

ORIGINAL ARTICLE

Response of Garlic (*Allium sativum* L.) for Graded Levels of Fertilizers and Jeevamruta Application

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ABSTRACT

The experiment was conducted at Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka to study the response of garlic for graded levels of fertilizers and jeevamruta application. The three years (2011, 2012 and 2013) pooled results of the experimentation revealed that among the main plot treatment 100 % RDF was recorded significantly highest garlic bulb yield (28.8 q ha⁻¹) compare to rest of the treatments. Among the sub plot treatments the application of jeevamruta at planting + vegetative growth stage + bulb initiation stage recorded significantly highest bulb yield (24.1 q ha⁻¹) compared to the rest of the stages of Jeevamruta application. The interaction effect of garlic supplied with 100% RDF + Jeevamruta application (@ 500 l ha⁻¹) at planting + vegetative growth stage was recorded significantly higher bulb yield (29.5 q ha⁻¹) compared other interaction effects.

Key words : Garlic, Jeevamruta, Liquid manure, Integrated nutrient management

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INTRODUCTION

Garlic (*Allium sativum* L) is the most widely used cultivated Allium species after onion belonging to the family Amaryllidaceae. It is consumed both fresh as well as in dried form as an important ingredient for flavouring various vegetarian and non-vegetarian dishes. In the Indian sub continent people use fresh leaves of garlic as salad and a good tasty pickle is also prepared from garlic cloves. Garlic has higher nutritive value as compared to other bulbous crops. It is a rich source of carbohydrates (29%), proteins (6.3%), minerals (0.3%) and essential oils (0.1- 0.4 %) and also contains fat, vitamin C and sulphur [6]. Ascorbic acid content is very high in green garlic. In addition to this garlic has several medicinal values. It has antibacterial, antifungal [2], antiviral [7] and antiprotozoal properties. It is beneficial to cardiovascular and immune system and has antioxidant and anticancer properties [1]. Therefore its reputation as a medicine has increased to the extent that garlic oil capsules are now marketed through pharmacies and health food stores. Garlic productivity in India is comparatively low as compared to world [8]. So in the recent years due attention has been given to improve the plant growth and yield with the application of organics and integrated nutrient management practices plays an important role. The Jeevamrutha is one of the major liquid manure which is prepared from cow urine and dung. Use of Jeevamrutha promotes higher growth, yield and quality of chilli crop [4]. Hence, the present investigation on response garlic crop for jeevamruta application at different crop growth stages along with the recommended dose of chemical fertilizers was carried out.

MATERIAL AND METHODS

The field research experiment was conducted at Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka for three years (2011, 2012, and 2013) in medium deep black soil during *kharif* season. The garlic variety used was Ranebennur local. The experimental design was split plot design with six main and three sub treatments replicated thrice. The main treatments were graded levels of recommended dose of fertilizers (RDF) from 25 to 100 per cent, organics (FYM + vermicompost applied on nitrogen equivalent base) and control (no fertilizers). The main factors of graded levels of fertilizers namely, T1 : 100 % RDF (125:62.5:62.5 kg NP₂O₅K₂O/ha), T2 : 75 % RDF, T3 : 50 % RDF, T4 : 25% RDF, T5 : Organics only (equivalent to 100% RDN), T6 : Control. The sub factors of stages of jeevamruta application includes J1 : Jeevamruta application @ 500 l/ha at planting, J2 : Jeevamruta application @

500 l/ha at (each stage) planting + vegetative growth stage and J3 : Jeevamruta application @ 500 lit/ha at (each stage) planting + vegetative growth stage + bulb initiation stage. The liquid manure Jeevamruta was prepared with 10 kg of cow dung mixed with 10 liter of cow urine + Jaggery 2 kg + Pulse flour 2 kg + handful of same field soil mixed in 200 liters of water and kept for 8 days. The crop was raised as per the package of practices and all the crop husbandry practices were carried out.

The jeevamruta a liquid manure contains many of the nutrients and good microbial load which stimulates growth and development of the plant. [10].

Table 1. Nutrient status of liquid manure Jeevamruta

Parameter	pH	Soluble salt (dsm ⁻¹)	Total nitrogen (ppm)	Total phosphorus (ppm)	Total potassium (ppm)	Total zinc (ppm)	Total copper (ppm)	Total Iron (ppm)	Total manganese (ppm)
Nutrient status	7.07	3.40	770	166	126	4.29	1.58	2.82	10.7

Table 2. Microbial load of liquid manure Jeevamruta

Parameter	Bacteria (no. X 10 ⁵)	Fungi (no. X 10 ⁴)	Actinomycetes (no. X 10 ³)	Phosphate solubilising organisms (no. X 10 ²)	Free living N ₂ -fixers (no. X 10 ²)
Colony count (cfu/ml)	20.4	13.8	3.6	4.5	5.0

