



Short Note

## Influence on Growth, Yield Attributes and Yield of Bt Cotton by Soil and Foliar Application of Nutrients

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**Field experiment was conducted at cotton breeding station, Tamil Nadu Agricultural University, Coimbatore in a sandy clay loam soil during 2009-2010 to study the effect of soil and foliar application of nutrients to maximize the seed Bt cotton yield under irrigated condition. Taller plants, higher number of symbodial branches, dry matter production, better yield attributes like number of bolls and boll weight were associated with soil application of 150 per cent RDF combined with foliar application of TNAU MN mixture. Application of 150 per cent RDF combined with TNAU MN mixture recorded 26 per cent higher seed cotton yield as compared to 100 per cent RDF.**

**Key words:** Bunny Bt, fertilizer levels, TNAU MN mixture, net return

Cotton the 'White Gold' still holds its position high. Its use world over has been on the upswing. India is the second largest producer of cotton in the world after China. World produces about 26.22 million Mt of cotton from 35.91 million hectares of land area. Although about 10.17 million hectares is under cotton cultivation in India, which constitutes about 21 per cent of the world area, the productivity keeps fluctuating owing to monsoon and other factors. In terms of average productivity, India is among the lowest with 488 kg per hectare. Similarly, the national cotton production increased from mere 13.6 million bales in 2002-2003 to 29.2 million bales in 2009-2010 (CCI, 2009). Cotton contributes 29.8 % of the Indian agricultural gross domestic product. In Tamil Nadu, during 2008-09, around 0.5 million bales of seed cotton was produced while sowing was done in 0.12 million hectares (CCI, 2009). In Tamil Nadu, Perambalur, Dharmapuri and Virudhunagar districts are the major cotton producing areas.

Among the various production constraints, unbalanced and in adequate nutrition to cotton crop is considered to be one of the important factors. Due to early and semi-determinate habit of Bt cotton, the rate of growth and rejuvenation capacity of the plant after first flush of flowering is slow. First formed squares and bolls are retained upto 90 per cent in Bt cotton. When there is need to have more nutritional requirement, the plant could not cope with the nutrient availability and necessitates additional nutrition. A micronutrient addition in conjunction with macronutrient increases the cotton yield. Essential micronutrient is required for optimal growth and development of cotton (Mefhar Temiz *et al.*, 2009). Considering the above facts, an experiment

was conducted to study the effect of soil and foliar application of nutrients on the seed cotton yield in Bt cotton under irrigated condition.

### Materials and Methods

Field experiment was conducted at Cotton Breeding Station, Tamil Nadu Agricultural University, Coimbatore in a sandy clay loam soil during 2009-2010 to study the effect of soil and foliar application of nutrients on the seed cotton yield in Bunny Bt under irrigated condition. The nutrient status of soil was low in available nitrogen, medium in available phosphorus and high in available potassium. The experiment was laid out in randomized block design with three replications. The treatments included, T<sub>1</sub>-100 per cent recommended dose of fertilizers (RDF), T<sub>2</sub>- 125 per cent RDF, T<sub>3</sub>- 150 per cent RDF, T<sub>4</sub>- T<sub>1</sub> with TNAU micronutrient (MN) mixture, T<sub>5</sub>- T<sub>2</sub> with TNAU MN mixture, T<sub>6</sub>- T<sub>3</sub> with TNAU MN mixture, T<sub>7</sub>-T<sub>1</sub> with Polyfeed+ Multi K, T<sub>8</sub>- T<sub>2</sub> with Polyfeed + Multi K and T<sub>9</sub>- T<sub>3</sub> with Polyfeed+ Multi K. TNAU MN mixture was applied basally, while Polyfeed and Multi K were sprayed at stray flowering and boll formation stages, respectively. Cotton seeds were sown at a spacing of 120 x 60 cm. Fertilizers were applied at the rate of 120: 60: 60 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O ha<sup>-1</sup> respectively. Full dose of P & K and ½ N were applied as basal. Remaining N was applied at the time of earthing up. All the standard packages recommended for cotton were adopted.

### Results and Discussion

#### Growth Attributes

Application of all major (NPK) and micronutrients (TNAU MN mixture) helped to increase the plant height after 80 DAS (Table 1.) Significant difference was observed in the plant height at 80 and 120 DAS.

