



## **Study of Nutrient Levels on Yield and Economics on Chilli Based Cropping System (Chilli – Cotton + Onion)**

**Krishna D. Kurubetta \*, M. H. Tatagar, R. K. Mesta, T. B. Allolli, 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](mailto:krishna.kurubetta@uhsbagalkot.edu.in)

### **ABSTRACT**

*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 significantly highest equivalent yield (16.4 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 and T8. Based on the net returns and B:C ratio it is concluded that the treatment (T8) Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF) found to be more economically benefit compare to other treatments.*

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

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### **INTRODUCTION**

Formulating 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. Mixed cropping in chilli is generally practiced for ripe dry chilli rather than for green chilli. In the transition zone of Karnataka, intercropping of cotton with chilli is a well established and remunerative cropping system practiced on large scale in Dharwad, Haveri and parts of Gadag districts. Short duration crops like garlic, onion or coriander can also be raised as intercrops and cotton as mixed cropping system in Vertizols or horsegram and castor intercrops in Alfisols [2]. Chilli is planted with wider row spacing (60 to 120 cm) and the crop has initial slow growth, therefore, it provides excellent opportunities to taken up intercrops. Earlier studies on intercropping of onion, garlic, coriander, greengram, blackgram, soybean in chilli + cotton mixed cropping have been found to be remunerative [4, 5]. In chilli + cotton mixed cropping system, generally intercrops are grown with the onset of monsoon. Transplanting of chilli is done in the month of July and cotton seeds are dibbled in between two chilli plants one way late in August or early September. The crops like soybean, vegetable like French bean and spices like coriander, garlic and onion owing to their root system, growth pattern, yielding ability and crop duration affect the performance of the cropping system. Interaction of intercrops with the main component crops of the cropping system *viz.*, chilli and cotton also varies considerably because of their differential root growth, growth pattern, yielding ability and crop duration [1]. Nutritional requirement of the crop plays an important role for such a cropping system to get highest economic returns [3]. With this background the present investigation for nutritional study on Chilli – Cotton + Onion cropping system was undertaken.

### **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, onion variety of Arka Kalyan 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 onion 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 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 Onion - 100 % RDF (125:75:125 NPK kg/ha), T4 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Onion (100 % RDF), T5 : Chilli (100 % RDF) - Cotton (100 % RDF)+ Onion (75% RDF), T6: Chilli (100 % RDF) - Cotton (100 % RDF)+ Onion (50 % RDF), T7 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Onion (100 % RDF), T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Onion (75 % RDF), T9 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Onion (50 % RDF), T10 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Onion (100 % RDF), T11 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Onion (75 % RDF), T12 : Chilli (75 % RDF) - Cotton (100 % RDF)+ Onion (50 % RDF), T13 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Onion (100 % RDF), T14 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Onion (75 % RDF), T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Onion (50 % RDF), T16 : Chilli (100 % RDF) - Cotton (0 % RDF)+ Onion (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 9.5 q/ha, cotton of 10.2 q/ha and Onion of 150 q/ha of was noticed in sole crop with application of 100% RDF. Among the intercropping treatments the highest yield of chilli was noticed in T7, cotton and onion in T4 next to the sole cropping. However the yield of all the crops were found on par with the treatments T4, T5, T6, T7 and T8. Hence, the lowest dose of fertilizer treatment T8 : Chilli (100 % RDF) - Cotton (50 % RDF)+ Onion (75 % RDF) is found to be most economic for the cropping system.. Among the intercropping treatments the significantly lowest yield of chilli was noticed for T15 : Chilli (75 % RDF) - Cotton (50 % RDF)+ Onion (50 % RDF), for cotton T16 and for onion T15. The similar findings were also observed by Verma, S. P. [6] and [1].

