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## Effect of nutrient management practices on growth, yield and economics of cotton crop in west central table land zone at Bargarh district of Odisha

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### Abstract

A field experiment was conducted at the farmer's field of Bargarh district of Odisha in *khari*, 2023 under the demonstration programme of Krishi Vigyan Kendra, Bargarh to study the "Effect of nutrient management practices on growth, yield and economics of cotton crop in west central table land zone at Bargarh district of Odisha". The treatments were taken as Farmer's practice (FP) on improper nutrient management and recommended practice (RP) on STBF + one spray of 2% urea and one spray of 1% urea + 1% MgSO<sub>4</sub> during flowering to boll development stage. Each treatment replicated for 10 times with randomized block design. The results concluded that the application of nutrient management practices (RP) as STBF with one spray of 2% urea and one spray of 1% urea plus 1% MgSO<sub>4</sub> during flowering to boll development stage gives the higher boll weight (3.41 g) with higher no of bolls/plant (22) and no of bolls/m<sup>2</sup> (101) over the FP. The plant height of the cotton crop was increased by the nutrient management practices as compared to the FP at 30 DAS (31.68 cm), 60 DAS (56.32 cm), 90 DAS (76.39 cm), 120 DAS (103.28 cm) and 150 DAS (123.68) respectively. The cotton crop significantly increased the yield (14 q/ha) over FP with increasing in net return (Rs. 42,220/-) with B:C ratio (1.89) respectively. The RP of nutrient management practices in cotton crop can be recommended to the farmers for better yield and income.

**Keywords:** Growth, yield, economics, cotton, boll and nutrient management etc.

### Introduction

Cotton is the major fiber crop and grown on 3090 ha area in Bargarh district of Odisha which was increased three fold during last 50 years worldwide and for sustainable yield in cotton, the major primary natural resource is soil which health & fertility management is necessary. Fertilizers and water must be judiciously applied in conjunction with other crop management practices to promote optimum, cost effective cotton productivity (Elzik and Frisbie, 1985) [7]. In cotton crop seed is the main reservoir of most of the nutrients while poor in lint (Bassett and Anderson, 1970; Halevy, 1976) [1, 10]. Therefore cotton is not considered very exhaustive in terms of nutrient depletion from soil.

The fertility management nitrogen in the major sources of fertility management followed by phosphorous and potassium. Now days the use of secondary and micronutrients *viz* boron, zinc is essential for better crop growth and development with organic manures are also essential in India (ICAC, 1996, Silver tooth, *et al.*, 1992) [11, 20].

The first two thirds of nitrogen application is three times more efficient in increasing crop yield than the last one third (Constable, 1988). Added nitrogen increasing yield primarily by prolonging growth and increasing the members of boll set. It also has secondary effect of increasing boll weight (Gardner and Tucker, 1967; Gerik *et al.*, 1989; Bouqut *et al.*, 1993; Moore *et al.*, 1994) [8, 9, 4, 17]. Fulfillment of nutritional requirements of the crop is essential for achieving the higher yields and fiber quality (Kalaichelic, 2009 and Kumar *et al.*, 2011) [13, 16]. Application of micronutrients through foliar application has shown importance for their efficient utilization of better performance of crop (Rathinavel *et al.*, 1999) [19]. It also changes in seed and increase yield in cotton (Chaudhury *et al.*, 2001) [5]. Squaring, blooming and boll development are stages where cotton makes highest nutrients demand.

Augmentation of nutrient supply through foliar application at such critical stage may increase yield in cotton (Bhatt and Nathu 1986) [2]. Therefore the objective of the experiment was to study the Effect of nutrient management practices on growth, yield and economics of cotton crop in west central table land zone at Bargarh district of Odisha.

### Materials & Methods

A field experiment was conducted during *kharif*, 2023 by taking the cotton crop of variety Bt cotton at village Bandeipali of Block Sohela under the demonstration programme of Krishi Vigyan Kendra, Bargarh to study the “Effect of nutrient management practices on growth, yield and economics of cotton crop in west central table land zone at Bargarh district of Odisha”. The treatments were taken as Farmer’s practice (FP) on improper nutrient management and recommended practice (RP) on STBF + one spray of 2% urea and one spray of 1% urea + 1% MgSO<sub>4</sub> during flowering to boll development stage. Each treatment replicated for 10 times with randomized block design. The soil is generally sandy loam in texture having pH 5.8. The fertility status of the soil was low in organic carbon (0.47%), low in available nitrogen (218 kg/ha), low in available phosphorous (13 kg/ha) and medium in potassium (129 kg/ha). The normal spacing was kept row to row distance of 65 cm and plant to plant distance of 30 cm. Crop was fertilized as per respective treatments where half of nitrogen and full dose of phosphorous & potassium was applied at the time of sowing and

remaining half of nitrogen was applied in equal installment at 30 days after sowing (DAS) and second at 60 DAS. Optimum plant protection measures were adopted and applied insecticide as per need of crops observations were taken up on growth and yield parameters. Harvesting was done on the basis of picking where bolls were fully opened.

