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Research Article

Economics of transplanted Bt. cotton (*Gossypium hirsutum* L.) to different plant geometry under irrigated condition

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Abstract : The field experiment was conducted during 2010-11 at Main Agricultural Research Station Farm, Raichur to assess the economics of transplanted Bt. cotton under irrigated condition. The results of the investigation indicate that the row spacing of transplanted cotton 90 cm x 60 cm registered significantly higher net returns (Rs. 1,07,118 ha^{-1}) but was found at par with row spacings of 90 cm x 45 cm (Rs. 1,03,109 ha^{-1}) and 120 cm x 45 cm (Rs. 99,639 ha^{-1}) of transplanted cotton than other spacings of transplanted cotton. The row spacing of 120 cm x 45 cm of dibbled cotton registered significantly lower net returns (Rs. 76,258 ha^{-1}) as compared to all the row spacings of transplanted cotton. The transplanting treatments with different plant densities recorded relatively higher cost of cultivation which was ranged from Rs. 33,009 to 37,638/ha compared to dibbled cotton. Benefit cost ratio was significantly higher with the 90 cm x 60 cm spacing of transplanted cotton (4.00) as compared to transplanted cotton at the row spacing of 90 cm x 45 cm (3.73) and dibbled cotton at the row spacing of 90 cm x 60 cm (3.78) and 120 cm x 45 cm (3.58).

Key Words : Bt. cotton, Dibbling, Economics, Plant geometry, Transplanting, Seed cotton yield

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INTRODUCTION

Cotton is an important fibre crop of India contributing about 85 per cent of raw materials to textile industry. It is the most important global cash crop and controls economy of many nations. The projection made in India for cotton lint for 2020 AD is around 47.5 million bales. India has the largest acreage (10.5 m.ha) under cotton and ranks second in production (310 lakh bales) after china. The productivity per ha in India is 518 kg lint/ha, which is very low when compared to world's average productivity of 767 kg lint/ha (Anonymous, 2010). There is much scope to increase cotton productivity through optimization and adaptation of appropriate agro-techniques. Among several production practices, planting geometry and time of planting have greater role in boosting the yield of cotton (Bhalearo *et al*., 2008). The actual yield levels are lower compared to the potential yields. Some of the reasons for low productivity are delayed sowing by dibbling method due to late release of canal water and poor germination. Under such situations, techniques like raising seedlings in polythene bags in a nursery well in advance and transplanting in to the main field may increase the yield and also mitigate the ill effects and compensate the yield of delayed sowing. Hence, it is necessary to adaptation of transplanting technique for Bt. cotton under late sown situations. In the present study, attempt was made to study the economics of transplanted Bt. cotton (*Gossypium hirsutum* L.) to different plant geometry under irrigated condition.

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EXPERIMENTAL METHODS

The field experiment was conducted at Main Agricultural Research Station Farm, Raichur during 2010-11 on medium black soil with pH of 8.21 and EC 0.39 ds/m. The available N, P_2O_5 and K_2O in the soil were 323.55, 35.48 and 292.83 kg/ha, respectively. The experiment was laid out in randomized block design (RBD) with three replications. There were seven treatments comprising methods of sowing with varied plant densities. (Transplanting at 90 cm x 45 cm, 90 cm x 60 cm, 90 cm x 90 cm, 120 cm x 45 cm and 120 cm x 60 cm and dibbling at 90 cm x 60 cm and 120 cm x 45 cm spacings). The cotton variety MRC-7351(Mahyco) BG-II was used. Bt. cotton seeds were sown on 24th June 2010 in polythene bags (9" x 6"). These polybags were filled with black soil and FYM in 3: 1 ratio. Soil was moisturized to field capacity and seeds were dibbled at the rate of one seed per polybag at a depth of 4-5 cm in the centre. Soil moisture in polybag was maintained by watering regularly. The seedlings were exposed to direct sunlight under protected condition. Twenty five days old seedlings were transplanted in main field on 19th July 2010 as per the treatment details. In dibbled plots, seeds were sown on the same day of transplanting of seedlings.

