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A CASE STUDY

On farm demonstrations on response of chickpea to irrigation in farmers fields of Anantapuram district of Andhra Pradesh

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Abstract : Six on-farm demonstrations were conducted to popularize the effect of irrigation on growth, yield components, yield and economics of chickpea in two villages *viz.*, Akuledu and R. Kothuru of Anantapuram district with an area of 7.2 hectares during *Rabi* season over a period of 3 years from 2007-08 to 2009-10. The results revealed that growth parameters like plant height, number of pods per plant, hundred pod weight, hundred seed weight of chickpea were improved by providing irrigation at 35 and 55 DAS compared to farmers practice. By giving irrigation at 35 and 55 DAS plant height, number of pods per plant, 100 pod weight and 100 seed weight were increased by 9.1, 38.7, 16.9, and 23.4 per cent, respectively over farmers practice. Irrigation at 35 and 55 DAS recorded higher seed yield (2006 kg ha^{-1}) which was 35.1 per cent higher over farmers practice (1485 kg ha^{-1}). Gross returns (Rs. 44655/-) and net returns (Rs. 34080/-) per hectare were more with irrigation at 35 and 55 DAS compared to farmers practice (Rs. 32783/- gross returns and Rs. 19908/- net returns).

Key Words : Chickpea, Irrigation, Farmers fields, Anantapuram district

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INTRODUCTION

Chickpea is the most important winter pulse crop of India occupying 9.51 million ha with an annual production of 8.8 million tonnes accounting to 75 per cent of world production (Anonymous, 2011). Among the pulses chickpea occupies 30 per cent of area and 38 per cent of annual production in India. In Andhra Pradesh it is cultivated in 6.81 lakh hectares with average productivity of 1115 kg ha^{-1}. In Anantapuram district chickpea is the major pulse crop cultivated under residual soil moisture conditions during *Rabi* season with an area of 90,000 ha, 77,000 tonnes production and with a productivity 862 kg ha^{-1}. In this district nearly 90 per cent of chickpea is cultivated under rainfed condition exclusively under residual soil moisture conditions, farmers never irrigate crop as they feel that yellowing of leaves occur due to irrigation. As a consequence, the crop experiences progressively increasing degree of moisture stress and thus, assumes a major limiting factor determining growth and yield of chickpea. Several

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research workers have reported positive response of chickpea to irrigation (Agarwal, 1997). Soil moisture plays a critical role in chickpea production influencing the plant growth right from the seedling establishment to maturity. Yield and yield attributing characters of chickpea are significantly influenced by the level of irrigation (Maity and Jana, 1987).

Hence, considering the above points on farm demonstrations were conducted in farmers fields to popularize beneficial effects of irrigation on chickpea among farmers under supervision of DAATT Centre (Extension unit of Acharya N.G. Ranga Agricultural University, Andhra Pradesh), Anantapuram for three years during *Rabi*, 2007-08 to 2009-10. The comparison was made between chickpea with irrigation and farmers practice (without irrigation) with an objective to obtain higher productivity in farmers' fields.

MATERIAL AND METHODS

Nine on-farm demonstrations were conducted to popularize the effect of irrigation on growth, yield components, yield and economics of chickpea in two villages *viz.,* Akuledu and R. Kothuru of Anantapuram district with an area of 7.2 hectares during *Rabi* season over a period of 3 years from 2007-08 to 2009-10 (Table 1). The treatments consisted of T_1: irrigation at 35 and 55 DAS and T_2: farmers practice. Plot size for each treatment of on-farm demonstration was 4000 m^2. In each year of on-farm demonstration soil samples were collected from farmer's fields and analyzed at Krishi Vigyan Kendra, Reddipalli (Anantapuram district). The soil analysis revealed that pH varied from 6.1 to 8.3, EC ranged from 0.05 to 0.49 dS m^{-1}, organic carbon was 0.05 to 0.38 per cent, available nitrogen was low in all the samples, available phosphorus was medium to high (36.2 to 67.2 kg ha^{-1}) and available potassium was low to medium (71 to 285 kg ha^{-1}). Chickpea variety JG -11 of 100-105 days duration was sown in first fortnight of November during three years of demonstration with spacing of 30 cm × 10 cm on flat beds. The seeds of chickpea were treated with carbendezim @ 3g and *Trichoderma viridi* @ 8 g/ kg seeds before sowing, respectively. In both treatments fertilizers were applied according to soil test results. The recommended dose of fertilizer 8-20-8 kg N, P and K/ha was applied at the time of sowing, respectively. During entire period of study nitrogen was low in all soil samples, hence, full recommended dose of nitrogen was applied. If the phosphorus and potassium nutrient status is medium, half of the recommended dose of fertilizers were applied. No fertilizers were applied if their status is high. In farmers practice 150 kg DAP per ha^{-1} was applied. The crop was harvested at 85-90 days after sowing (DAS). At harvest ten plants were randomly selected from each treatment for recording growth parameters such as plant height (cm), number of pods/ plant, 100 pod weight and 100 seed weight. At harvest in each treatment grain yield from the net plot (5 × 5 m) was recorded. Both treatments received uniform plant protection and cultural management practices throughout the period of crop growth. Labour charges, cost of inputs were worked out to compute the cost of cultivation. Gross returns were calculated based on local market prices of chickpea and net returns by subtracting the total cost of cultivation from gross returns.

