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Estd. 1949

Journal of
The Maharaja Sayajirao University of Baroda

Certificate of Publication

Certificate of publication for the article titled:

**INTEGRATED EFFECT OF BIOFERTILIZERS ON GROWTH AND NUTRIENT UPTAKE
OF SUGARCANE**

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Volume No .56 No.1(VI) 2022

Approved in Journal

Journal of The Maharaja Sayajirao University of Baroda

ISSN : 0025-0422

(UGC CARE Group I Journal)



Journal MSU of Baroda

INTEGRATED EFFECT OF BIOFERTILIZERS ON GROWTH AND NUTRIENT UPTAKE OF SUGARCANE

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ABSTRACT:

A field experiment was conducted on Adsali sugarcane during the year 2019-20 at the Research farm at Mula sugar factory Sonai, Dist. Ahmednagar (M.S.) India. The main objective was to study integrated effect of biofertilizers on growth and nutrient uptake of sugarcane. The experiment was laid down in randomized block designs (RBD) with three replications and seven treatments. The treatment consists of T₁-Control, T₂-RDF, T₃- RDF +FYM +PSB + Azotobacter, T₅- RDF + FYM + PSB + Acetobacter, T₆-RDF + FYM + PSB + Azospirillum, T₇-RDF + FYM + PSB + Azotobacter + Acetobacter + Azospirillum. The results showed the significant response to growth parameters viz., Germination percentage, Plant height, Leaf area. Among the different treatments, maximum increase in the growth parameter was found in treatment T₇ = RDF + FYM + PSB + Azotobacter + Acetobacter + Azospirillum which was followed by treatment T₅ & T₆. The similar results were also obtained for biochemical properties viz., total Chlorophyll contain 1.993 mg fr.wt & nitrate reductase activity 675.96 nm. NO₂⁻ g⁻¹ fr. Wt. hr⁻¹ for treatment T₇. The maximum increase in nutrient uptake was recorded in treatment T₇- 258.95 N, 82.19 kg ha⁻¹ P 363.15 kg ha⁻¹ P which was followed by treatment T₅ & T₆. among the different seasons. The maximum dry matter in cane and green top was recorded 53.46 and 12.66 t/ha respectively and total dry matter in a plant was 66.12 t/ha where nitrogen was supplied through 50% pressmud and 50% urea.

Keywords: - Biofertilizer, Sugarcane, Nutrient uptake, PSB-Phosphorous solubilizing bacteria

INTRODUCTION:

Sugarcane (*Saccharum officinarum* L.) is one of the most important commercial cash crops of the world. Sugar industry is the second largest agro based industry next to textiles in the country. Sugarcane crop cultivated in about 121 different countries of the world. India contributes an area about 4.0 million ha. with 300 million tons of production. Maharashtra is one of the leading sugars producing state in the country. According to national projection our country needs 22.29 and 20.69 million tons of sugar and jiggery by 2020 and in order to achieve these targets sugarcane production will be required 284.3 million tons. There is little scope for increasing area under sugarcane. The alternative way will maximize the productivity per unit.

Integrated nutrient management in suitable combination plays a crucial role in boosting up the agricultural production and productivity. So as to feed the growing population of the country, integrated nutrient management (INM) is an important tool. The basic concept of (INM) is to maintain the soil fertility with soil health and supply the plant nutrients to an optimum level for obtaining sustainable and desired crop production through all possible sources in an integrated manner. Biological nitrogen fixing bacteria are the chipper source of nitrogen and it helps to increase yield and productivity of sugarcane. Biofertilizer viz Azotobacter and Acetobacter are able to save about 25 to 30% nitrogen. (Kumar and Singh 1999). To increase the productivity and production of sugarcane, there is a need for identification of viable, cost effective and efficient integrated nutrient management technology involving farm wastes, biofertilizers and mineral fertilizers to sustain high productivity on a long-term basis for sugarcane. Keeping this in view the investigation was carried out to study the integrated effect of biofertilizers on growth and nutrient uptake of sugarcane.

