J Krishi Vigyan 2020, 8 (2) : 16-20 DOI : 10.5958/2349-4433.2020.00004.5

Assessment of Yield and Economics of Chickpea (*Cicer arietinum* L.) in Peddapalli district of Telangana State

Venkanna Yasa[×] and Bhaskar Rao B

Krishi Vigyan Kendra, Ramagirikhilla, Peddapalli-505212 (Telangana)

ABSTRACT

A technology demonstration of chickpea (*Cicer arietinum* L.) was aimed to improve the production after bringing new areas in to cultivation in Peddapalli district of Telangana. The vacant fields of rice-fallow under medium black soils with limited irrigation were selected. Studies were carried out to assess yield and economics of a full package with a new variety, NBeG3 at the farmer's field under cluster front line demonstration (CFLD) for three years (2016-17 to 2018-19). The results of 50 plots each 0.4 ha showed an increase in yield of 46.15, 28.6 and 22.6 per cent over farmer's practice during the year 2016-17, 2017-18 and 2018-19, respectively. Overall means of three years was found to be significantly higher for yield (1447 kg/ha), net profit (Rs. 37998/ha) and B:C ratio (2.3) compared to control. This study revealed the fulfillment of extension yield gap (337 kg/ha) by incurring Rs. 1333/ha which fletched an additional profit of Rs. 14921/ha.

Key Words: Chickpea, Extension gap, Front Line Demonstration, Rice fallow, Technology gap, Technology index.

INTRODUCTION

In India, pulses are playing an important role in regular diet by contributing a major share to the total intake of proteins. Apart from the supply of protein, pulses adds nitrogen to soil and improve physical structure of soil, fit in to mixed/inter cropping system/crop rotation, provide green pods used as vegetable and foliage as nutritious fodder for cattle. Among the various pulses Chickpea (*Cicer arietinum* L.) is the most important pulse crop. Even though India ranks first in area and production of chickpea, it was importing from Australia (85.1%), Russia (4.7%) and other countries to meet its own consumption. One of the reasons for this was the low productivity (995 kg/ha) as against world's highest productivity of 3759 kg/ha (Anon, 2016).

Over the past two decades there was a shifting in pulses production from northern states to central and southern states of India. Telangana is one of the important states grown chickpea with higher yield (1459 kg/ha) compared to national average (995 kg/ha). In Telangana, rice is one of the major crops grown under open and bore well irrigation system. Due to insufficient availability of ground water, majority of rice area was kept as fallow during Rabi. In some packets of rice fallow chickpea was in practice under broadcasting method of cultivation in black soils. In those farming situations where black soils existed with limited irrigation sources, chickpea can be promoted with new technologies. To bridge the yield gap between the potential and realized yield, some of the technologies were recommended as critical *viz*., deep summer ploughing once in 3 years, soil test based fertiliser application, seed treatment with Rhizobium, application of PSB and *Trichoderma viridi,* use of wilt tolerant varieties, installation of bird perches, nipping at 15-20 cm height, two irrigations first at branching and second at pod initiation stage, timely weed control and spray of NSKE 5% or Azadirachtin 0.03% (300 ppm) at pre-flowering stage (PJTSAU).

Keeping in view the need of increasing pulses production, chickpea production technology was demonstrated as a whole package under rice-fallow

Corresponding Author's Email: yvkanna@gmail.com

in Peddapalli district of Telangana under cluster front line demonstration programme.

MATERIALS AND METHODS

The area of rice fallow under medium-black soils having considerable irrigation facilities was selected in the villages of Peddapalli district of Telangana State. Pre-seasonal interaction was conducted during the initiation year, 2016-17 and collected information on existing practices, yields, profits and problems faced by the farmers. Based on the collected information, technological gaps were identified and a suitable demonstration package was prepared. As the seed was an important factor, a new chickpea variety, NBeG3 was selected against existing old variety, JG11 and demonstrated as a whole package with a recommended package of practices by state agricultural university (Professor Jayashankar Telangana State Agricultural University) (Table 1).

