

ORIGINAL ARTICLE

Study of Nutrient Requirement for Chilli Based Cropping System (Chilli – Cotton + Garlic)

Krishna D. Kurubetta *, M. Shivaprasad, M. H. Tatagar, M. Abdul Kareem 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 field experiment was carried out to study the nutritional requirement of the chilli based cropping system (Chilli – Cotton + Garlic) during kharif/rabi seasons of 2011, 2012 and 2013 at Horticultural Research Station, Devihosur, Haveri, under rainfed condition in medium deep black soil. The chilli cultivated variety of Bydagi dabbi was grown as a main crop, garlic variety of Haveri local as an intercrop and desi cotton variety Jayadhar as a mixed and relay crop. The application of 100 % RDF for chilli + 50 % RDF for Cotton and 50 % RDF for garlic found to be the most suitable nutrient management practice to get the highest yields of dry chilli, cotton and onion.

Key words : Dry Chilli, Cropping system, Inter/relay/mixed cropping system, Nutrient management

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INTRODUCTION

Chilli (*Capsicum annuum* L.), Cotton (*Gossypium herbaceum* L.) and Onion (*Allium cepa* L.), are the most extensively grown commercial crops in rainfed Vertisols of northern Karnataka under intercropping systems. This system is the most assured and paying intercropping system since least competition exists among the component crops especially when cotton variety Jayadhar was used and still continues to be the important cropping system [3]. Among these three crops, onion is the poor competitor to weeds due to its short stature, non branching habit, sparse foliage, shallow root system and extremely slow growth in the initial stages, enabling quick and rapid growth of weeds [5]. Standardization fertilizer requirement for an intercropping system consisting of more than one crop with different growth habit poses a problem of estimating the nutrient requirement of the component crops, as the uptake pattern of these crops are affected by their associate interaction [1, 4]. Fertilizer recommendation for multiple cropping systems have been so far based on the schedule recommended for sole crop. But the nutrient requirement differs from that of sole crop due to crop interference. The present study was conducted to assess the effect of different doses of nutrients on the performance and bio-economic suitability of chilli based cropping system.

MATERIALS AND METHODS

The field experiment was carried out to study the nutritional requirement of the chilli based cropping system during kharif/rabi seasons of 2011, 2012 and 2013 at Horticultural Research Station, Devihosur, Haveri, under rainfed condition in medium deep black soil. The chilli cultivated variety of Bydagi dabbi was grown as a main crop, garlic variety of Haveri Local as an intercrop and desi cotton variety Jayadhar as a mixed and relay crop. The transplanting of chilli was taken in the month of July with the onset of monsoon in a row spacing of 60 x 60 cm and garlic as an inter crop with 1:2 rows ratio and dibbling of cotton in a same row of chilli (between two chilli plants) was done during first fortnight of September month as mixed and relay crop. The experiment was laid out in randomized block design with three replications. The treatments included were 100 % recommended dose of chemical fertilizers for chilli, onion and cotton as a sole crop and graded levels of recommended dose of chemical fertilizers in cropping system. Other crop husbandry practices were followed to raise the crops. The treatment details are as follows T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha), T2 : Sole Cotton - 100 % RDF (80:40:40

NPK kg/ha), T3 : Sole Garlic- 100 % RDF (125:62.5:62.5 NPK kg/ha), T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF), T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (75% RDF), T6: Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF), T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF), T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF), T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF), T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF), T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (75 % RDF), T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF), T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF), T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF), T15 : Chilli (75 % RDF) - Cotton (50 % RDF) + Garlic (50 % RDF), T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Garlic (50 % RDF) farmers Practice.

RESULTS AND DISCUSSION

The pooled data (Table 2) of three years (2011, 2012 and 2013) revealed that the significantly highest dry chilli yield of 10.3 q/ha, cotton of 9.5 q/ha and garlic of 26.0 q/ha of was noticed in sole crop with application of 100% RDF. Among the intercropping treatments the highest yield of chilli and cotton was noticed with treatment T4, garlic with treatment T6 next to the sole cropping. However, in the cropping system treatments the yield of all the crops were found on par with the treatments T4, T5, T6, T7, T8 and T9. Hence, the lowest dose of fertilizer treatment T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF) is found to be most economic for the cropping system.. Among the cropping system treatments the significantly lowest yield of chilli was noticed for T13 and T15, for cotton T16 and for garlic T14. The similar findings were also observed by Anita and Geetakumari [1] and Durgannavar *et al*, [2].

