

Original Research Article

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Yield Gap Analysis for Chickpea (*Cicer arietinum* Linn) Through Cluster Front Line Demonstration under NFSM Scheme in Barmer District of Rajasthan, India

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ABSTRACT

Enhancing the production potential and socio economic level of farmers, 126 cluster front line demonstration on chickpea laid out during the year 2015-16 to 2017-18. Area under the demonstration was 90 hectare comprising 126 farmer of three villages Nagarda and Bhiyar from Sheo block and Gandhavkhurd from Gudamalani block of Barmer District in Rajasthan. Under the cluster approach for technology dissemination programme recommended intervention i.e. high yielding variety, integrated nutrient management and integrated disease and pest management were attempted. Recommended practice recorded mean yield of 11.94 q/ha, which was 28.64 percent higher over the farmer practices (9.31 q/ha). Additional cost under the intervention of Rs1992 to 3942 gave additional return of Rs. 6245 to 10421 per hectare. Higher side benefit: cost ratio (1.52 – 2.10) was recorded during the study period. The extension gap was observed between 2.11 to 3.08 q/ha, technology gap was observed 8.99 to 13.08 q/ha, whereas technology index 37.46 to 54.50 percent. The favorable benefit ratio exhibited the feasibility of technology demonstrated. Therefore, cluster front line demonstration programme was an effective tool for increasing the productivity of chickpea and changing knowledge, attitude and skill of farmers. This created greater awareness and motivated the other farmers to adopt improved practices of chickpea.

Keywords

Chickpea (*Cicer arietinum* Linn), NFSM, Cluster

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Background and objectives

Oilseed and pulses are the integral part of human diet as they are rich sources of proteins and quality nutrition. Chickpea (*Cicer arietinum* Linn) is a major pulse crop being grown in India occupies 38 percent area (25.26 million hectares) and 50 percent of the total pulse production (16.47 million tonnes) Anonymous (2016). It is being grown all around the country except high altitude of

Northern, North eastern regions and costal peninsula, Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Andhra Pradesh, Karnataka, Gujarat, Chhattisgarh, Haryana, Bihar, Orrisa and West Bengal are the major producing state sharing over 95 percent area. The area, production and productivity of the chickpea in the country is 8.35 million hectare, 7.17 million tones and 8.59 q/ha, respectively. Similarly area, production and productivity of the chickpea in Rajasthan accounting 1.37 million hac, 1.68 million tons

and 12.28 q/ha (IIIrd advance estimate Rajasthan 2017-18). Area under chick pea in Barmer recorded 2014hectare producing 1834 tonnes with productivity of 9.11q/ha (Raj Krishi 2016-17). Average productivity of chick pea in Barmer district was noticed lower side (9.11 q/ha) than the average potential yield (22.00 q/ ha). Through survey, farm diagnostic visit and farmers meeting it was realized that the reason behind the lower productivity was due to lack of improved variety, no seed treatment, imbalance use of inorganic fertilizers, lack of knowledge about IPM practices etc. Among the biotic stress, the gram pod borer is a major pest occurring for 75 per cent pod damage in the crop (Krishan Kant *et al.*, 2007). To combat the causes of yield reduction and technology gap, dissemination of recommended technologies of chickpea through cluster front line demonstration were organized at farmer's field during 2015 -16 to 2017-18.

Materials and Methods

The present study was carried out by Krishi Vigyan Kendra, Barmer-I during *Rabi* season from 2015-16 and 2017-18 in the farmer's field of three villages Nagarda and Bhiyar from Sheo block and Gandhavkhurd from Gudamalani block of Barmer District. Total of 126 front line demonstrations on chickpea were laid out comprising 126 farmers covering the total area of 90 ha with demonstration plots ranging from 0.40 to 0.80 ha. Under the cluster front line demonstrations improved technologies included improved variety (cv. RSG-895 & RSG-896 during 2015-16 and GNG-1581 during 2016-17 and 2017-18), integrated nutrient management (20: 40: 0 kg N: P: K/ha) +*Rhizobium* + P.S.B. @ 600 g per ha, integrated pest management (Deep ploughing + seed treatment with *Trichoderma viridi* + pheromone trap @ 6/ha + Spinosad 190 ml/ha) were tested as intervention. Crop was sown between 20 October to first week of

November with a spacing of 30 cm X 10 cm and seed rate 70 kg/ha. Entire dose of N and P was applied as basal dose at the time of sowing. Under the demonstration programme farmer practice was maintain as control. Prior to conducting the front line demonstrations, group meeting and specific skill trainings were conducted. All other steps like farmer selection, site selection, farmer's participation etc was followed as suggested by Kirar *et al.*, (2004). Three villages Nagarda and Bhiyar from Sheo block and Gandhavkhurd from Gudamalani block of Barmer District

Farmer practice constituted no deep ploughing during summer, use of old or local variety, with higher seed rate 80-100 kg/ha, no seed treatment, no bio-fertilizer and indiscriminate use of inorganic fertilizer (9:23:0 NPK kg/ha). All other production and plant protection technologies except the interventions were followed in similar manner in recommended as well in farmer's practices. The yield data were collected from both the demonstration and control plots. The collected data were analyzed using simple tabular analysis like percentage etc. The yield data were collected from both the demonstration and farmer's practices and their technology gap, extension gap, and technology index were a workout as given below (Samui *et al.*, 2000).

