

ORIGINAL ARTICLE

Response of Onion (*Allium cepa*) for Graded Levels of Fertilizers and Jeevamruta Application

Krishna D. Kurubetta *, R. K. Mesta, T. B. Allolli, M. H. Tatagar and K. Sweta

* Assistant Professor of Agronomy, Horticulture Research and Extension Station, Devihosur-581110, Haveri, Karnataka.

e-mail: krishna.kurubetta@uhsbagalkot.edu.in

ABSTRACT

The experiment was conducted at Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka to study the response of onion 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 onion bulb yield (206 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 (180 q ha^{-1}) compared to the rest of the stages of Jeevamruta application. The interaction effect of onion supplied with 100% RDF + Jeevamruta application (@ 500 l ha^{-1}) at planting + vegetative growth stage + bulb initiation stage was recorded significantly higher bulb yield (225 q ha^{-1}) compared other interaction effects.

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

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INTRODUCTION

Onion (*Allium cepa* L.) is one of the important commercial bulbous crops cultivated extensively in India and it belongs to the family Alliaceae. Onion is mainly used for its flavour and pungency. The chief component of pungency is 'allyl propyl disulphide'. Although, onions have low nutritional value (average nutritional value = 2.06), it is one of the most widely used vegetables in the country. The primary centre of origin of onion lies in Central Asia. The Near East and the Mediterranean are the secondary centres of origin. It is an ancient crop having been utilized in medicine, rituals and as a food in Egypt and in India since 600 B.C. The genus *Allium* is very large with more than 500 species, which are perennial and mostly bulbous plants. Out of these, only seven species are in cultivation. However, *Allium cepa* (onion) is the major cultivated species grown all over the world. The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable food production. The cost of inorganic fertilizers is increasing enormously to an extent that they are out of reach of small and marginal farmers and also the fertility status of the soil is decreasing due to lack of application of organic manure to the crops. However, the organic manures are also fetching the higher prices due to insufficient availability and higher recommended doses. Such being the case the liquid manures plays important role as alternative to bulky solid organic manures, easy and least cost involved in preparation. The Jeevamruta is one of the major liquid manure which is prepared from cow urine and dung. Use of Jeevamruta promotes higher growth, yield and quality of chilli crop [2]. Hence, the present investigation on response onion 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 onion variety used was Bellary red. 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 ($125:75:125 \text{ kg NP}_2\text{O}_5\text{K}_2\text{O/ha}$), 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 - 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 [7].

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

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 onion bulb yield (206 q ha⁻¹) compare to rest of the treatments while the lowest yield was recorded with control (137 q ha⁻¹). Among the various stages of Jeevamruta applied, the application at planting + vegetative growth stage + bulb initiation stage recorded significantly highest bulb yield (180 q ha⁻¹) compare to rest of the stages of Jeevamruta application.

Among the interactions, onion supplied with 100% RDF + Jeevamruta application at planting + vegetative growth stage + bulb initiation stage was recorded significantly higher bulb yield (225 q ha⁻¹), while the treatments of control + Jeevamruta application at planting stage recorded the lowest yield (126 q ha⁻¹). 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.*, [1], and Shashidhara *et al.*, [5] and Kurubetta *et al.*, [2].

The increase in dry bulb yield of onion with the application 100 % RDF + Jeevamruta application @ 500 l ha⁻¹ at planting, vegetative and bulb initiation stage is mainly due to significantly increased yield parameters such as weight and girth bulb per plant. Similar result of increase in yield components was reported by Manoj Kumar Singh *et al.*, [3] and Sanjutha *et al.*, [4], increased growth and yield parameters in Kalmegh with the application of FYM @ 15 t ha⁻¹ + NPK @ 75:75:50 kg ha⁻¹ + Panchagavya @ 3 per cent foliar spray.