The intercropping treatments differed significantly for equivalent yield of dry chilli. The significantly highest equivalent yield (19.2 q/ha) of dry chilli was noticed with T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Onion (100 % RDF). However, it was found on par with the treatments T5, T7, T8 and T9. The significantly lowest equivalent yield (13.0 q/ha) was noticed with treatment T15 : Chilli (75 % RDF) - Cotton (50 % RDF) + Garlic (50 % RDF). With these results the treatment T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF) is found to be the most economic and suitable nutrient required combination for the cropping system to get the higher yields. The findings are in conformity with the Shivprasad [6] and Durgannavar *et al*, [2].

The growth and yield parameters of chilli were also differed significantly. The highest equivalent yield of chilli was supported by the higher growth and yield parameters (Table 1).

Table 1: Effect of nutrient levels on growth and yield of chilli under cropping system.

Treatments	Plant height (cm)	No. of Branches/ plant	Number of leaves/ plant	Fruit length (cm)	No. of Fruits/ plant	Dry chilli yield (g/plant)
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	61.4	6.4	153.0	11.8	86.2	38.0
T2 : Sole Cotton - 100 % RDF (80:40:40 NPK kg/ha)	-	-	-	-	-	-
T3 : Sole Garlic- 100 % RDF (125:62.5:62.5 NPK kg/ha)	-	-	-	-	-	-
T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	63.7	6.1	139.0	10.8	80.3	32.7
T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (75% RDF)	61.8	6.2	139.0	10.5	76.1	30.2
T6: Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	62.9	6.0	143.9	10.3	75.8	29.9
T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	59.6	5.4	129.7	10.6	72.4	26.7
T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	56.8	6.2	136.5	10.7	79.2	30.5
T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	59.3	6.1	122.0	10.4	72.3	24.0
T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	57.5	5.4	116.5	10.0	68.4	20.5
T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (75 % RDF)	58.4	6.2	109.5	10.1	66.2	18.5
T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	60.8	6.3	104.9	10.1	56.3	21.9
T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	59.9	5.3	92.1	10.0	45.3	22.1

% RDF)+ Garlic (100 % RDF)						
T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	61.6	4.9	98.7	10.3	41.1	16.7
T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	60.3	4.8	72.0	9.9	35.1	18.0
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Garlic (50 % RDF)	62.0	4.1	74.1	9.2	38.0	17.0
S.Em±	3.95	0.41	6.20	0.42	1.55	1.76
C. D @ 5%	NS	1.2	18.0	1.2	4.5	5.2

Table 2: Effect of nutrient levels on crop yield and equivalent yield of chilli under cropping system.

Treatments	Dry chilli yield (q/ha)	Seed cotton yield (q/ha)	Garlic yield (q/ha)	Chilli equivalent yield (q/ha)
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	10.3	-	-	-
T2 : Sole Cotton - 100 % RDF (80:40:40 NPK kg/ha)	-	9.5	-	-
T3 : Sole Garlic- 100 % RDF (125:62.5:62.5 NPK kg/ha)	-	-	26.0	-
T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	9.1	8.0	19.1	19.2
T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (75% RDF)	8.5	8.0	19.0	18.6
T6 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	8.1	7.5	19.3	18.2
T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	8.5	7.0	18.2	18.0
T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	8.1	7.5	18.0	17.7
T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	7.1	6.3	17.2	16.0
T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	7.0	6.5	15.5	15.2
T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (75 % RDF)	6.3	6.1	14.0	13.8
T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	6.1	6.1	13.4	13.3
T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	6.0	6.0	13.4	13.2
T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	6.2	5.8	13.0	13.2
T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	6.0	5.5	13.1	13.0
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Garlic (50 % RDF)	6.8	2.8	13.5	13.7
S.Em±	0.68	0.74	0.76	1.17
C. D @ 5%	2.0	2.4	2.2	3.4

CONCLUSION

In chilli cropping system nutritional studies under rain fed situation of northern parts of Karnataka the application of 100 % RDF for chilli + 50 % RDF for Cotton and 50% RDF for garlic found to be the most suitable nutrient management practice to get the highest yields of dry chilli, cotton and onion.

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