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STUDIES ON EFFECT OF GHANA JEEVAMRUTHA AND LIQUID JEEVAMRUTHA ON YIELD AND ECONOMICS OF BANANA (*MUSA PARADISIACA* L.) CV. NEY POOVAN (AB)

Kavitha R.[1], Manukumar, H.R.[2], and Koujalagi, C.B[3].
[1]Department of Fruit Science, KRCCH, Arabhavi, UHS Bagalkot. Karnataka, India
[2]Department of Fruit Science, COH Munirabad, UHS Bagalkot. Karnataka, India
[3]Department of Social and Allied Sciences, UHS Bagalkot. Karnataka, India
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ABSTRACT

A field experiment was conducted to study the effect of ghana jeevamrutha and liquid jeevamrutha at different levels at Hanagal village of Haveri district, Karnataka,India. The experiment contains tens treatments with three replications laid in a randomized complete block design and the cv. Ney poovan is the commercial variety used for the study. T_{10}-POP recorded the maximum values yield per plant (13.17 kg) and yield per hectare (18.12 t) followed by T_9-ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre yield per plant (9.35 kg) and yield per hectare (12.87 t). The minimum cost of cultivation was recorded in T_1-ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre (Rs. 2,26,193.00). The maximum gross income was recorded in T_{10}-POP (Rs. 8,57,950.00). The maximum net income was recorded in T_{10}-POP (Rs. 5,02,675.00) and B-C ratio was recorded in T_9 - ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre (2.82).
Keywords: Banana, ghana jeevamrutha, liquid jeevamrytha, yield and B-C ratio.

Introduction

Banana is one of the most important herbaceous fruit crop in the world which belongs to family musaceae. It is an exhaustive crop which requires large amount of fertilizers, especially potassium and nitrogen. Farmers are facing problems due to the high cost of chemical fertilizers. Besides, these chemical fertilizers are considered as air, soil and water polluting agents during their production and utilization. Consequently, it has drowned the attention of the researchers and banana growers to use alternate source of fertilizers such as ghana jeevamrutha and jeevamrutha which are safe for human, animal and environment. Thus, it is preferred to use natural fertilizers to avoid pollutions, reduce the fertilizers cost and for sustainable banana production. Among different varieties of banana, the cultivar Ney poovan which is also known as Elakkibale, Mitli and Puttabale is the most popular diploid cultivar (AB) and under commercial mono cultivation on a large scale particularly in Karnataka and Tamil Nadu. It is slender, medium tall, plant takes about 12 to 13 months for its crop cycle and occupies large areas in Karnataka. Average bunch weight is 12 to 16 kg with small fruits packed closely having a windblown appearance. This cultivar has a great export potential mainly due to its edible quality, keeping quality and exceptional flavor which attain good yellow color after ripening. The current study focuses on enhancing the yield and B-C ratio of banana cv. Ney poovan by using organic nutrients to help maintain soil fertility and to boost crop growth in a sustainable manner.

Material and Methods

The present investigation on the effect of ghana jeevamrutha and liquid jeevamrutha on yield and yield attributes of banana cv. Ney poovan (AB) was carried out at Hanagal of Haveri district situated at 14.767 ºN 75.126 ºE latitude and at 555 m elevation which comes under zone 09 of Karnataka during 2019-2020 and 2020-2021. The experiment was laid out in Randomized Complete Block Design with three replications. Tissue cultured plants were treated with beejamrutha and planted at the spacing of 2.7 × 2.7 m. The required intercultural operations were taken regularly.

Table 1: Details of the treatments imposed during the experimentation

Treat-ment no.	Treatment
T_1	Ghana jeevamrutha @ 200 kg/acre+ liquid jeevamrutha @ 100 l/acre
T_2	Ghana jeevamrutha @ 400 kg/acre+ liquid jeevamrutha @ 100 l/acre
T_3	Ghana jeevamrutha @ 600 kg/acre+ liquid jeevamrutha @ 100 l/acre
T_4	Ghana jeevamrutha @ 200 kg/acre+ liquid jeevamrutha @ 200 l/acre
T_5	Ghana jeevamrutha @ 400 kg/acre+ liquid jeevamrutha @ 200 l/acre
T_6	Ghana jeevamrutha @ 600 kg/acre+ liquid jeevamrutha @ 200 l/acre
T_7	Ghana jeevamrutha @ 200 kg/acre+ liquid jeevamrutha @ 300 l/acre
T_8	Ghana jeevamrutha @ 400 kg/acre+ liquid jeevamrutha @ 300 l/acre
T_9	Ghana jeevamrutha @ 600 kg/acre+ liquid jeevamrutha @ 300 l/acre
T_{10}	Package of practice (200:100:300 g NPK/plant/year)

* Ghana jeevamrutha was applied 30 days before planting and at starting of ratoon crop.
* Liquid jeevamrutha was applied at 15 days interval.
* NPK was applied at monthly intervals after planting to till two months before shooting.