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

Fertilizer Dose	Plant height (cm)				No. of leaves /plant				Girth of bulb (cm/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 %	41.7	45.3	46.5	44.5	7.2	7.7	8.8	7.9	16.4	17.8	18.7	17.6	61.7	65.1	70.2	65.6	195	199	225	206
RDF 75 %	40.3	42.1	43.5	41.9	7.4	7.5	7.9	7.6	15.9	16.4	16.3	16.2	58.1	59.5	63.0	60.2	170	178	199	182
RDF 50 %	37.7	39.9	40.1	39.2	7.1	7.6	7.7	7.5	15.5	15.3	16.1	15.6	55.5	54.4	60.0	56.6	166	162	171	166
RDF 25 %	38.3	39.0	39.3	38.8	7.4	7.7	7.6	7.6	14.5	15.3	14.2	14.6	52.0	59.9	54.7	55.5	162	165	174	167
Organic	36.7	39.4	41.9	39.3	7.1	7.4	7.9	7.5	15.1	13.4	15.0	14.5	50.4	46.1	51.6	49.4	160	158	175	164

Control	38.7	38.7	39.1	38.8	7.2	7.0	7.1	7.1	15.3	15.3	14.5	15.0	47.1	50.1	43.2	46.8	126	146	139	137
Mean	38.9	40.7	41.7	40.4	7.2	7.5	7.8	7.5	15.3	15.5	15.8	15.6	54.1	55.8	57.1	55.7	163	168	180	170
	S.Em ±	C.D @ 5 %																		
Main (F)	1.71	5.1	0.19	0.6	0.31	0.8	1.07	3.2	5.09	15.5										
Sub (J)	1.10	NS	0.12	0.4	0.20	0.6	0.54	1.6	3.12	9.2										
Interaction (FX) at same levels	2.50	NS	0.28	0.8	0.45	NS	2.06	NS	6.11	17.8										
Interaction (FX) at diff. levels	3.93	8.5	0.43	0.9	0.71	1.5	2.29	4.9	10.27	22.2										

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.

CONCLUSION

Application of recommended dose of chemical fertilizers with jeevamruata application @ 500 l ha⁻¹ at each stage of planting, vegetative and bulb initiation will enhances the growth and yield parameters of the onion. The increased bulb yield ha⁻¹ will more than the control and other graded levels of fertilizers.

REFERENCES

1. Kattimani, S.R., Yadahalli G.S. and Vidyavathi (2009). Effect of integrated nutrients management on yield and nutrients uptake of chilli genotypes. *Journal of Ecotoxicology & Environmental Monitoring*. 19(2): 119-123.
2. Kurubetta , K. D., Mesta, R. K., Tatagar, M. H. and Abdul Kareem M., (2017) . Response of Chilli (*Capsicum annum* L.) for Graded Levels of Fertilizers and Jeevamruta Application. *Journal of Pure and Applied Microbiology*., 11 (2): 1099-1103.
3. Manoj Kumar Singh, Vipin Kumar, Sunil Malik, Mulkesh Kumar and Uttam Kumar (2010). Response of Organic and Inorganic fertilizers on Growth and Yield of Chilli (*Capsicum annum* L.) Cv. Pant C-1, *Annals of Horticulture*. 3(1) : 122-123.
4. Sanjutha, S., Subramanian, S., Indu Rani, C. and Maheshwari, S. (2008). Integrated nutrient management in *Andrographis paniculata*. *Research Journal of Agriculture and Biological Science*. 4(2): 141-145.
5. Shashidhara, G.B., Timma Naik, M., Bidari, B. I. and Yenagi, B. S., (2007). Studies on the effect of organic manures on growth, yield and quality of chilli (*Capsicum annum* L.) under black soils of northern transition zone of Karnataka. *Indian journal of crop science*. 2 (z): 315-317.
6. Shivaprasad, M., Kumar, H. D. M., Astaputre, S.A., Chittapur, B. M., Tatagar, M. H. and Mesta, R. K., (2010). Yield and economics of Chilli (Cv. *Byadagi dabbi*) as influence of by integrated nutrients management. *Karnataka Journal of Agrcultural. Sciences*., No. 23(4): 638-639.
7. Sreenivasa, M. N., Nagaraj Naik and Bhat, S. N. (2011). Nutrient status and microbial load of different organic liquid manures. *Karnataka Journal of Agrcultural. Sciences*., 24 (4) : 583-584.

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