



Influence of Legume Intercropping on Yield of Bt Cotton

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ABSTRACT

A field experiment was undertaken to study the effect of intercropping legumes in *Bt* cotton on clay soil during *Kharif*, 2015. Experiment was laid out in Randomized Block Design with four replications. The legumes included greengram, blackgram, cowpea and soybean grown in 1:2 ratio with *Bt* cotton. Results indicated that intercropping of cotton with blackgram resulted in higher seed cotton equivalent yield which was comparable with cotton + greengram and cotton + cowpea. Legumes as sole crops resulted in higher yields than when intercropped with cotton. Performance of soybean, cowpea and greengram were on par when intercropped with cotton.

Key words: *Blackgram, Cotton, Greengram, Intercropping, Legumes.*

Intercropping is recognized as a potential system of crop production in subsistence farming which provides yield advantage over sole cropping, because the component crops utilize the natural and artificial resources aptly to complement each other, which in turn, contributes to higher yield of the crops (Prasad and Prasad, 1988). Intercropping of crops having different growth habit, canopy adoption and root system can easily be accommodated with least competition in cotton. Choice of intercrops can vary depending on the ecological conditions, land holding size and marketing possibilities (Brintha and Seran, 2009).

Intercropping cotton with short duration legumes offer good scope for stability in production and profit besides offering pest control, carbon sequestration, organic N addition, soil stabilization and nutrient recycling apart from fulfilling the basic need of pulses for consumption purpose. However, intercropping with legumes is not so popular among the farming community of Krishna Agro Climatic Zone in AP. Hence, the present trial was conducted to study the effect of intercropping legumes in cotton.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural College Farm, Bapatla under rainfed conditions during *kharif*, 2015. The soil was clay having pH 7.3 and organic carbon 0.52 per cent.

The available nitrogen, phosphorus and potassium contents were 190.3, 23.0 and 294.6 kg ha⁻¹, respectively. The experiment consisted of nine treatments, viz., T₁- Sole cotton; T₂- Cotton + Greengram; T₃- Cotton + Blackgram; T₄- Cotton + Cowpea; T₅- Cotton + Soybean; T₆- Sole greengram; T₇- Sole blackgram; T₈- Sole cowpea; T₉- Sole soybean. The experiment was laid out in Randomized Block Design with four replications. Cotton was sown at 90 cm × 60 cm and two rows of intercrops were sown in between the lines of cotton. The varieties sown were Jadoo BG-II (cotton), LGG - 460 (greengram), PU -31 (blackgram), Gowthami (cowpea) and JS335 (soybean). Recommended dose of 120:60:60 kg NPK ha⁻¹ was applied in the form of urea, SSP and MOP, respectively to cotton. Entire phosphorus was applied basally. Nitrogen and potassium were applied in three splits at 30, 60 and 90 DAS by pocketing method. Recommended dose of NPK kg ha⁻¹ were applied to the legumes as basal viz., blackgram and greengram - 20 : 50 kg ha⁻¹, soybean - 30:60:40 kg ha⁻¹ and cowpea - 20:50:25 kg ha⁻¹. Cotton and intercrops were hand dibbled simultaneously. Other production aspects such as intercultivation and weeding for cotton remained same in all the treatments. A total rainfall of 646.4 mm (33 rainy days) was received during the crop growth period. Cotton equivalent yield was calculated by converting the seed yield of legume

intercrops into cotton seed equivalent yield on the basis of selling prices in the market.

RESULTS AND DISCUSSION

SEED COTTON YIELD

Highest seed cotton yield was recorded with sole cotton which was statistically comparable with cotton + blackgram (Table 1). Among, the different intercropping treatments, cotton + blackgram recorded the highest seed cotton yield of 1917 kg ha⁻¹ which was on par with cotton + greengram (1807 kg ha⁻¹), cotton + cowpea (1736 kg ha⁻¹) and cotton + soybean (1690 kg ha⁻¹). There was a reduction in seed cotton yield by 21.54 per cent when intercropped with soybean in 1:2 ratio over sole cotton which was maximum among the different intercrops. Yield reduction was relatively more by intercropping soybean due to the fact that soybean crop competed with cotton crop relatively for a longer time of 95 to 100 days than the cowpea, greengram and blackgram intercrops. The investigations of Ramanjaneyulu and Buchareddy (2002) also confirmed that the intercropped soybean competed, lowering the yield of cotton. The reduction in seed cotton yield when intercropped

with cowpea, greengram and blackgram was 19.4, 16.1 and 11.0 per cent, respectively compared to sole cotton. On an average, cotton intercropped with legumes recorded 17.04 per cent less seed cotton yield than sole cotton.

INTERCROPS YIELD

The present investigation revealed that seed yield of different sole crops was higher when compared with the yields of intercropped legumes in *Bt* cotton at 1:2 row ratio. Highest seed yield of legumes was recorded with sole soybean followed by sole cowpea and sole greengram which were significantly superior over the yield of sole blackgram. Similar is the case with intercropping situation also. Intercropped legumes viz., greengram, blackgram, cowpea and soybean on an average produced 43.42, 37.27, 36.18 and 32.67 per cent less yield than their sole crops, respectively.

COTTON EQUIVALENT YIELD

Total productivity of the system in terms of cotton equivalent yield revealed that, cotton + blackgram was the most productive intercropping system which was statistically comparable with

Table 1. Seed cotton yield, intercrop yield and Cotton equivalent yield as influenced by different intercrops.

Treatment	Seed cotton yield (kg ha ⁻¹)	Intercrop yield (kg ha ⁻¹)	Cotton equivalent yield (kg ha ⁻¹)
Sole cotton	2154	—	2154
Cotton + Greengram	1807	508	2303
Cotton + Blackgram	1917	488	2393
Cotton + Cowpea	1736	575	2044
Cotton + Soybean	1690	616	2231
Sole greengram	—	898	877
Sole blackgram	—	778	759
Sole cowpea	—	901	483
Sole soybean	—	915	804
SEm±	100.9	37.8	80.5
CD (p=0.05)	310	111	235
CV (%)	10.8	10.7	10.3

Market prices of different crops (Rs. /q)

Cotton	Greengram	Blackgram	Cowpea	Soybean
4100	4000	4000	2200	3600

cotton + greengram and cotton + soybean. These three treatments were significantly superior to rest of the treatments. Seed cotton equivalent yield increased by 11.09, 6.91 and 3.57 per cent with growing of blackgram, greengram and soybean as intercrops respectively, as compared to sole cotton. A reduction of about 5.10 per cent was observed in cotton equivalent yield by taking cowpea as an intercrop with cotton over sole cotton. Similarly, Balasubramanian *et al.* (1994) and Chellaiah and Gopaldaswamy (2002) reported that cotton intercropped with blackgram, greengram, soybean gave significantly higher seed cotton equivalent yield than sole cotton.

It can be concluded that though the seed cotton yield was higher in sole cotton the cotton equivalent yield was higher in cotton + blackgram intercropping system followed by cotton + greengram.

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