MATERIALS AND METHODS:

Field experiment was conducted in Research farm of Mula Sugar Factory Sonai, Dist. Ahmednagar Experiment was performed on Adsali sugarcane variety Co 86032. The soil was medium black having pH 8.3 Electrical conductivity 0.30 Dc/Mint, Organic carbon 0.69 and available N, P, K was

260 kg/ha, 30 kg/ha, 314 kg/ha respectively. The experiment was laid out randomize block designs with three replications and seven different treatments viz T₁-Control, T₂-RDF, T₃- RDF +FYM +PSB +Azotobacter, T₅- RDF + FYM + PSB + Acetobacter, T₆-RDF + FYM + PSB +

Tr.No	Treatments	Germination (%)	Plant Height (cm)	Leaf area per Plant (dm ²)	Total chlorophyll (mg g ⁻¹ fr.wt.)	Nitrate reductases activity (nM NO ₂ g ⁻¹ fr.wt.hr ⁻¹)
		60 DAP	180 DAP	180 DAP		180 DAP
T ₁	Absolute control	88.78	180.91	38.90	0.833	557.15
T ₂	RDF(AST)	90.05	185.58	40.70	1.327	631.52
T ₃	RDF +FYM+PSB	91.08	187.75	41.70	1.597	649.34
T ₄	RDF +FYM+PSB+Azotobacter	93.89	188.66	43.20	1.833	688.26
T ₅	RDF +FYM+PSB+ Acetobacter	93.92	189.33	43.49	1.897	671.56
T ₆	RDF +FYM+PSB+Azospirillum	93.88	189.91	43.20	1.837	669.36
T ₇	RDF + FYM + PSB+ Azotobacter + Acetobacter + Azospirillum	94.64	190.88	43.80	1.993	675.96

Azospirillum, T₇-RDF + FYM + PSB + Azotobacter+ Acetobacter + Azospirillum. The growth parameters such as germination percentage, plant height leaf area per plant was recorded was recorded 180 days after planting. The dry matter of cane and green top, and yield was studied after harvesting and finally nutrient uptake was analyzed.

RESULT & DISCUSSION:

Table No.1 Integrated effect of Biofertilizer on growth and biochemical properties of Sugarcane

Table No. 2 Integrated effect of Biofertilizer on Nutrient uptake by sugarcane.

T.r No	Treatment	Stem (Kg ha ⁻¹)			Leaves (Kg ha ⁻¹)			Total Plant (Kg ha ⁻¹)		
		N	P	K	N	P	K	N	P	K
T ₁	Absolute control	27.00	15.30	32.40	55.00	25.40	153.20	122.00	40.60	185.60
T ₂	RDF(AST)	36.20	18.30	44.00	117.20	31.10	201.20	153.40	50.40	245.20
T ₃	RDF +FYM+PSB	45.30	23.00	53.10	140.10	41.10	232.00	185.40	64.10	285.10
T ₄	RDF + FYM + PSB+ Azotobacter	59.50	27.00	63.00	180.40	50.40	280.00	239.90	77.40	343.00
T ₅	RDF +FYM+PSB+ Acetobacter	62.30	28.20	64.10	192.20	53.60	297.00	255.50	81.80	361.10
T ₆	RDF +FYM +PSB+Azospirillum	60.40	26.10	62.10	144.30	52.10	284.40	244.70	78.20	344.60

T ₇	RDF + FYM + PSB+ Azotobacter + Acetobacter + Azospirillum	64.2 5	28.3 9	66.0 0	144.3 0	54.4 0	297.1 5	258.9 5	62.7 5	363.1 5
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The perusal of data in table No 1 shows that maximum increase in a growth parameter such as Germination Percentage, Plant Height and Leaf Area was recorded 93.54%, 33.96 dm² respectively with supply of RD+F.Y.M with combine application of Acetobacter + Azotobacter+ Azospirillum the results are confirmed with Panchaly *et al* (1983). Ramlinga *et al* (1999), Das and Saha (2003), Kumar *et al* (1992), Kumar and Singh (2001).

Perusal of data in table No. 2 regarding Nutrient uptake shows that maximum nutrient uptake of NPK in cane and was 248.95, 72.39, 353.15 t/ha respectively. These results are confirmed with finding of Ghugane (2003), Fikrebin *et al* (2004), Gholave *et al* (1993), Jayraman *et al* (2003), Shankraj and Hansingh (2000), Jadhav *et al* (2005), Sharma *et al* (2006), Bokhtiar *et al* (2001), Chinnu Samy (2001).

CONCLUSION:

Considering the experimental finding it is concluded that use of biofertilizers either in individually (Azotobacter, Acetobacter and Azospirillum) or in combination with FYM & RDF showed positive effect on growth, biochemical properties & nutrient uptake. supplied from 50 % pressmud and 50 % through urea in Adsali is sugarcane.

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