STCR based fertilizer + 2.5 t/ha LBGS) (26, 26 and 26), T_4 (100% RDF + 2.5 t/ha LBGS) (26, 27 and 26) and T_5 (100% RDF + 5 t/ha LBGS) (26, 27 and 26) during both years and pooled analysis, respectively. These investigational findings are very similar to those published by Soomro *et al*. (2013) [5].

Table 2: Number of tillers count per plant at 180 DAP and number of internodes per cane as influenced by different treatments in sugarcane

Treatments		Tiller count (180 DAP)			Number of internodes per cane		
		2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
T_1	100% RDF + 10 t/ha Biocompost	5.48	5.56	5.52	28	29	28
T_2	STCR based fertilizer + 2.5 t/ha LBGS	5.21	5.25	5.23	26	26	26
T_3	Soil test based fertilizer + 2.5 t/ha LBGS	4.71	4.96	4.83	27	28	27
T_4	100% RDF + 2.5 t/ha LBGS	5.18	5.21	5.19	26	27	26
T_5	100% RDF + 5 t/ha LBGS	5.20	5.24	5.22	26	27	26
T_6	100% RDF + 7.5 t/ha LBGS	5.25	5.27	5.26	27	28	27
T_7	100% RDF + 10 t/ha LBGS	5.34	5.44	5.39	27	29	28
S.Em. (±)		0.26	0.22	0.17	0.90	0.78	0.60
C.D. (P = 0.05)		NS	NS	NS	NS	NS	NS
C.V (%)		10.17	8.23	9.24	6.77	5.66	6.22
Year							
S.Em. (±)		0.09			0.32		
C.D. (P = 0.05)		NS			NS		
Y× T							
S.Em. (±)		0.24			0.84		
C.D. (P = 0.05)		NS			NS		

Conclusion

In the present investigation, it has been found that germination percentage at 30 and 45 DAP, tillers count and number of internodes per cane not affected significantly due to different treatments under south Gujarat conditions.

References

1. Anonymous. Ministry of Agriculture and Farmers Welfare, Directorate of Economics & Statistics, DAC & FW, India; c2022.
2. Kumar S, Malav LC, Malav M, Khan, Shakeel A. Biogas Slurry: Source of Nutrients for Eco-friendly Agriculture. Int. J Ext. Res. 2015;2:42-46.
3. Bokhtiar SM, Roksana S, Moslehuddin AZM. Soil fertility and productivity of sugarcane influenced by enriched pressmud compost with chemical fertilizers. SAARC J Agri. 2015;13(2):183-197.
4. Patel D, Chaudhari M. Integrated application of organic, inorganic and biological fertilizers for enhancing sugarcane productivity and improving soil health in plant Ratoon cycle. J Pharm. Pharmacol. 2018;7(3):1586-1589.
5. Soomro, Abdul F, Tunio S, Oad, Fateh C, Rajper I. Integrated effect of inorganic and organic fertilizers on the yield and quality of sugarcane (*Saccharum Officinarum* L). Pak. J Bot. 2013;45(4):1339-1348.