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Evaluating the performance of drip irrigation in cotton

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Abstract

A field experiment was conducted during *Kharif* in three consecutive years 2016, 2017 & 2018 at three locations in farmer's fields, which includes Dasarigudem, Elikatte, and Ramannapet villages of Erstwhile Nalgonda district. In on farm trails (OFT) compared the performance of growing cotton crop under drip irrigation and conventional farmer practices. The average seed cotton yield (1950 kg Ac^{-1} , 1920 kg Ac^{-1} , 1816 kg Ac^{-1}), gross returns (Rs. 78975 Ac^{-1} , Rs. 97536 Ac^{-1} , Rs. 78451 Ac^{-1}), net returns (Rs. 49375 Ac^{-1} , Rs. 67786 Ac^{-1} , Rs. 58611 Ac^{-1}), B:C ratio (2.66, 3.27, 3.95) at all three locations during *kharif* season, respectively recorded the highest in drip irrigation system than the farmers practice.

Keywords: Drip irrigation, cotton, OFT

Introduction

Cotton (*Gossypium hirsutum* L.), is one of the major cash crop of India, popularly known as 'White gold' and 'king of fibers' for its role in the national economy in terms of foreign exchange earnings and employment generation. In India, cotton cropping provides 60% of the fiber to textile industries, supplies more than one million metric ton of cooking oil, animal feed and 40 million metric tons of biomass in the form of cotton stalks. India accounts for around 37.5% of the global cotton area and contributes to 26% (*i.e.*, 6.20 million metric tons) of the global cotton produce of 23.92 million metric tons. The textile industry, which consumes the cotton, as its principal raw material, contributes about 4% to the GDP and is the major exchange earner for the country. Telangana ranks 3rd in area and production with 52.55 lakh acres and 68.58 lakh bales accounting for 16.65% and 19.02% of all over India, cotton area and production respectively. Among the districts in Telangana, Nalgonda stood first (2.73 lakh ha) followed by Nagarkurnool (1.42 lakh ha), Adilabad (1.40 lakh ha), Sangareddy (1.40 lakh ha) and Komaram Bheem (1.24 lakh ha) in cotton area (www.agri.telangana.gov.in).

The availability of water for irrigation is becoming scarce, due to competition from other sectors and the cost of fertilizers is increasing enormously day by day. Therefore, judicious use of these inputs in scientific manner is essential for increasing the productivity. The lower yields of cotton could be attributed to inefficient irrigation and fertilizer management practices (Veeraputhriam and Chinnusamy, 2009) [6]. In India and Telangana cotton is grown under rainfed conditions and also under furrow irrigation. The existing method of surface irrigation with canal water is inefficient because their application efficiencies are far less as compared to the modern pressurized irrigation systems. To improve water use efficiency there is a need to introduce efficient micro irrigation system like drip irrigation (Chauhan and Shukla, 1990) [1]. By using drip irrigation system water can be saved up to 70 percent (Rao and Dixit, 1994) [4]. Moreover, with drip irrigation system crop yield and cotton quality can also be improved as the application of irrigation water and fertilizer quantity can controlled precisely. Adoption of micro-irrigation might help in increasing productivity of crop, irrigation area and water use efficiency (Sivanappan, 2004) [5]. Drip is more generally localized irrigation has been shown to increase crop water productivity of cotton by increasing yields and decreasing the amount of water used.

Material and Methods

The experiment was conducted during *Kharif* in three consecutive years 2016, 2017 & 2018 at three locations in the farmer's fields which includes Dasarigudem, Elikatte, and Ramannapet villages of erstwhile Nalgonda district. In field experiment, compared the performance of cotton crop under drip irrigation with conventional farmer practices. In field experiment only irrigation has given through the drip. The recommended dose of fertilizers (RDF) N-P₂O₅-K₂O @ 120-60-60 kg ha⁻¹ were applied manually in soil, as entire recommended dose of

phosphorus was applied in the form of single super phosphate as basal at the time of sowing, nitrogen and potassium were applied in the form of urea and murate of potash at 20 DAS, 40 DAS, 60 DAS and 80 DAS to soil.

Results and Discussion

Comparative yield performance of drip irrigation cotton with conventional practice

In all the three locations of Nalgonda district drip irrigated field was recorded higher seed cotton yield compared to the respective locations of farmers practice. In 2015-2016 average seed cotton yield was about 36.4% higher in drip irrigated field compared to farmers practice. In 2016-2017 average seed cotton yield was about 41.6% higher in drip irrigated field compared to farmers practice. In 2017-2018 average seed cotton yield was about 46.8% higher in drip irrigated field compared to farmer practice. Similar findings were also reported by Kalfountzos *et al.*, 2009^[7].

Economics of drip irrigated cotton with conventional practice

In 2015-2016 cost of cultivation was higher in drip irrigated field (Rs. 29,600 per Ac) than the farmers practice (Rs. 17,000 per Ac) and also gross returns, net returns and B:C ratio recorded higher in drip irrigated field (Rs. 78975 per Ac, Rs. 49375 per Ac, 2.66) than the farmers practice (Rs. 28755 per Ac, Rs. 11755 per Ac, 1.69). In 2016-2017 cost of cultivation was higher in drip irrigated field (Rs. 29750 per Ac) than the farmers practice (Rs. 17100 per Ac) and also gross returns, net returns and B:C ratio recorded higher in drip irrigated field (Rs. 97536 per Ac, Rs. 67786 per Ac, 3.27) than the farmers practice (Rs. 40640 per Ac, Rs. 23540 per Ac, 2.37). In 2017-2018 cost of cultivation was higher in drip irrigated field (Rs. 19840 per Ac) than the farmers practice (Rs. 17400 per Ac) and also gross returns, net returns and B:C ratio recorded higher in drip irrigated field (Rs. 78451 per Ac, Rs. 58611 per Ac, 3.95) than the farmers practice (Rs. 36720 per Ac, Rs. 19230 per Ac, 2.11). Similar findings were also reported by Rajak *et al.*, 2006^[3].

Table 1: Comparative yield and economic performance of drip irrigated cotton with conventional practices

Season	Kharif 2015-16		Kharif 16-17		Kharif 17-18	
	Trial Yield (kg/Ac)	Farmer Practice Yield (kg/Ac)	Trial Yield (kg/Ac)	Farmer Practice Yield (kg/Ac)	Trial Yield (kg/Ac)	Farmer Practice Yield (kg/Ac)
Location 01	2035	770	1850	756	1832	920
Location 02	1965	620	1946	832	1766	785
Location 03	1850	740	1964	812	1850	845
Average Yield	1950	710	1920	800	1816	850
Cost of cultivation	29600	17000	29750	17100	19,840	17400
Gross returns	78975	28755	97536	40640	78,451	36,720
Net returns	49375	11755	67786	23540	58611.00	19230.00
BC Ratio	2.66	1.69:1	3.27	2.37	3.95	2.11
Price (Rs /qtl)	4050 /qtl		5080 /qtl		4320 /qtl	

Conclusions

The OFT study was conducted in Erstwhile Nalgonda district at three locations in farmer's field on drip irrigation in cotton concluded that the trail field which was drip irrigated and the recommended fertilizer practices have higher seed cotton yield, cost of cultivation, gross returns, net returns and B: C ratio than the farmer practices.

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