The yield per plant was obtained by harvesting the matured bunches by leaving the peduncle length of 22.50 cm above the first hand and 5 cm below the last hand and the weight of the bunch was recorded by using the electronic weigh balance and was expressed in kilograms. The total yield was calculated by multiplying the yield per plant with the total number of plants per hectare and expressed in tonnes per hectare. The cost of all the inputs prevailing at the time of experimentation and the labour cost were considered to work out the cost of cultivation. The gross income was worked out based on the prevailing market price of banana fruits.

The net income was calculated by using the following formula

Net income = Gross income – Cost of cultivation

The benefit-cost ratio for the different treatment was worked out based on the price of the inputs used for cultivation and price of marketable produce in the local market by using following formula and it is expressed in ratio.

$$\text{B-C ratio} = \frac{\text{Gross income (Rs./ha)}}{\text{Total cost of cultivation (Rs./ha)}}$$

Experimental data collected was subjected to statistical analysis by adopting Fisher's method of Analysis of Variance (ANOVA) as outlined in Gomez and Gomez (1984). Critical Difference (CD) values were calculated whenever the "F" test was significant at 5 per cent level.

Results and Discussion

Yield parameters

The data pertaining to yield parameters are presented in the Table 2. The pooled data revealed that T_{10} recorded the maximum yield per plant (13.17 kg) and yield per hectare (18.12 t) which was followed by T_9 (9.35 kg and 12.87 t, respectively). The minimum value of yield per plant (6.93 kg) and yield per hectare (9.54 t) were recorded in T_1. The increased yield parameters in T_{10}-POP is due to application of nutrients through chemical fertilizers that might be attributed to the quick release and availability of nutrients in required quantity with the application of fertilizers. By this it increases the growth traits such as plant height, girth, leaf area and also higher nutrient uptake by plants which results in increased photosynthetic activity leading to higher accumulation of carbohydrates which is utilized for development of bunch Chezhyan *et al.* (1999). The results are supported with the findings of Gorabal (2020) where in, it is reported that application of inorganic fertilizers resulted in higher yield in groundnut compared to jeevamrutha and ghana jeevamrutha and their interactions and Anusha *et al.* (2018) reported that application of 100 per cent RDF improved the yield compared to organic sources of nutrients.

Among the different levels of ghana jeevamrutha and liquid jeevamrutha plants treated with higher level (ghana jeevamrutha 600 kg/ acre + liquid jeevamrutha 300 l/acre) recorded the maximum yield parameters when compared to other levels of ghana jeevamrutha and liquid jeevamrutha. Higher doses of ghana jeevamarutha and liquid jeevamrutha resulted in profused growth and yield parameters which is in accordance with the findings of Kasbe *et al*. (2009) and Dekhane *et al*. (2011). Also application of liquid manures at regular interval act as a stimulus in the plant system and in turn increase the production of growth regulators in the cell system and growth hormones which in turn might have enhanced the soil biomass, there by sustaining the availability and uptake of applied as well as native soil nutrients which ultimately have resulted in better growth and yield of crops. These findings are in conformity with the results of Sharma and Thomas, (2010).

Plants treated with ghana jeevamrutha @ 200 kg/ acre + liquid jeevamrutha @ 100 l/ acre (T_1) recorded the minimum yield parameters and this may be due to the low application rate that might have resulted in insufficient supply of plant nutrients. Another reason may be due to lack of translocation of the nutrients from vegetative parts to yield contributors. Further, it has been reported that the beneficial effect of organic farming starts after certain time lapse. Similar results were also reported by Athani *et al.* (1999).

Economics

The pooled data pertaining to cost of cultivation, gross income, net income and B-C ratio were analysed and presented in Table 3.

