AGRONOMIC MANAGEMENT FOR Bt COTTON UNDER RAINFED CONDITIONS

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ABSTRACT

A field trial was conducted for three seasons from 2006-07 to 2008-09 with an objective to find out the response of hybrid Bt Bunny to three different nitrogen levels (120, 150 and 180 kg ha⁻¹) and scheduling of nitrogen in five equal splits at 25 days interval viz., 15-40-65-90-115 days after sowing (DAS), 20-45-70-95-100 DAS and 25-50-75-100-125 DAS under rainfed conditions at Scheduling of nitrogen from 20 or 25 days after sowing gave significantly higher seed cotton yield (3592 kg ha⁻¹ and 3630 kg ha⁻¹) than scheduling nitrogen from 15 DAS with seed cotton yield of 3138 kg ha⁻¹. The other parameters like number of monopodia and sympodia per plant, boll number and boll weight were not influenced by nitrogen scheduling. Nitrogen application at different levels did not influence the seed cotton yield, number of monopodia and sympodia per plant, boll number and boll weight. However, the seed cotton yield ranged from 3300 kg ha⁻¹ to 3600 kg ha⁻¹ indicating the potentiality of the hybrid Bt Bunny. No significant interaction among the different variables for any treatment combination was observed. However, the net returns and BC ratio were highest for nitrogen at 180 kg ha⁻¹ and scheduling from 25 DAS.

Key words: Nitrogen, Scheduling, Net returns, BC ratio.

INTRODUCTION

Cotton cultivation in India has changed tremendously with introduction of Bt cotton in 2002 under rainfed conditions. More than eighty per cent of total cotton area in the country at present is under Bt cotton hybrids. Efficient crop production practices help in realizing the potential yields of this crop. Several studies on Bt cotton have shown that they mature earlier than non – Bt cotton and also yield better. So this early maturity may require nutrient application earlier and also with higher doses of nutrients than recommended especially nitrogen to realize higher yields. Farmers in Northern Telangana zone of Andhra Pradesh, generally grow Bt cotton with application of high doses of fertilizers usually top dressing with complex fertilizers. Hence, this study was undertaken to evaluate Bt cotton, Bunny to different nitrogen doses and for scheduling of nitrogen application.

MATERIALS AND METHODS

An experiment was conducted for three years during kharif season from 2006 to 2008 in vertisols at Agricultural Research Station, Adilabad, ANGRAU in Northern Telangana zone of Andhra Pradesh under rainfed conditions. The soil of the experimental site was clayey, neutral to alkaline with pH 7.75, low in organic carbon (0.48 %), low in available nitrogen (134.2 kg ha⁻¹), high in phosphorus status (49.0 kg ha⁻¹) and potassium with 347.2 kg ha⁻¹. The sowing was done on 13 July 2006, 21 June 2007 and 1 July 2008 with the onset of monsoon. A total rainfall of 809.7 mm (32 rainy days), 898.4 mm (47 rainy days) and 878.3 mm (42 rainy days) was received during 2006, 2007 and 2008 respectively. Bt cotton hybrid Bunny was the test crop fertilized with phosphorus @ 60 kg P₂O₅ ha⁻¹ applied basally in the form of SSP and potassium @ 60 kg K₂O ha⁻¹ applied in three splits as per recommendation in the form of muriate of potash.

Treatments consisted of three nitrogen levels viz., 120, 150 and 180 kg N ha⁻¹ and scheduling of nitrogen in five equal splits at 25 days interval viz., T₁ : 15-40-65-90-115 DAS, T₂:20-45-70-95-120 DAS, and T₃:25-50-75-100-125 DAS. The trial was laid out in randomised block design with factorial concept in three replications. Plant protection measures were taken up as per requirement especially for sucking pests incidence during the
crop growth. Data pertaining to yield attributing characters like number of monopodia / sympodia, number of bolls/plant and boll weight along with ginning out-turn and seed index were recorded from randomly selected five plants in each treatment and seed cotton yield was recorded from the net plot. Data were statistically analyzed by standard procedure of Panse and Sukhatme (1967).