With the improved package of practices, assessment was carried out by taking 0.4 ha as a unit and covered a total of 20.0 ha with 50 farmers. Chickpea fields from adjacent area in the same village were considered as control (farmer's practice). The demonstrations were laid out for three consecutive years from 2016-17 to 2018-19. In each year a pre-seasonal training and three trainings during the crop period were conducted to prepare the farmers on implementation of selected package of practices. The critical inputs were supplied to the farmers by procuring foundation seed of NBeG3 from KVK, Yagantipally, Kurnool district of Andhra Pradesh, *T. viridi* and PSB from Bio Control Laboratory, Karimnagar and remaining were purchased from local market. Data on cost of cultivation, yield and gross returns were collected from each selected farmer as well as from non-practicing farmer for the comparison. From the collected data, mean values for cost of cultivation, yield, gross returns, net profits and B:C ratio were worked out. To know the overall impact over three years of assessment, data were analysed for cumulative mean and variance using F-test. By analysis of technology gap, extension gap and technology index (Samui *et al,* 2000) final conclusions were drawn.

Table 1. Details of different components of assessed technology against the farmer's practice of chickpea.

Sr. No.	Component	Farmer's practice	Assessed technology	Gap
1	Seed rate (kg/ha)	62.5	75	Partial gap
2	Seed treatment	No	Seed treatment with Carbendizum @ 3 g/kg	Full gap
3	Method of sowing	Broadcasting	Line sowing	Full gap
4	Bio-fertiliser	No	Rhizobium & PSB	Full gap
5	Chemical fertilisers	DAP @ 125 kg/ha	Soil test based application	Partial gap
6	Weed control	No	Spraying of Pendimethalin @ 2.5 l/ha as Pre-emergence	Full gap
7	Wilt management	No	*Tricoderma viridi* soil application @ 5 kg/ha	Full gap
8	Number of irrigations	2	2	No gap
9	Pest management	Chemical spray	Azadirachtin 0.03% @ 5 ml/l at pre-flowering stage and need based chemical spray	Partial gap

$$\text{Yield gap (\%)} = \frac{\text{Demonstration yield kg/ha)} - \text{Control yield(kg/ha)}}{\text{Control yield (kg/ha)}} \times 100$$

Technology gap (Kg/ha) = Potential yield (kg/ha) - Demonstrated yield (Kg/ha)

Extension gap (Kg/ha) = Demonstrated yield (kg/ha) – Control yield (kg/ha)

$$\text{Technology index} = \frac{\text{Potential yield (kg/ha)} - \text{Demonstration yield (kg/ha)}}{\text{Potential yield (kg/ha)}} \times 100$$

RESULTS AND DISCUSSION

Yield and Economics

During the first year of assessment (2016-17) obtained higher yields in technology demonstration with a mean of 1,140 kg/ha which was 46.15 per cent higher than farmer's practice (780 kg/ha). With mean gross returns of Rs. 68400/ha realised higher net profits in demonstration (Rs. 32,570/ha) compared to control (Rs. 18,300/ha). However, cost of cultivation was higher in demonstration as incurred towards critical inputs particularly seed. Overall superior performance of demonstrated technology over farmer's practice was resulted an additional income of Rs. 14,270/ha with high B:C ratio (1.91) compared to control (1.64). Despite of increased cost of cultivation for the first year (2016-17), it was reduced during subsequent years by saving Rs. 1472/ha and Rs. 1,860/ha over control in the year 2017-18 and 2018-19, respectively. This cost reduction was achieved due to use of own seed and practicing of other cost effective management practices. For both the consecutive years, increased yields were obtained in demonstration with an increase of 28.6 and 22.6 per cent for the year 2017-18 and 2018-19, respectively. With combined effect of yield increase and cost saving, achieved higher net profits of Rs. 33,600/ha and Rs. 47,825/ha for the year 2017-18 and 2018-19, respectively as compared to control (Table 2). The results obtained in the present study were in line with the findings of Mauria *et al* (2017) who reported the higher net returns (Rs46250/ha) and benefit cost ratio (3.53) for chickpea gained through the improved production technologies demonstrated under CFLD programme.