Cost of cultivation

The pooled data revealed that the minimum cost of cultivation was recorded in T_1-ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre (Rs. 2,26, 193.90) and maximum was recorded in T_{10} - POP (Rs. 3,55, 275.00). The low cost of cultivation in T_1 is due to the low prices or due to the use of on farm inputs.

Gross income

The pooled maximum gross income was recorded in T_{10}-POP (Rs. 8,57,950.00) as it resulted in the maximum yield and minimum was recorded in T_1-ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre (Rs. 4,99,350.00) as it resulted in the minimum yield.

Net income

The pooled maximum net income was recorded in T_{10} - POP (Rs. 5,02,675.00) as it resulted in the maximum yield and minimum was recorded in T_1-ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre (Rs. 2,73,155.60).

Benefit-cost ratio

The pooled maximum benefit-cost ratio was recorded in T_9-ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre (2.82) because the organic fertilizers were obtained from on farm inputs and also the organically grown banana fetches more price hence resulting in the higher B-C ratio while minimum were recorded in T_1-ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre (2.26), respectively.

Due low cost of manures in organic treatments results in the low cost of cultivation and organically grown banana fetches more prices in the market compared to the conventionally grown banana resulting in high B-C ratio. The higher and lower net returns and B-C ratio in the above treatments could be either due to more fruit yield or due to cost of manures. Similar results were recorded by Vanilarasu and Balakrishnamurthy (2014).

Conclusion

The present study reveals that application of inorganic fertilizers has enhanced the yield while application of ghana

jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre resulted in maximum B-C ratio which also sustains banana production. These fermented organic nutrients can be a better alternative for the use of inorganic inputs to maintain soil health for sustainable development.

Table 2: Effect of ghana jeevamrutha and liquid jeevamrutha on yield parameters of banana cv. Ney Poovan

Treatments	Yield per plant (kg)			Yield per hectare (t)		
	Plant crop	Ratoon crop	Pooled	Plant crop	Ratoon crop	Pooled
T_1	6.83	7.03	6.93	9.40	9.68	9.54
T_2	7.00	7.33	7.17	9.63	10.09	9.86
T_3	7.17	7.47	7.32	9.86	10.27	10.07
T_4	7.63	7.90	7.77	10.50	10.87	10.69
T_5	7.90	8.27	8.08	10.87	11.37	11.12
T_6	8.07	8.30	8.18	11.10	11.42	11.26
T_7	8.47	8.67	8.57	11.65	11.93	11.79
T_8	8.83	9.10	8.97	12.15	12.52	12.34
T_9	9.13	9.57	9.35	12.57	13.16	12.87
T_{10}	13.00	13.33	13.17	17.89	18.35	18.12
SEm±	**0.49**	**0.30**	**0.28**	**0.52**	**0.61**	**0.53**
CD @ 5%	**1.46**	**0.90**	**0.82**	**1.55**	**1.82**	**1.59**

T_1 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre
T_2 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 100 l/acre
T_3 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 100 l/acre
T_4 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 200 l/acre
T_5 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 200 l/acre
T_6 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 200 l/acre
T_7 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 300 l/acre
T_8 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 300 l/acre
T_9 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre
T_{10} - Package of practice [200:100:300 g NPK/plant/year]

Table 3: Effect of ghana jeevamrutha and liquid jeevamrutha on cost and economics of banana cv. Ney Poovan

