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Study of Nutrient Levels on Yield, Incidence of Pest and Economics on Chilli Based Cropping System (Chilli – Cotton + Garlic)

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ABSTRACT
In a chilli based cropping system (Chilli – Cotton + Garlic) the significantly highest leaf curl index (LCI) was noticed on sole crop of chilli compare to the cropping system. The gross and net income also found highest in chilli based cropping system compare to sole cropping. Among the cropping system the treatment (T4) Chilli (100 % RDF) - Cotton (100 % RDF) + Garlic (100 % RDF) recorded significantly highest gross (Rs. 2,30,920/ha) and net (Rs. 1,81,120/ha) income compare to rest of the treatments. However, it is found on par with the treatments T5, T6, T7 and T8. The trend was similar with respect to net income also. The significantly highest B:C ratio of 5.0 was found with the treatment T8. Hence, the application of nutrients in a cropping system at these rates i.e. Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF) found to be economically highly profitable.
Key words : *Dry Chilli, Cropping system, Inter/relay/mixed cropping system, Nutrient management, Leaf curl index, Economics*

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INTRODUCTION

Mixed cropping of chilli and cotton is very popular traditional practice among the farming community in Karnataka and Maharashtra. Mixed cropping in chilli is generally practiced for ripe dry chilli rather than for green chilli. Short duration crops like garlic, onion or coriander are grown as intercrops with chilli + cotton mixed cropping system in medium and deep black soils of Karnataka is most common. 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 [6]. 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* reasons 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 Loacal as a 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 a 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 observation on incidence thrips a sucking pest on chilli was taken at 45 and 90 days after transplanting (DAT) and worked out the leaf curl index (LCI). 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 1) 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. 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], Durgannavar *et al*.,[2] and Kurubetta *et al*.,[5].

Table 1: Effect of nutrient levels on yield, equivalent yield of chilli and leaf curl index 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)	Leaf Curl Index	
					45 DAT	90 DAT
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	10.3	-	-	-	1.56	1.98
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	0.66	0.86
T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (75% RDF)	8.5	8.0	19.0	18.6	0.72	0.78
T6: Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	8.1	7.5	19.3	18.2	0.77	0.89
T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	8.5	7.0	18.2	18.0	0.68	0.91
T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	8.1	7.5	18.0	17.7	0.81	0.81
T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	7.1	6.3	17.2	16.0	0.73	0.79
T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	7.0	6.5	15.5	15.2	0.85	0.96
T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (75 % RDF)	6.3	6.1	14.0	13.8	0.91	1.05
T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	6.1	6.1	13.4	13.3	0.77	0.99
T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	6.0	6.0	13.4	13.2	0.82	1.25
T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	6.2	5.8	13.0	13.2	0.98	1.10
T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	6.0	5.5	13.1	13.0	0.88	1.20
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Garlic (50 % RDF)	6.8	2.8	13.5	13.7	0.93	0.98
S.Em±	**0.68**	**0.74**	**0.76**	**1.17**	**0.11**	**0.23**
C. D @ 5%	**2.0**	**2.4**	**2.2**	**3.4**	**0.31**	**0.72**

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). The findings are in conformity with the Durgannavar *et al.,*[2].
The leaf curl index also (Table 1) differed significantly for the nutrient levels in cropping system. Significantly highest LCI was noticed on sole crop of chilli compare to cropping systems at 45 and 90 days after transplanting.
The gross income, net income and B:C ratio (Table 2) also differed significantly for the nutrient levels in the cropping system of chilli. The gross and net income is highest in cropping system compare to sole cropping. Among the cropping system the treatment T4: Chilli (100 % RDF) - Cotton (100 % RDF) + Garlic (100 % RDF) recorded significantly highest gross (Rs. 2,30,920/ha) and net (Rs. 1,81,120/ha) income compare to rest of the treatments. However, it is found on par with the treatments T5, T6, T7 and T8. The trend was similar with respect to net income also. The significantly highest B:C ratio of 5.0 was found with the treatment T8. Hence, the application of nutrients in a cropping system at these rates i.e. Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF) found to be economically highly profitable.

Table 2: Cost of cultivation, Gross income, Net income and Benefit cost ratio as influenced by nutrient levels on chilli based cropping system.

Treatments	Cost of Cultivation (Rs/ha)	Gross income (Rs/ha)	Net income Rs/ha)	B:C Ratio
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	30050	123600	93550	4.1
T2 : Sole Cotton - 100 % RDF (80:40:40 NPK kg/ha)	12500	26600	14100	2.1
T3 : Sole Garlic- 100 % RDF (125:62.5:62.5 NPK kg/ha)	29150	135200	106050	4.6
T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	49800	230920	181120	4.6
T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (75% RDF)	47500	223200	175700	4.7
T6: Chilli (100 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	45300	218560	173260	4.8
T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	44250	216240	171990	4.9
T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	42300	211800	169500	5.0
T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	41250	192280	151030	4.7
T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (100 % RDF)	47050	182800	135750	3.9
T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (75 % RDF)	45000	165480	120480	3.7
T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Garlic (50 % RDF)	42950	159960	117010	3.7
T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (100 % RDF)	41900	158480	116580	3.8
T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (75 % RDF)	39500	158240	118740	4.0
T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Garlic (50 % RDF)	39100	155520	116420	4.0
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Garlic (50 % RDF)	38000	159640	121640	4.2
S.Em±		6724.1	4068.9	0.18
C. D @ 5%		19500	11800	0.55

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