During the second year of demonstration (2017-18), increased yield (28.6 %) and cost saving (Rs. 1472/ha) were contributed to an additional income of Rs. 14,772/ha by recording higher B:C ratio of 2.28 over control (1.68). The same trend was continued in the third year (2018-19) with an additional income of Rs. 15,720/ha and high B:C ratio of 2.75 as against 2.10 of control. These results were in accordance with the earlier findings of Mauria *et al* (2017), Meena (2017), Purushottam *et al* (2012) and Narwale *et al* (2009) as reported higher yield of demonstration plots compared to the control plots. The cumulative data analysis over three years revealed that, the superiority of demonstrated technology by recording yield increase of 32.5 per

Table 2. Yield and economics of chickpea demonstration (2016-17 to 2018-19).

Year	Plot	Yield (kg/ha)	% increase in yield	Cost of cultivation (Rs/ha)	Cost saving (Rs/ha)	Gross returns (Rs/ha)	Net profit (Rs/ha)	Additional income (Rs/ha)	B:C ratio
2018-19	Demon.	1625	22.6	27250	1860	75075	47825	15720	2.75
	Control	1325	-	29110	-	61215	32105	-	2.10
2017-18	Demon.	1575	28.6	26250	1472	59850	33600	14772	2.28
	Control	1225	-	27722	-	46550	18828	-	1.68
2016-17	Demon.	1140	46.15	35830	-7330	68400	32570	14270	1.91
	Control	780	-	28500	-	46800	18300	-	1.64
Mean	Demon.	1447±112	32.5	29777±1433	-1333	67775±2314	37998±1661	14921	2.3±0.12
	Control	1110±92	-	28444±1129	-	51522±2115	23078±1063	-	1.8±0.09
F(0.05)	-	Sig.	-	NS	-	Sig.	Sig.	-	Sig.

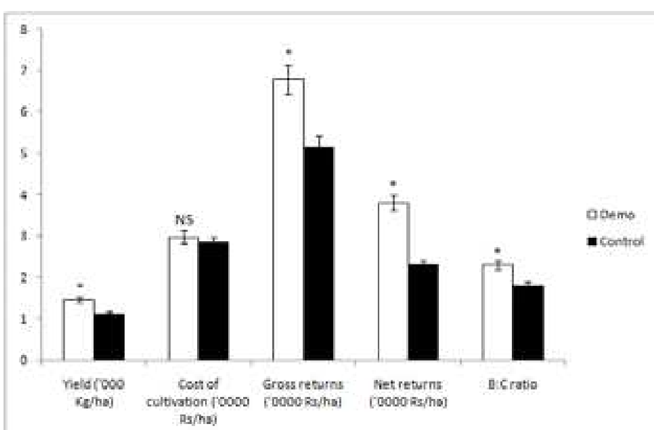
Values are with Mean±SE, NS-Non significant, Sig.-Significant cent with the average additional income of Rs. 14921/ha over control. Similarly the yield increase of chickpea was ranged from 7.10 to 47.28 per cent under demonstration over the farmer's practice as reported by Lakshmi *et al* (2017).

Benefit to Cost ratio

The overall cumulative mean for B:C ratio was recorded as 2.3 and 1.8 for demonstration and farmer's practice, respectively. Overall superior performance was proved for the demonstrated technology by exhibiting significant higher values for yield, net profit and B:C ratio (Fig 1). Present results were in line with the earlier findings of Jayalakshmi *et al* (2018) who reported higher net profits in demonstration with an additional income of Rs 7743/ha and B:C ratio of 2.09 against control (1.59).

Over three years of chickpea demonstration with improved package of practices including a new variety (NBeG3), identified 337 kg/ha as extension yield gap which was filled through the assessed technology with an additional investment of Rs. 1333/ha. However, still there was a considerable technology yield gap (303 kg/ha) to catch the potential yield of 1750 kg/ha as signified by the technology index of 17.3 per cent. Technology yield gap found in this study might be due to variations in the soil fertility status, time of sowing and seasonal weather conditions as similarly concluded by Tomar *et al* (2010) and this could be overcome by developing fine tuned location specific package. The overall findings of present study were in concurrence with the earlier findings of Kaur *et al* (2019) who reported 16.28 per cent increase in yield of chickpea demonstration plots over farmer's practice, and also similarly found technology gap of 125kg/ha, extension gap of 264 kg/ha and technology index of 6.23 per cent.

