J Krishi Vigyan 2019, 8 (1) : 208-211 DOI : 10.5958/2349-4433.2019.00101.6

Micronutrients Spray on Yield and Economics of Cotton in Rainfed Areas of Prakasam district in Andhra Pradesh

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ABSTRACT

Demonstrations were conducted at farmers fields in Pasupugallu (Mundlamuru mandal) and Tanamchintalaand Bandiveligandla (Darsi mandal) during *Kharif* 2016-17 to 2018-19 on 4.0 ha area during each year to study the effect of micronutrient management in cotton. Under demonstration, treatments consisted of spraying of MgSo4 @ 10 g/l(45 and 75 d), ZnSo4 @ 2 g/lat 4-5d interval at 45 DAS and Boron @ 1.5 g/l (60 and 90 d) and compared with control plot without using micronutrients. The results showed that application of micronutrients significantly improved yield and cost to benefit ratio in cotton .Under demonstration, pooled average yield was 10.9q/ha with B: C ration of 0.70 whereas, under control plot pooled average yield was 9.1q/ha with B: C ratio of 0.62. Hence, application of micronutrients reduced flower and boll drop and increased returns to farmers.

Key Words: Boron, Cotton, Micronutrient, Magnesium, Zinc.

INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is known as a white gold and king of fibre crops. Cotton is an important cash crop and backbone of textile industries mainly because of its lint. It earns about 33 per cent of total foreign exchange in India (Anonymous, 2014). India ranks first position in production and export of cotton in world. India contributes 5.6 per cent of area and 5.43 per cent of production in world. In Andhra Pradesh, cotton is grown on an area of 6.63 lakh ha with production of 19.10 lakh bales with a productivity of 641 kg/ ha. In Prakasam district cotton was grown in an area of 38,822 ha with production and productivity of 35603 MT and 1082 kg/ha. during 2018-19. As per the estimates, 47.5 m bales of lint are required to meet the domestic and export requirements by 2020 AD in India. To meet these demands, the cotton production and productivity has to be increased considerably (Ravikiran *et al,* 2012).

One of the factors responsible for low productivity is imbalanced use of fertilizers and deficiency of micronutrients. Famers in Prakasam district are applying only macronutrients to cotton. Essential micronutrients like magnesium, zinc and boron plays important role in physiology of cotton crop being a part of enzyme system of catalyst in enzymatic reactions (More *et al,* 2018). Boron application resulted in increase of seed cotton yield up to 22 per cent, application of both the micronutrients in combination (Boron+Zinc), the overall increase in seedcotton yield was 40 per cent (Mooro *et al,* 2009). Deficiency of micronutrients reduces yields in cotton. Thus for getting better results, the balance supply of macro and micronutrients is an important factor. Keeping the above points in view, demonstration was conducted at farmers' fields.

MATERIALS AND METHODS

Front line demonstration was conducted at Bandiveligandla (Darsi mandal)-2016-17, Tanamchintala (Darsi mandal)-2017-18 and Pasupugallu (Mundlamuru mandal)-2018-19 in area of 4.0 ha during each year at10 farmers' fields. In each farmer's field two treatments were tested in demonstration and control plots. T1**:** Spraying of

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Sr. No.	Particular	Demonstration				Control			
		2016-17	2017-18	2018-19	Pooled mean	2016-17	2017-18	2018-19	Pooled mean
1	Plant height	81.3	82.5	79.04	80.9	76.4	79.5	75.6	77.2
2	Number of branches/plant	19.0	21.5	16.2	18.9	15.2	17.1	13.8	15.4
3	Number of bolls/plant	22.2	24.5	21.8	22.8	19.1	21.3	18.8	19.7

MgSo4 - 10 g/l (45 and 75 d) , Spraying of ZnSo4 - 2 g/l at 4-5d interval at 45 DAS and Spraying of boron - 1.5 g/l(60 and 90 days). T2**:** Farmer's practice (Without micronutrients).

Five plants were selected in each field and data on plant height, number of branches/plant, number of bolls/plant were recorded. Yield was recorded from 10 farmers' field in each year from 0.4ha/ farmer. Economics was calculated as shown below:

Cost of cultivation (Rs/ha)

Cost of cultivation (Rs/ha) was calculated considering the prevailing charges of agricultural operations and market price of inputs involved.

Gross returns were obtained by converting the harvest into monetary terms at the prevailing market rate during the course of studies.