Benefit :

Cost ratio was computed by dividing gross returns with cost of cultivation.

RESULTS AND DISCUSSION

The results of on-farm demonstrations on response of chickpea to irrigation at 35 and 55 DAS in comparison with farmers practice are given in Table 2. The results revealed that growth and yield attributes like plant height, number of pods per plant, hundred pod weight, hundred seed weight of chickpea were improved by providing irrigation at 35 and 55 DAS compared to farmers practice.

Growth and yield attributes :

Higher plant height of 38.4 cm was recorded with irrigation at 35 and 55 DAS compared to farmers practice (35.2 cm). There were more number of pods per plant (46.6) in irrigation at 35 and 55 DAS as compared to 33.6 pods in farmers practice. Higher 100 pod weight of 57.9 g was recorded with irrigation at 35 and 55 DAS compared to farmers practice (49.5 g). Similarly higher 100 seed weight of 39.6 g was recorded with irrigation at 35 and 55 DAS compared to farmers practice (32.1cm) which can be attributed to favourable moisture conditions resulting from irrigations at critical phonological stages of flowering and seed filling. Similar results were reported by Ray *et al*. (2011). By giving irrigation at 35 and 55 DAS plant height, number of pods per plant,100 pod weight and 100 seed weight were

Table 1 : Details of on-farm demonstrations

Sr. No.	Year	Number of villages	Number of locations	Area (ha)
1.	2007-08	3	3	2.4
2.	2008-09	3	3	2.4
3.	2009-10	3	3	2.4
	Total	9	9	7.2

Table 2 : Yield of chickpea as influenced by irrigation at 35 and 55 DAS **(Mean of 3 years data)**

Sr. No.	Particulars	Irrigation at 35 and 55 DAS	Farmers practice	% increase or decrease over farmers practice
1.	Plant height (cm)	38.4	35.2	9.1
2.	No. of pods per plant	46.6	33.6	38.7
3.	100 pod weight (g)	57.9	49.5	16.9
4.	100 seed weight (g)	39.6	32.1	23.4
5.	Seed yield (kg ha^{-1})	2006	1485	35.1
6.	Cost of cultivation (Rs. ha^{-1})	10575	12875	-17.9
7.	Gross returns (Rs. ha^{-1})	44655	32783	36.2
8.	Net returns (Rs. ha^{-1})	34080	19908	71.2
9.	C:B ratio	1:4.2	1:2.6	61.5

increased by 9.1, 38.7, 16.9 and 23.4 per cent, respectively over farmers practice. Whereas, in farmers practice due to no irrigation at critical stages probably led to poor growth which was also reflected in growth and yield attributes such as plant height, number of pods per plant, 100 pod weight and 100 seed weight. Similar findings were observed by Ahlawat and Gangaiah (2010).

Seed yield :

Irrigation at 35 and 55 DAS recorded higher seed yield (2006 kg ha^{-1}) which was 35.1 per cent higher over farmers practice (1485 kg ha^{-1}). Higher number of pods per plant, 100 pod weight and 100 seed weight might be the reason behind the yield increase in irrigation at 35 and 55 DAS treatment as reported by Ray *et al*. (2011). Lower seed yields under farmers practice might be due to no irrigation at critical stages probably led to poor growth due to moisture stress which was also reflected in growth and yield attributes such as number of pods per plant, 100 pod weight and 100 seed weight. Similar findings were observed by Ahlawat and Gangaiah (2010).

Economics :

Gross returns (Rs. 44,655/-) and net returns (Rs. 34,080/-) per hectare were more with irrigation at 35 and 55 DAS compared to farmers practice (Rs. 32,783/- gross returns and Rs. 19,908/-net returns). This was due to higher grain yield with irrigation at 35 and 55 DAS. Higher gross returns of Rs.11872/- per hectare was obtained with irrigation at 35 and 55 DAS due to higher seed yield compared to farmers practice. The cost of cultivation was comparatively low in irrigation at 35 and 55 DAS due to application of fertilizers as per soil test results which resulted in gaining an additional net profit of Rs.14172/- per hectare in irrigation at 35 and 55 DAS as compared to farmers practice (Table 2). Similar results were reported by Tomar (2010). Simultaneously cost benefit ratio was higher with irrigation at 35 and 55 DAS (1:4.2) compared to farmers practice (1:2.6) because of lower cost of cultivation and improved yield with irrigation at 35 and 55 DAS. In irrigation at 35 and 55 DAS cost of cultivation was reduced by 17.9 per cent whereas, gross returns and net returns were improved by 36.2 and 71.2 per cent, respectively over farmers practice.

From the results of these demonstrations it can be concluded that irrigating chickpea crop at 35 and 55 DAS were found more productive and profitable in terms of

growth, yield and economic advantage compared to farmers practice.

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