Figure 1. Cumulative mean yield and economics of chickpea over three years.



NS-non significant, *significant at $P<0.05$, bars for ±SE.

CONCLUSION

Improved technology for cultivation of chickpea under rice-fallow was proved profitable in the present yield economics assessment. It could help the farmers to better utilize the vacant land of rice-fallow and it adds to the pulses production in the district.

ACKNOWLEDGEMENTS

Financial help received from ICAR - ATARI, Zone X, Hyderabad under NFSM-Pulses, Directorate of Pulses Development, Ministry of Agriculture & Farmers Welfare, Gov't of India is duly acknowledged.

REFERENCES

Anonymous (2016). Agricultural statistics at a glance-2018. Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare, Gov't of India.

Jayalakshmi M, Prasad Babu G, Chowdary K R, Vijayabhinandana B and Subba Rao M (2018). Impact of cluster frontline demonstrations (CFLDs) on pulse production productivity, profitability and transfer of Technologies in Kurnool District of Andhra Pradesh, India. *Int J Curr Microbiol App Sci* **7**(12): 937-947. doi.org/10.20546/ijcmas.2018.712.117.

Kaur J, Singh V, Aulakh G S and Raina D (2019). Assessment of front line demonstrations on chickpea in Ferozepur district of Punjab. *J Food Leg* **32**(1): 49-52.

Lakshmi D V, Vijay Kumar P and Padma Veni C (2017). Impact of cluster frontline demonstrations to transfer of technologies in pulse production under NFSM. *Bull Env Pharmacol Life Sci* **6**(1): 418-421.

Mauriya A K, Kumar V, Kumari A, Kumar P, Kumari M and Hoda M Z (2017). Impact of cluster front line demonstrations on productivity and profitability of chickpea (*Cicer arietinum* L.). *J Food Leg* **30**(1): 57-60.

Meena M L (2017). Effect of front line demonstrations of chickpea Cv. RSG-888 on farmer's field in rainfed condition of Rajasthan, India. *Asian J Agril Extn Econ and Sociol* **18**(2): 1-7.

Narwale S S, Pawar A D, Lambade B M and Ugle N S (2009). Yield maximization of chickpea through INM applied to sorghum-chickpea cropping sequence under irrigated condition. *Legumes Res* **4**: 282-285.

Purushottam, Singh S K, Chaudhary R N, Kumar K, Praharaj C S and Krishana B (2012). Assessment of technological inputs for major pulses in Bundelkhan region. *J Food Leg* **25**: 61-65.

Roy B, Singh R, Singh S K, Singh Lakhan and Singh A K (2006). Adoption of improved pulses production technologies and related constraints in Uttar Pradesh. *Indian J Pulses Res* **19**: 104-106.

Samui S K, Maitra S, Roy D K, Mondal A K and Saha D (2000). Evaluation on front line demonstration on groundnut (*Arachis hypogea* L.). *J Indian Soc Coastal Agril Res* **18**: 180-183.

Singh J, Dhillon B S , Astha and Singh P (2012). Front line demonstration-an effective tool for increasing the productivity of summer moong in Amritsar district of Punjab. *Asian J Soil Sci* **7**: 315-318.

Tiwari A K and Shivhari A K (2017). Pulses in India Retrospect & Prospects -2017. Directorate of Pulses Development, Ministry of Agriculture & Farmers Welfare, Gov't of India, pp.330.

Tomar R K S (2010). Maxmization of productivity for chickpea (*Cicer arietinum* L.) through improved technologies in farmer's field. *Indian J Natural Products and Res* **1**: 515-517.

Received on 14/01/2020 *Accepted on 20/04/2020*