Table 3. Effect of graded levels of fertilizers and jeevamruta application on growth and yield of garlic (three years pooled)

Fertilizer Dose	Plant height (cm)				No. of leaves/plant				No. of bulblets/plant				Weight of the bulb (g/plant)				Yield (q/ha)				
	J1	J2	J3	Mean	J1	J2	J3	Mean	J1	J2	J3	Mean	J1	J2	J3	Mean	J1	J2	J3	Mean	
RDF 100 %	44.5	47.0	47.5	46.3	5.5	6.0	6.3	5.9	13.5	17.6	18.5	16.5	3.3	3.9	3.9	3.7	24.7	29.5	32.4	28.8	
RDF 75 %	44.5	47.0	47.5	46.3	5.5	5.4	5.2	5.3	14.0	13.5	13.8	13.8	3.3	3.4	3.3	3.3	23.7	23.8	24.6	24.0	
RDF 50 %	42.5	43.5	47.5	44.5	5.5	5.1	5.2	5.2	12.5	13.8	13.6	13.3	3.0	3.2	3.4	3.2	22.1	24.0	23.5	23.2	
RDF 25 %	43.5	44.0	41.0	42.8	5.1	4.6	5.2	4.9	12.0	13.0	14.0	13.0	3.1	3.1	2.7	3.0	22.7	21.2	21.7	21.9	
Organic	46.5	47.0	46.5	46.7	5.6	5.4	4.6	5.2	12.0	12.0	12.7	12.2	2.9	3.1	3.2	3.1	23.0	24.4	23.1	23.5	
Control	44.0	41.5	47.0	44.2	5.0	5.6	5.9	5.5	12.0	11.0	12.7	11.9	2.9	3.0	2.9	2.9	21.0	20.6	19.2	20.3	
Mean	44.3	45.0	46.2	45.1	5.3	5.3	5.4	5.3	12.7	13.5	14.2	13.4	3.1	3.2	3.2	3.2	22.9	23.9	24.1	23.6	
	S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %		S.Em ±	C.D @ 5 %	
Main (F)	0.87	NS		0.24	0.7		0.51	1.5		0.14	0.42		0.69	2.1							
Sub (J)	0.55	1.6		0.16	NS		0.33	1.0		0.09	NS		0.59	NS							
Interaction (FXJ) at same levels	1.26	3.7		0.36	NS		0.75	2.2		0.20	0.60		1.01	2.9							
Interaction (FXJ) at diff. levels	1.99	4.3		0.56	1.2		1.18	2.5		0.32	0.69		1.58	3.4							

Where, J1 - Jeevamruta application @ 500 l ha⁻¹ at planting stage, J2 - Jeevamruta application @ 500 l ha⁻¹ at planting + vegetative growth stage

J3 - Jeevamruta application @ 500 l ha⁻¹ at planting + vegetative growth stage + bulb initiation stage

RESULT AND DISCUSSION

The three years (2011, 2012 and 2013) pooled results of the experiment (Table 3) revealed that among the main treatment 100 % RDF was recorded significantly highest garlic yield (28.8 q ha⁻¹) compare to

rest of the treatments while the lowest yield was recorded with control (20.3 q ha⁻¹). Among the various stages of Jeevamruta applied, the application at planting + vegetative growth stage + bulb initiation stage recorded significantly highest yield (24.1 q ha⁻¹) compare to rest of the stages of Jeevamruta application. However, it is found on par with the jeevamruta application one time (J1 : Jeevamruta application at planting) and two time application (J2 : Jeevamruta application at planting + vegetative stage).

Among the interactions, garlic supplied with 100% RDF + Jeevamruta application at planting + vegetative growth stage + bulb initiation stage was recorded significantly higher yield (28.8 q ha⁻¹) however, it is found on par with 100% RDF + Jeevamruta application at planting + vegetative growth stage. The similar trend was noticed in all the three years (2011, 2012 and 2013) of experimentation. The similar result of increase in yield of chilli by combination of RDF and organic manure was also reported by Kattimani *et al*, [3] and Kurubetta *et al*, [4].

The increase in yield of garlic with the application 100 % RDF + Jeevamruta application @ 500 l ha⁻¹ at planting and vegetative stage is mainly due to significantly increased yield parameters such as weight and number of bulblets per plant. Similar result of increase in yield components was reported by Manoj Kumar [5] and Sanjutha *et al*, [9], increased growth and yield parameters in Kalmegh with the application of FYM @ 15 t ha⁻¹ + NPK -1 @ 75:75:50 kg ha⁻¹ + Panchagavya @ 3 per cent foliar spray.

CONCLUSION

Application of recommended dose of chemical fertilizers with jeevamruata appiaccation @ 500 l ha⁻¹ at each stage of planting and vegetative stage will enhances the growth and yield parameters of the garlic. This ultimately results into higher yield level in garlic.

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