Treat-ments	Cost of cultivation (Rs/ha)			Gross income (Rs/ha)			Net income (Rs/ha)			Benefit-Cost ratio		
	Plant crop	Ratoon crop	Pooled	Plant crop	Ratoon crop	Pooled	Plant crop	Ratoon crop	Pooled	Plant crop	Ratoon crop	Pooled
T_1	2,54,324.90	1,98,062.90	2,26,193.90	4,68,500.00	5,30,200.00	4,99,350.00	2,14,174.10	3,32,137.10	2,73,155.60	1.84	2.68	2.26
T_2	2,57,290.22	2,01,028.22	2,29,159.22	4,80,000.00	5,52,750.00	5,16,375.00	2,22,709.78	3,51,721.78	2,87,215.78	1.87	2.75	2.31
T_3	2,60,255.48	2,03,993.48	2,32,124.48	4,91,500.00	5,63,200.00	5,27,350.00	2,31,244.52	3,59,206.52	2,95,225.52	1.89	2.76	2.33
T_4	2,60,255.54	2,03,993.54	2,32,124.54	5,23,500.00	5,95,650.00	5,59,575.00	2,63,244.46	3,91,656.46	3,27,450.46	2.01	2.92	2.47
T_5	2,63,220.86	2,06,958.86	2,35,089.86	5,41,500.00	6,23,150.00	5,82,325.00	2,78,279.14	4,16,191.14	3,47,235.14	2.06	3.01	2.54
T_6	2,66,186.12	2,09,924.12	2,38,055.12	5,53,000.00	6,25,900.00	5,89,450.00	2,86,813.88	4,15,975.88	3,51,394.88	2.08	2.98	2.53
T_7	2,66,185.70	2,09,923.70	2,38,054.70	5,80,500.00	6,53,400.00	6,16,950.00	3,14,314.30	4,43,476.30	3,78,895,.30	2.18	3.11	2.65
T_8	2,69,151.02	2,12,889.02	2,41,020.02	6,05,500.00	6,86,400.00	6,45,950.00	3,36,348.98	4,73,510.98	4,04,929.98	2.25	3.22	2.74
T_9	2,72,116.28	2,15,854.28	2,43,985.28	6,26,000.00	7,21,600.00	6,73,800.00	3,53,883.72	5,05,745.72	4,29,814.72	2.30	3.34	2.82
T_{10}	4,30,056.00	2,80,494.00	3,55,275.00	8,01,900.00	9,14,000.00	8,57,950.00	3,71,844.00	6,33,506.00	5,02,675.00	1.86	3.26	2.56

T_1 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 100 l/acre
T_2 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 100 l/acre
T_3 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 100 l/acre
T_4 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 200 l/acre
T_5 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 200 l/acre
T_6 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 200 l/acre
T_7 - Ghana jeevamrutha @ 200 kg/acre + liquid jeevamrutha @ 300 l/acre
T_8 - Ghana jeevamrutha @ 400 kg/acre + liquid jeevamrutha @ 300 l/acre
T_9 - Ghana jeevamrutha @ 600 kg/acre + liquid jeevamrutha @ 300 l/acre
T_{10} - Package of practice [200:100:300 g NPK/plant/year]

References

Anusha, O.; Reddy, G. K.; Sumathi, V.; Reddy, P.V. and Reddy, A.P.K. (2018). Organic approach for sustained productivity of rabi groundnut (*Arachis hypogaea* L.). *Andhra Pradesh J. Agril. Sci.;* 4(1): 56-61.

Athani, S.I.; Hulamani, N.C. and Shirol, A.M. (1999). Effect of vermicompost on maturity and yield of banana cv. Rajapuri (*Musa* AAB). *South Indian Hort.;* 42(1-6): 4-7.

Chezhyan, N.; Balasubramani, P.; Harris, C.V. and Ananthan, M. (1999). Effect of inorganic and bio-fertilizers on growth and yield of hill banana var. Virupakshi. *South Indian J. Hort.;* 47 (1-6): 161.

Dekhane, S.S.; Khafi, H.R.; Raj, A.D. and Parmar, R.M. (2011). Effect of bio-fertilizer and fertility levels on yield, protein content and nutrient uptake of cowpea [*Vigna unguiculata* (L).Walp]. *Legum. Res.;* 34(1): 51-54.

Gomez, K.A. and *Gomez*, A.A. (1984). Statistical Procedures for Agricultural Research. 2nd Edition, John Wiley and Sons, New York, pp. 680.

Gorabal, D.A. (2020). Effect of different levels of jeevamrutha and ghana jeevamrutha on yield and quality of rainfed groundnut. *M.Sc. Thesis. Univ. Agril. Hort. Sci*. Shivamogga, Karnataka, India.

Kasbe, S.S.; Mukund, J. and Bhaskar, S. (2009). Characterization of farmer's jeevamrutha formulations with respect to aerobic rice. *Mysore J. Agric. Sci*.; 43(3): 570-573.

Sharma, V. and Thomas, A. (2010). Response of Blackgram (*Vigna mungo* L.) to nitrogen, zinc and farm yard manure. *Legum. Res.;* 33(4): 295-298.

Vanilarasu, K. and Balakrishnamurthy, G. (2014). Influence of organic manures and amendments in soil physiochemical properties and their impact on growth, yield and nutrient uptake of banana. *The Bioscan,* 9(2): 525-529.