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmer's yield

Technology index = {(Potential yield - Demonstration yield) / Potential yield} x 100

Results and Discussion

The gap between the recommended practices and existing farmer practices under chick pea is presented in Table 1. Full gap was observed

in case of variety, seed rate, seed treatment and partial gap was observed in fertilizer and plant protection.

Yield

The yield of chickpea obtained over the year under improved technology as well as local check is presented in Table 2. The productivity of chickpea ranged from 9.90 to 15.01 q/ha with mean yield of 11.94 q/ha under improved technology on farmers field as against a yield ranged from 7.79 to 11.93 q/ha with a mean of 9.31 q/ ha recorded under farmers practice.

The higher productivity was found in the recommended practices as compared to farmer practice during reporting period, which might be due to continuous use of IPNM (Integrated Pest and Nutrient Management) practices. The higher yield of chickpea under recommended practices was due to the use of latest high yielding variety, integrated nutrients

management and pest management. Similar results have been reported by Verma (2013).

Economic

The input and output prices of commodities prevailed during each year of demonstration were taken for calculating cost of cultivation, net return and benefit cost ratio (Table 3). The net return from recommended practices was Rs. 15355 to Rs. 27998 while the net return from farmer practices was Rs. 9110 to Rs. 17793. It means that net return from demonstration was higher than the farmer practices. The additional cost of Rs. 1992 to 3942 gave additional net return, it ranged Rs. 6245 to Rs. 10421 per hectare. The increase benefit: cost ratio was also calculated, it ranged from 1.52 to 2.10. Thus, and it was clearly showed that the demonstration of chickpea with full package was better than farmer's practices. Similar result has been reported by earlier by Teggelli *et al.*, (2015).

Table.1 Difference between recommended practices and existing farmer practices under chickpea CFLD

Crop operations	Recommended practices	Farmers practice	Gap
Variety	GNG-1581, GNG-1958, RSG-974, RSG-895, RSG-896	Local or old variety	Full gap
Seed rate (kg/ha)	70	80-100	Full gap
Soil treatment	Trichoderma viridae @ 2.5 kg enriched with 100 kg FYM	No soil treatment	Full gap
Seed Treatment	Carbendazim @ 2.5g/ kg seed	No seed treatment	Full gap
Fertilizer dose (kg/ha)	NPK (20:40:0) Rhizobium and PSB @ 600g / ha	DAP 50	Partial gap
Sowing method	30x10 cm row to row and plant to plant	Line sowing	Nil
Plant protection	IPM module (Pheromone trap 6/ha + Spinosad @ 190ml/ ha	One spray of insecticide	Partial gap

Table.2 Productivity, extension gap, technology gap and technology index of chickpea as grown under FLD and existing package of practices

Year	Area	No. of Demo	Average potential yield	Yield q/ha		Impact %	Extension gap (q/ha)	Technology gap (q/ha)	Technology Index (%)
				RP	FP				
2015-16	20	25	20	9.9	7.79	27.09	2.11	10.1	50.50
2016-17	20	38	23	10.92	8.21	33.01	2.71	13.08	54.50
2017-18	50	63	23	15.01	11.93	25.82	3.08	8.99	37.46
Mean	90	126	22	11.94	9.31	28.64	2.63	10.72	47.49

RP – Recommended practice, FP –Farmer’s practice

Table.3 Economic analysis of demonstration and farmers practices

Year	Cost of cultivation		Gross return		Net return		Additional cost	Additional net return	B:C ratio	
	RP	FP	RP	FP	RP	FP			RP	FP
2015-16	23928	21936	50465	39729	26537	17793	1992	8744	2.1	1.81
2016-17	29878	25936	57876	43513	27998	17577	3942	10421	1.94	1.68
2017-18	29675	26680	45030	35790	15355	9110	2995	6245	1.52	1.34
Total Mean	27827.00	24850.67	51123.67	39677.33	23296.67	14826.67	2976.33	8470	1.85	1.61

RP – Recommended practice, FP –Farmer’s practice, B: C Ratio –Benefit cost ratio.

Extension gap

The extension gap showed an increasing trend. The extension gap ranging between 2.11 to 3.08 q/ha (Table 2) during the period of study emphasizes the need to educate the farmers through various means for the adoption of improved agriculture production to reverse the trend of wide extension gap. The trends of technology gap reflected the farmers’ co-operation in carrying out such demonstration with encouraging results in sequent year. The technology group observed may be attributed to the dissimilarity in soil fertility status and weather conditions.

The technology index showed the feasibility of the evolved technology at the farmer’s field. The lower value of technology index more is the feasibility of the technology demonstrated (Sagar and Chandra, 2004). As

such reduction in technology index from 50.50 % during 2015-16 to 37.46 % during 2017-18 exhibited the feasibility of the demonstrated technology in this region.

These results confirm the findings of crop technology demonstration on oilseed and pulses crops by Yadav *et al.*, (2003) and Lathwal (2010).

From the above findings it can be concluded that use of scientific method of chickpea cultivation can reduce the technology gap to a considerable extent which will lead to increase productivity of chickpea in the district. Moreover extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better pulse production in the district.

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