**Table 1: Effect of nutrient levels on individual crop yield and equivalent yield of chilli.**

Treatments	Dry chilli yield (q/ha)	Seed cotton Yield (q/ha)	Onion Bulb Yield (q/ha)	Chilli Equivalent Yield (q/ha)
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	9.5	-	-	-
T2 : Sole Cotton - 100 % RDF (80:40:40 NPK kg/ha)	-	10.2	-	-
T3 : Sole Onion - 100 % RDF (125:75:125 NPK kg/ha)	-	-	150	-
T4 : Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (100 % RDF)	8.5	8.5	70	16.3
T5 : Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (75% RDF)	8.3	8.0	68	15.8
T6: Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (50 % RDF)	8.0	7.3	61	14.8
T7 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (100 % RDF)	8.7	7.0	66	15.8
T8 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF)	8.0	7.0	65	15.1
T9 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (50 % RDF)	7.1	6.8	58	13.5
T10 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (100 % RDF)	7.3	6.5	59	13.7
T11 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (75 % RDF)	6.8	6.2	55	12.8
T12 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (50 % RDF)	6.5	6.0	56	12.6
T13 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (100 % RDF)	6.0	5.8	56	12.0
T14 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF)	6.2	5.5	51	11.7
T15 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (50 % RDF)	5.8	5.6	50	11.3
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Onion (50 % RDF) Farmer practice	6.5	5.0	60	10.1
S.Em±	0.28	0.54	1.67	0.48
C. D @ 5%	0.8	1.6	5.1	1.4

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

Treatments	Cost of Cultivation (Rs/ha)	Gross Returns (Rs/ha)	Net Returns (Rs/ha)	B:C Ratio
T1 : Sole Chilli - 100 % RDF (100:50:50 NPK kg/ha)	30050	114000	83950	3.8
T2 : Sole Cotton - 100 % RDF (80:40:40 NPK kg/ha)	12500	28560	16060	2.3
T3 : Sole Onion - 100 % RDF (125:75:125 NPK kg/ha)	39600	150000	110400	3.8
T4 : Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (100 % RDF)	48200	195800	147600	4.1
T5 : Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (75% RDF)	45850	190000	144150	4.1
T6: Chilli (100 % RDF) - Cotton (100 % RDF) + Onion (50 % RDF)	43500	177440	133940	4.1
T7 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (100 % RDF)	45450	190000	144550	4.2
T8 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF)	41400	180600	139200	4.4
T9 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (50 % RDF)	40350	162240	121890	4.0
T10 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (100 % RDF)	46150	164800	118650	3.6
T11 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (75 % RDF)	44100	153960	109860	3.5
T12 : Chilli (75 % RDF) - Cotton (100 % RDF) + Onion (50 % RDF)	42050	150800	108750	3.6
T13 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (100 % RDF)	41000	144240	103240	3.5
T14 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF)	37600	140800	103200	3.7
T15 : Chilli (75 % RDF) - Cotton (50 % RDF) + Onion (50 % RDF)	34200	135280	101080	4.0
T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Onion (50 % RDF) Farmer practice	31700	152000	120300	4.8
S.Em±		5344.8	3638.93	0.12
C. D @ 5%		15500	10550	0.35

The intercropping treatments differed significantly for equivalent yield of dry chilli. The significantly highest equivalent yield (16.4 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 and T8. The significantly lowest equivalent yield (10.1 q/ha) was noticed with treatment T16 : Chilli (100 % RDF) - Cotton (0 % RDF) + Onion (50 % RDF) which was the most commonly practiced by the farmers in northern Karnataka region. With these results the treatment T8 : Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF) is found to be the most economic and suitable nutrient required combination for the cropping system to get the higher yields. These results are in conformity with the findings of Kurubetta *et al.*, [3].

The gross returns, net returns and B:C ratio (Table 2) also differed significantly for the different nutrient levels. 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) + Onion (100 % RDF) recorded significantly highest gross and net returns Rs. 1,95,800/ha and Rs. 1,47,600/ha respectively, compare to rest of the treatments. However, it is found on par with the treatments T5, T7 and T8. The significantly highest B:C ratio of 4.4 was found with the treatment T8. Hence, based on the net returns and B:C ratio it is concluded that the treatment (T8) Chilli (100 % RDF) - Cotton (50 % RDF) + Onion (75 % RDF) found to be more economically benefit compare to other treatments.

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