Effect of nitrogen scheduling: In contrast to the normal recommended application of nitrogen in three splits at 30,60,90 DAS to cotton, scheduling the different levels of nitrogen in five equal splits at 25 days interval was studied in Bt cotton hybrid Bunny. During 2006, only monopodia per plant and seed cotton yield (SCY) were influenced by scheduling of nitrogen in five equal splits. Monopodia per plant (0.75) was significantly higher with scheduling from 20 DAS and was on a par with 25 DAS scheduling. Seed cotton yield was significantly higher with scheduling from 20 (3898 kg ha\(^{-1}\)) and 25 DAS (3989 kg ha\(^{-1}\)) than 15 DAS but were at par with each other. In 2007, only number of bolls/plant and SCY were influenced by nitrogen scheduling. Boll number and SCY were significantly higher with 20 and 25 DAS scheduling over 15 DAS and were at par with each other. During 2008, nitrogen scheduling could influence only monopodia/plant. Perusal of pooled analysis for three years from Table 1 indicated that boll weight and SCY were significant compared to all the other parameters studied which were non-significant. Boll weight recorded was maximum with nitrogen scheduling from 25 DAS (4.63g) which was at par with scheduling from 20 DAS(4.58g) but significantly superior over 15 DAS scheduling(4.38g). Scheduling of nitrogen from 25 DAS (25-50-75-100-125) recorded maximum SCY (3630 kg ha\(^{-1}\)) which was significantly superior to 15 DAS (3138 kg ha\(^{-1}\)) scheduling but was at 20 DAS scheduling (3592 kg ha\(^{-1}\)). Similar results were reported by Mohan Das and Govind Reddy (2009) where frequency of nitrogen application at 25-55-85 -115 DAS recorded larger quantity of SCY. Application of nitrogen in four splits as per zonal recommendation was reported by Reddy and Gopinath (2008).

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<th>TABLE 1: Effect of scheduling nitrogen and nitrogen levels on yield attributes and seed cotton yield of Bunny Bt.</th>
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RESULTS AND DISCUSSION

Effect of nitrogen levels: Increased nitrogen levels were studied for three years on Bunny Bt. Increasing nitrogen levels from 120 kg N ha$^{-1}$ to 180 kg N ha$^{-1}$ did not have any influence on the yield attributes or seed cotton yield of Bt cotton though numerically mean SCY was highest with 180 kg N ha$^{-1}$ (3614 kg ha$^{-1}$). This trend indicates that recommended level of nitrogen viz., 120 kg N ha$^{-1}$ is sufficient for Bt cotton to obtain good yields. These results corroborate with the findings of Narayana et al (2008) that increased NPK levels had no significant influence on seed yield of Bt cotton Bunny at RARS, Lam, Guntur in black soils. Similar results were reported by Mohan Das et al (2009). Similarly increase in seed cotton yield with recommended fertilizer in cotton variety Narsimha on a soil with low available nitrogen was reported by Munirathnam and Sangita (2008). However, the seed cotton yield obtained at 150 kg N/ha was less compared to that obtained at 120 kg N/ha probably due to low boll weight obtained at 150 kg N/ha than at 120 kg N/ha.

Three years mean interaction between nitrogen scheduling and levels of nitrogen was non significant for all the parameters.

Quality and Economics:

Ginning out-turn was influenced by scheduling of nitrogen and nitrogen levels while seed index was influenced by scheduling of nitrogen only. However, either scheduling of nitrogen or levels did not influence the lint index. Seed index was significantly higher when nitrogen was scheduled from 15 DAS (9.79 g) compared to nitrogen scheduled either from 20 or 25 DAS. (Table 2). Ginning out-turn was maximum (38.0 %) with nitrogen scheduling from 25 DAS and on par with 20 DAS scheduling but significantly superior over 15 DAS (36.5). Ginning out-turn decreased as the nitrogen levels increased due to availability of more nitrogen resulting in immature fibres, which might have reduced the ginning out-turn(Table 2). These results were in conformity with the findings of Sunitha et al, (2010). Net returns and BC ratio also were highest when nitrogen was applied in splits starting from 25 DAS. (Table 2). Maximum net returns and BC ratio were obtained at 180 kg N/ha .However, there was decrease in net returns and BC ratio at 150 kg N/ha than 120 kg N /ha due to low SCY obtained at 150 KgN/ha.

It can be concluded that since Bt hybrids are earlier in duration, early split application of nitrogen can be recommended without increasing the recommended dose of nitrogen beyond 120 kg ha$^{-1}$ for hybrid cotton to realize good yields under rainfed conditions of Adilabad in Northern Telangana zone of Andhra Pradesh even in soils where available nitrogen is low.
REFERENCES