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**Table 1. Effect of treatments on growth, yield attributes and yields of Bt cotton as influenced by soil and foliar nutrition**

Treatment	Plant height (cm)		LAI		DMP (kg ha <sup>-1</sup> )		No. of sympodia plant <sup>-1</sup>	No. of bolls plant <sup>-1</sup>	Boll wt (g)	Yield (kg ha <sup>-1</sup> )
	80 DAS	120 DAS	80 DAS	120 DAS	80 DAS	120 DAS				
T1- 100 per cent RDF	80.48	115.80	2.20	2.53	2262	4418	9.21	34.07	4.03	1843
T2- 125 per cent RDF	80.87	120.63	2.38	2.90	2638	4435	9.97	38.91	4.50	2001
T3- 150 per cent RDF	87.66	128.01	2.46	2.97	2819	4443	10.40	41.29	4.65	2028
T4- T <sub>1</sub> + TNAU MN mixture	86.85	132.44	2.56	2.97	2795	4680	10.48	42.72	4.84	2052
T5- T <sub>2</sub> + TNAU MN mixture	91.10	140.50	2.63	3.07	2847	4690	10.85	44.11	5.18	2247
T6- T <sub>3</sub> + TNAU MN mixture	98.11	158.12	2.97	3.37	3108	5452	12.83	51.01	5.64	2563
T7- T <sub>1</sub> + Polyfeed+ Multi K	86.70	132.70	2.43	2.87	2819	4900	10.25	42.81	4.83	2000
T8- T <sub>2</sub> + Polyfeed + Multi K	83.89	138.40	2.63	3.07	2903	4792	10.41	44.65	5.09	2191
T9- T <sub>3</sub> + Polyfeed+ Multi K	94.82	144.44	2.82	3.13	3057	5068	11.60	46.59	5.39	2388
SEd	4.97	11.18	0.20	0.13	202	283	0.90	3.50	0.42	185
CD (P = 0.05)	10.65	23.98	0.43	0.27	434	607	1.93	7.50	0.91	397

The rate of increase in plant height was more between 80 and 120 DAS as compared to 40 and 80 DAS. This was mainly due to supply of more macro and micro nutrients. Moreover, the faster growth rate between 80 and 120 DAS might have helped for better uptake of soil nutrients by plant, which in turn increased the photosynthetic rate and faster mobilization of nutrients to the growing parts of cotton. Significantly taller plants were recorded by the application of 150 per cent RDF (Recommended Dose of Fertilizer) combined with TNAU MN mixture.

Significant difference in DMP was observed after 80 DAS. This might be due to favourable effect of macro and micronutrients on cell elongation, cell wall thickening, stem and leaf thickness and more of leaf and stem weight. Application of 150 per cent RDF combined with TNAU MN mixture recorded maximum DMP at 80 and 120 DAS.

Leaf area index (LAI) was comparable under both soil application of 150 per cent RDF combined with TNAU MN mixture and 150 per cent RDF combined with Polyfeed (1.5 per cent) + Multi K (1.5 per cent) application. Higher LAI was recorded with the soil application of 150 per cent RDF combined with TNAU MN mixture followed by 150 per cent RDF combined with Polyfeed (1.5 per cent) + Multi K (1.5 per cent) application. Successive increase in dose of N application upto 160 kg ha<sup>-1</sup> significantly increased the LAI upto 95 days after sowing in cotton (Shamim Ansari and Mahey, 2003).

#### **Yield attributes and Yield**

In general, the major portion of the nutrients from the applied fertilizer was used by the cotton plant from the time of squaring to boll formation stage. Increase in boll numbers and boll weight in the above treatments were due to better absorption of the macro and micronutrients and increased translocation of photosynthates as well as better partitioning of dry matter. Number of sympodia and boll production were more in Bunny Bt in summer

irrigated cotton at Srivilliputhur, Tamil Nadu (TNAU, 2005).

The number of sympodia, number of bolls plant<sup>-1</sup> and boll weight were significantly influenced by the soil application and foliar spray of nutrients (Table 1). In all the above parameters, the highest readings were observed under 150 per cent RDF combined with TNAU MN mixture. Maximum yield potential of crop can be realized by adopting suitable agronomic practices like promising genotypes and fertilizer levels. Seed cotton yield is the reflection of yield attributing parameters like boll numbers per plant, boll weight and boll setting percentage. Soil application macro and micronutrients improved the kapas yield significantly. Among the different treatments, application of 150 per cent RDF combined with TNAU MN mixture recorded significantly higher seed cotton yield.

#### **Conclusion**

Soil application of 150 per cent RDF combined with TNAU MN mixture favourably increased the growth characters, yield attributes and seed cotton yield. Application of 150 per cent RDF combined with TNAU MN mixture recorded 26 per cent higher seed cotton yield as compared to 100 per cent RDF.

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