Gross return (Rs/ha) = (Seed yield x price)

Net returns were obtained by deducting cost of cultivation from gross return.

Net returns (Rs/ha) = Gross return (Rs/ha) - Cost of cultivation (Rs/ha)

Cost: benefit ratio

The benefit: cost ratio was calculated by dividing gross returns by cost of cultivation.

$$\text{Cost: benefit ratio} = \frac{\text{Gross returns (Rs/ha)}}{\text{cost of cultivation (Rs/ha)}}$$

RESULTS AND DISCUSSION

Yield parameters

Perusal of the data (Table 1) revealed that demonstration plots recorded significantly higher number of branches and bolls/plant compared to control plots. Under demonstration plots, number of branches per plant was 19.0, 21.5 and 16.2 during 2016-17, 2107-18 and 2018-19, respectively with pooled mean of 18.9 whereas, in control plot number of branches were 15.2, 17.1 and 13.8 during 2016-17, 2107-18 and 2018-19, respectively with pooled mean of 15.4. The number of bolls per plant were 22.2, 24.5 and 21.8 during 2016-17, 2107-18 and 2018-19, respectively with pooled mean of 22.8 whereas, in control plot number of bolls per plant were 19.1, 21.3 and 18.8 during 2016-17, 2107-18 and 2018-19, respectively with pooled mean of 19.7.These findings were in line with Singh *et al* (2015).

Yield

Perusal of the data (Table 2) revealed that demonstration plots (T1) recorded significantly higher yields compared to control (T2) plots. Under T1, yields recorded during 2016-17, 2017-18 and 2018-19 were 10.6, 14.5 and 8.2q/ha, respectively with pooled mean of 11.1q/ha. Per cent increase in yield under T1 plot over T2 was 19.1, 26.1, 18.8 during 2016-17, 2017-18 and 2018-19, respectively with pooled mean of 21.3. Higher yield under T1 was due to more number of sympodial branches and more number of bolls per plant and good boll size and shape due to application of micronutrients compared to farmers' practice. Flower drop was also low compared to farmers practice. Kausar *et al* (2000) obtained increase in yield up to 40 per cent with the applicationof zinc, whereas, with the

Table 2. Yield and economics of cotton with and without micronutrients.

Particular	Demo				Control			
	2016-17	2017-18	2018-19	Pooled mean	2016-17	2017-18	2018-19	Pooled mean
Yield (q/ha)	10.6	14.5	8.2	11.1	8.9	11.5	6.9	9.1
Per cent increase in yield over control	19.1	26.1	18.8	21.3				
Cost of cultivation (Rs/ha)	66250	71350	65350	67650	63000	68000	64000	65000
Gross returns (Rs/ha)	53000	58000	41000	50667	44500	46000	34500	41667
B :C Ratio	0.80	0.81	0.63	0.75	0.70	0.68	0.50	0.62

*Average rainfall received during 2018-19 was only 50.6 mm with deficit of 51.73%. So the yields were very less.

application of boron the yield was increased up to 30 per cent. Application of zinc and magnesium sulphate significantly increased SCY per plant as compared with the untreated control (Soomro *et al,* 2000, Zakaria *et al,* 2008).

Economics

Cost of cultivation under demo plot was higher than control plots because of additional application of micronutrients along with farmers practice. Gross returns and B; C ration were substantially higher under demo plot compared to control plot (Table 2). Gross returns of Rs.50,667/-ha with B: C of 0.75 were obtained in demo plot. In control plot, gross returns were Rs.41,667/- ha. The benefit to cost ratio in control plot was 0.62. Higher gross returns and B: C ratio under T1 plot compared to T2 plot was due to higher yield. Yaseen *et al* (2013) also reported 20 to 30 per cent more economic benefit over NPK fertilizers alone with foliar application of Zn, B, Mn, Cu and Fe.

CONCLUSION

Micronutrients like magnesium, zinc and boron application in cotton showed positive effects on growth and yield of cotton with higher B: C ratio. In demo plots where the nutrients were applied reddening of leaves, flower and boll drop, malformed bolls were reduced. Under demonstration plot pooled average yield was 10.9 q/ha with B: C ration of 0.70. whereas, under control plot pooled average yield was 9.1 q/ha with B: C ratio of 0.62.

ACKNOWLEDGEMENT

Financial support by ATARI and technical support from ANGRAU is highly acknowledged.

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Received on 31/10/2019 *Accepted on 01/12/2019*