### Results & Discussion

The effect of nutrient management practices on yield attributes of cotton has been presented at Table-1.

The recommended practices significantly increases the no of boll/plant, no of bolls/m<sup>2</sup> and boll weight over FP. The no of boll/plant in RP is 22 nos whereas in FP is 14 nos which increase the 57% over FP. One no of boll/m<sup>2</sup> in RP is 101 whereas in FP is 67 which increases the 50% over FP. The bolls weight in RP is 3.41 g whereas in FP is 3.12 which increases the 9.2% over FP. The findings are corroborate with the results of Jadhav *et al.*, (2012) [12]. (Fig-1)

**Table 1:** Effect of nutrient management practice on yield attributes of cotton

Treatments	No of bolls/plant	No of bolls/m <sup>2</sup>	Bolls weight (g)
FP	14	67	3.12
RP	22	101	3.41
SE(d)±	0.58	1.58	0.06
C.D. at 5%	1.31	3.60	0.15



**Fig 1:** Effect of nutrient management practice on yield attributes of cotton)

### The effect of nutrient management practices on growth parameters of cotton has been represented at Table-2

The RP significantly increases the plant height at 30, 60, 90, 120 & 150 DAS. At 30 DAS the RP increases the plant height 31.68 whereas in FP is 25.12 which increases 26.1% over FP. At 60 DAS the RP increase the plant height 56.32 cm whereas in FP is 45.16 cm which increases 24.7% over FP. At 90- DAS the RP

increases the plant height 76.39 cm whereas in FP 68.28 cm which increases the 11.8% over FP. At 120 DAS the RP increases the plant height 103.28 cm whereas in FP 93.19 cm which increases 10.8% over FP. At 150 DAS the RP increases the plant height 123.68 cm DAS whereas in FP 109.2 cm. which increases the 13.26% over FP. The similar results has been found by the Kaur *et al.*, 2010 [14]. (Fig-2)

**Table 2:** Effect of nutrient management practice on growth parameters of cotton

Treatments	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS
FP	25.12	45.16	68.28	93.19	109.2
RP	31.68	56.32	76.39	103.28	123.68
SE(d)±	0.58	1.12	0.67	0.59	1.12
C.D. at 5%	1.31	3.60	0.15	1.28	3.41



**Fig 2:** Effect of nutrient management practice on growth parameters of cotton)

**The effect of nutrient management practices on yield & economics of cotton has been represented at Table-3**

The highest yield was recorded in RP (14 q/ha) as compared to the farmers practice (12 q/ha) which was 20 percent increase in yield over FP. The application of STBF + one spray of 2% urea and one spray of 1% urea + 1% MgSO<sub>4</sub> during flowering to boll development stage significantly increased the cotton yield. Similar results were made by Bhattoo *et al.*, (2012) [3]. The

increasing of fertilizer level from 50 to 100 percent RDF resulted in the significant increase in cotton yield as reported by the Raskar (2004) [18]. The yield attributing character also responsible for increasing the cotton yield in increasing level of fertilizers. Kote *et al.*, (2005) [15] reported that the application 100 percent of recommended dose of fertilizers produced significantly higher seed cotton yield as compared to 75 percent and 50 percent recommended dose of fertilizers.(Fig-3)

**Table 3:** Effect of nutrient management practice on yield and economics of cotton

Treatments	Yield (q/ha)	% change in yield	Gross cost (Rs.)	Gross return (Rs.)	Net return (Rs.)	B:C ratio
FP	12	-	43,500	76,560	33,060	1.76
RP	14	20	47,100	89,320	42,220	1.89
SE(d)±	0.92					
C.D. at 5%	0.145					



**Fig 3:** Effect of nutrient management practice on yield and economics of cotton)

Application of different nutrient management practices significantly increased the gross cost, gross return, net return and B:C ratio of cotton crop. The gross cost in FP was Rs. 43,500/- with gross return of Rs. 76,560/- which gives the net return Rs. 33,060 with B:C ratio of 1.76 whereas in RP higher gross cost (Rs. 47,100) with gross return (Rs. 89,320/-) was found which gives the higher net return (Rs. 42,220/-) with B:C ratio (1.89) compared to the FP.

**Conclusion**

On the basis of above result, it may be concluded that the application of nutrient management practices (RP) as STBF with one spray of 2% urea and one spray of 1% urea plus 1% MgSO<sub>4</sub>

during flowering to boll development stage gives the higher boll weight (3.41 g) with higher no of bolls/plant (22) and no of bolls/m<sup>2</sup> (101) over the FP. The plant height of the cotton crop was increased by the nutrient management practices as compared to the FP at 30 DAS (31.68 cm), 60 DAS (56.32 cm), 90 DAS (76.39 cm), 120 DAS (103.28 cm) and 150 DAS (123.68) respectively. The cotton crop significantly increased the yield (14 q/ha) over FP with increasing in net return (Rs. 42,220/-) with B:C ratio (1.89) respectively. The RP of nutrient management practices in cotton crop can be recommended to the farmers for better yield and income.



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