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RESPONSE OF CHILLI (*CAPSICUM ANNUM* 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 effect of different levels of fertilizers with jeevamruta applications at different growth stages of Byadagi Chilli (Dabbi). The pooled results of the experiment revealed that among fertilizer levels (main plots) 100% RDF has given the significantly highest dry Chilli yield (829 kg ha^{-1}) compared to other levels of fertilizer doses application. The response of dry chilli yield for jeevamruta application at different stages (sub plots) showed the significant effect. The jeevamruta application @ 550 l ha^{-1} at the time of transplanting + flowering + fruit initiation stages has recorded significantly highest dry chilli yield (619 kg ha^{-1}) compare to jeevamruta application at transplanting stage and transplanting + fruit initiation stage. The similar trend was noticed with respect to number of fruits and fruit yield per plant. The interaction effect for different levels of fertilizers and jeevamruta application was also differed significantly *i.e.* the 100% RDF with jeevamruta application @ 550 l ha^{-1} at transplanting + flowering + fruit initiation stages has recorded significantly highest dry chilli yield (910 kg ha^{-1}) compare to other interaction effects. The similar trend was also noticed with respect to number of fruits and fruit yield per plant.

Key words : Dry chilli, integrated nutrient management, Jeevamruta, RDF.

Introduction

Chilli (*Capsicum annuum* L.) is one of the widely grown high value vegetable crops in India as well as in the world, mostly because of its high yield potential, high income to the farmers, greater supply of vitamins and minerals in human nutrition. Extraction of alkaloids (capsaicin) can potentially generate employment opportunities. In addition, the versatilities of this vegetable contribute greater to its popularity as a food product either directly or after processing. The production of chilli is governed not only by the inherent genetic yield potential of the cultivar but also greatly influenced by several environmental factors and cultivation practices. Integrated nutrient management plays an important role in crop nutrition because of increased demand from high yielding crops and intensive cropping. The continued expansion of cropping on the marginal lands with low levels of micro-nutrients due to increased use of high analysis fertilizers containing low levels of micro-nutrients decreased use of manures, compost and crop residue in some parts of world.

Materials and Methods

The field experiment was laid out at Horticulture Research and Extension Station, Devihosur, Haveri, Karnataka for three years (2011, 2012, and 2013) in 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 liquid manure Jeeavamruta 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 sub treatments include the stages of Jeevamruta application. The Jeevamruta was applied @ 550 l/ha at three different growth stages mainly at the time of transplanting, flowering and fruit initiation stage. 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

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Table 3 : Effect of graded levels of fertilizers and jeevamruta application on growrh and yield of dry chilli (Three years pooled).

Fertilizer dose	Plant height (cm)				No. of Barnches/plant				No. of leaves/plant				No. of Fruits plant^{-1}				Dry fruit yield plant^{-1} (gm)				Dry Fruit yield (kg ha^{-1})			
	Jeevamruta Application																							
	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean
RDF 100 %	57.1	58.5	61.8	59	4.2	4.7	4.9	4.6	269	277	296	281	27.0	34.0	38.0	33.0	20.0	28.0	33.0	27.0	708	870	910	829
RDF 75 %	56.3	54.8	61.5	58	4.6	4.8	5.2	4.9	210	172	228	203	22.0	23.0	33.0	26.0	16.0	17.0	26.0	19.7	558	705	791	685
RDF 50 %	53.0	53.7	55.7	54	4.4	4.6	4.5	4.5	155	192	185	177	22.0	23.0	23.0	22.7	15.0	17.0	18.0	16.7	446	523	619	529
RDF 25 %	56.2	53.7	53.8	55	4.7	4.9	4.8	4.8	225	214	193	211	19.0	21.0	25.0	21.7	12.0	15.0	15.0	14.0	344	437	554	445
Organic	55.2	53.0	56.7	55	4.8	4.5	4.9	4.7	189	193	187	190	20.0	17.0	22.0	19.7	12.0	15.0	17.0	14.7	343	414	438	398
Control	51.3	52.3	53.4	52	4.2	4.7	4.2	4.4	98	144	156	133	17.0	19.0	19.0	18.3	15.0	12.0	15.0	14.0	315	338	399	351
Mean	55	54	57	55	4.5	4.7	4.8	4.6	191	199	208	199	21.2	22.8	26.7	23.6	15.0	17.3	20.7	17.7	452	548	619	540
	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)	0.95		2.9		0.14		0.45		3.56		10.7		0.71		2.0		0.90		2.6		7.35		22.1	
Sub (J)	0.61		1.8		0.09		0.26		2.27		6.7		0.45		1.3		0.58		1.7		4.70		13.8	
Interaction (FXJ)	2.18		4.7		0.32		0.7		8.16		17.6		1.65		3.5		2.07		4.5		16.87		36.4	

Where, J1 - Jeevamruta application @ 550 l ha^{-1} at transplanting stage, J2 - Jeevamruta application @ 550 l ha^{-1} at transplanting + flowering stage
J3 - Jeevamruta application @ 550 l ha^{-1} at transplanting + flowering + fruit initiation stage.