The recommended dose of 150:75:75 kg NPK per hectare was used for the study. One fourth of nitrogen and potassium and entire phosphorus in the form of Urea, Muriate of Potash (MOP) and Diammoniam phosphate (DAP), respectively were band placed, 4-5 cm deep and about 5 cm away from the seed as basal dose. Remaining dose of nitrogen and potassium in the form of urea and muriate of potash (MOP), respectively were top dressed in three-splits at 30, 60 and 90 days after sowing in the ring formed 5 cm away from the plant. The total seed cotton picked from the net plot of each treatment in different pickings was used for working out seed cotton yield per hectare and expressed in kg. The economics of various treatments was calculated as per the prevailing market prices during the period of experimentation.

EXPERIMENTAL RESULTS AND ANALYSIS

The acceptance of new technology by the farmers ultimately depends on the economics involved in the crop production. Transplanting of cotton led to incurring of higher cost of cultivation than direct sowing. Raising seedlings in polythene bags and transplanting in main field increased the cost of cultivation and raising the seedlings and transplanting were labour intensive. The transplanting treatments with different plant densities recorded relatively higher cost of cultivation which was ranged from Rs. 33,009 to 37,638/ha over dibbled cotton. Transplanted cotton recorded relatively higher cost of cultivation, but consequent upon higher seed cotton yield, it resulted in higher gross returns, net returns and B: C ratio over the dibbled cotton.

Among different row spacings of transplanted cotton, the row spacing of 90 cm x 60 cm spacing fetched maximum gross and net returns (Rs. 1,42,809 and 1,07,118 ha^{-1}, respectively) and closely followed by 90 cm x 45 cm (Rs. 1,40,747 and 1,03,109 ha^{-1}, respectively) and 120 cm x 45 cm spacings (Rs. 1,35,022 and 99,639 ha^{-1}, respectively) than other spacings of transplanted cotton. The increase in net returns with transplanted cotton at 90 cm x 60 cm was 28.80 and 40.46 per cent when compared to dibbling at 90 cm x 60 cm and 120 cm x 45 cm spacings, respectively. The lowest gross returns (Rs. 1,05,809 ha^{-1}) as well as net returns (Rs. 76,258 ha^{-1}) were noticed with dibbling at 120 cm x 45 cm spacing. The higher net returns with transplanted cotton was mainly due to higher seed cotton yield. These results are in accordance with the findings of Sarkar and Malik (2004) and Rajakumar *et al.* (2010) and Salikanop *et al.* (2010) who noticed higher net returns with transplanted cotton over

Table 1 : Seed cotton yield (kg ha^{-1}), cost of cultivation (Rs. ha^{-1}), gross returns (Rs. ha^{-1}), net returns (Rs. ha^{-1}) and benefit cost ratio of Bt. cotton as influenced by transplanting under different planting geometry

Treatments	Seed cotton yield (kg ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Gross returns (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	Benefit cost ratio
T_1 – Transplanting 90 x 45 cm	2787	37638	140747	103109	3.73
T_2 – Transplanting 90 x 60 cm	2828	35690	142809	107118	4.00
T_3 – Transplanting 90 x 90 cm	2492	33009	125859	92849	3.81
T_4 –Transplanting 120 x 45 cm	2674	35382	135022	99639	3.81
T_5 – Transplanting 120 x 60 cm	2563	33704	129425	95721	3.83
T_6 – Dibbling 90 x 60 cm	2238	29835	113000	83164	3.78
T_7 – Dibbling 120 x 45 cm	2095	29550	105809	76258	3.58
S.E.±	63	-	3158	3033	0.07
C.D. (P=0.05)	193	-	9730	9345	0.21

dibbled cotton. In china, net revenue generated ranged from 20.8 to 22.5 per cent by transplanting over dibbling (Dong *et al*., 2005).

Various spacing of transplanted cotton had significant influence on benefit cost ratio. Transplanted cotton at the row spacing of 90 cm x 60 cm recorded significantly superior B: C ratio (4.00) compared to transplanted cotton at the row spacing of 90 cm x 45 cm (3.73) and dibbled cotton at the row spacing of 90 cm x 60 cm (3.78) and 120 cm x 45 cm (3.58). While the lowest benefit cost ratio was noticed with dibbled cotton at 120 cm x 45 cm (3.58) on account of higher seed cotton yield. These results are also in accordance with Salikanop *et al*. (2010) who noticed higher benefit cost ratio with transplanted cotton than the dibbled cotton.

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