Table 4 : Effect of graded levels of fertilizers and jeevamruta application on economics of dry chilli.

Fertilizer dose	Cost (Rs ha^{-1})				Gross Returns (Rs ha^{-1})				Net Returns (Rs ha^{-1})				B:C ratio			
	Jeevamruta Application															
	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean	J 1	J 2	J 3	Mean
RDF 100 %	27900	28900	29900	28900	77825	95700	100100	91208	49925	66800	70200	62308	2.8	3.3	3.3	3.2
RDF 75 %	26400	27400	28400	27400	61380	77550	86955	75295	34980	50150	58555	47895	2.3	2.8	3.1	2.7
RDF 50 %	24900	25900	26900	25900	49060	57530	68035	58208	24160	31630	41135	32308	2.0	2.2	2.5	2.2
RDF 25 %	23400	24400	25400	24400	37785	48015	60940	48913	14385	23615	35540	24513	1.6	2.0	2.4	2.0
Organic	24200	25200	26200	25200	37730	45485	48180	43798	13530	20285	21980	18598	1.6	1.8	1.8	1.7
Control	21900	22900	23900	22900	34650	37125	43835	38537	12750	14225	19935	15637	1.6	1.6	1.8	1.7
Mean	24783	25783	26783	25783	49738	60234	68008	59327	24955	34451	41225	33544	2.0	2.3	2.5	2.3
	S.Em±		C.D @ 5%		S.Em±		C.D @ 5%		S.Em±		C.D @ 5%		S.Em±		C.D @ 5%	
Main (F)					808.4		2425		702.1		2106		0.014		0.042	
Sub (J)					516.9		1520		448.9		1320		0.009		0.026	
Interaction (FXJ)					1855.4		4008		1611.4		3481		0.032		0.07	

Where, J1 - Jeevamruta application @ 550 l ha^{-1} at transplanting stage, J2 - Jeevamruta application @ 550 l ha^{-1} at transplanting + flowering stage
J3 - Jeevamruta application @ 550 l ha^{-1} at transplanting + flowering + fruit initiation stage.

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 solublising organisms (no. X 10^2)	Free living N2–fixers (no. X 10^2)
Colony count (cfu/ml)	20.4	13.8	3.6	4.5	5.0

load which stimulates growth and development of the plant (table 1 & 2) (Sreenivasa *et al*., 2011)

Results 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 dry chilli yield (829 kg ha^{-1}) compare to rest of the treatments while the lowest yield was recorded with control (315 kg ha^{-1}). Among the various stages of Jeevamruta applied, the application at transplanting + flowering + fruit intimation stage recorded significantly highest dry chilli yield. (619 kg ha^{-1}) compare to rest of the stages of Jeevamruta application.

Among the interactions, chilli supplied with 100% RDF + Jeevamruta application at transplanting + flowering + fruit initiation stage was recorded significantly higher dry chilli yield (910 kg ha^{-1}), while control + Jeevamruta application at transplanting stage recorded the lowest dry chilli yield (315 kg 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.* (2009) and Shashidhara *et al*. (2007).

The increase in dry pod yield of chilli with the application 100% RDF + Jeevamruta application @ 550 l ha^{-1} at transplanting, flowering and fruit initiation stage is mainly due to significantly higher yield parameters such as number of fruits and fruit weight per plant. Similar result of increase in yield components was reported by Singh *et al.* (2010) and Sanjutha *et al*. (2008), 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.

The economics of the experiment (table 4) revealed that among the main treatments significantly highest gross returns (Rs. 91,208/-) net returns (Rs. 62,308/-) and B: C ratio (3.2) was obtained with 100% RDF compare to rest of the treatments. The similar trend was also noticed with Jeevamruta application at transplanting + flowering + fruit initiation stages. The treatments differed significantly for interaction effects. The interaction effect of 100 % RDF + Jeevamruta application at three stages (transplanting + flowering + fruit initiation) recorded significantly highest gross returns (Rs. 1,00,100/-), net gross returns (Rs. 70,200/-) and B: C ratio (3.3) compare to rest of the treatment combinations. These results are in conformity with the findings of Shivaprasad *et al.* (2010).

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