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Impact of Cluster Frontline Demonstration on Yield of Chickpea in Nalanda, Bihar

NK SINGH1, SANJEEV KUMAR2*, BK SINGH1 AND WAJIDHASAN[3]

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ABSTRACT

The yield gaps between cluster frontline demonstration (CFLD) and Farmers practice extent of technology adoption and extension gap. Krishi Vigyan conducted cluster Frontline demonstration on chickpea, Kendra, Nalanda, Bihar during the year 2015-16, 2016-17, and 2017-18 in 16, 07 and 2 villages, respectively. Results of CFLD reveals that the variety (GNG 1581) recorded the highest grain yield (19.78q/ha). It was 23% higher over the farmer practice (16.12q/ha). An average yield of 18.60q/ha was recorded in cluster frontline demonstration and in farmer practices, it was just 14.73 q/ha. Thus, the average technology gap, extension gap and technology index of 5.39 q/ha, 4.60 q/ha and 23.67 percent, respectively were obtained between demonstration and farmer practices. The average yield of chickpea increased 26.66 percent over farmer practices, while the year wise variation in yield increased from 17.00 to 40.00%.

KEYWORDS

Chickpea, CFLD, Extension gap, Yield

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is one of the important *rabi* pulse crops cultivated predominantly in northern India. In Bihar, it is grown in 0.11 Mha with total production of 0.11 M tonnes and yield of 1028 kg/ ha. It is the cheapest source of protein (18-22%), carbohydrate (52-70%), Fat (4-10%) and minerals. It also plays an important role in sustainable agriculture to improve soil fertility status through biological nitrogen fixation. Its straw is also used as animal feed (Singh *et al.*, 2015). The per-capita availability of pulses had declined sharply due to the higher growth rate of the population followed by a low growth rate of production and productivity of chickpea. The improved chickpea production technology which was introduced by the scientists was found suitable for enhancing the total production and productivity per unit of area also (Singh *et al.*, 2014). Hence, it is the prime importance to demonstrate the improved production technology and practices of chickpea on farmers' field so that they can reap the benefit of technology (Raj *et al.*, 2013). Indian Council of Agriculture Research, New Delhi introduced Cluster frontline demonstration (CFLD's) with the inception of technology mission of pulse and oilseed crops from 2015. The Cluster filed demonstration took place under the supervision of KVK Scientists all over India.

MATERIALS AND METHODS

Krishi Vigyan Kendra conducted cluster front line demonstration (CFLD) on chickpea, at Harnaut, Nalanda (Bihar) during the year 2015 to 2018 in different villages *viz.* Katari , Bisunpur, Juhichak, Brah, Langhora, Rajanbigha, Dharampur, Chhatiyana, Mirjapur, Nanand, Faridpur, Nagdoi, Hasanpur, Gonama, Pachoura, and Jorarpur, of district Nalanda. Total 164 numbers of cluster demonstration was conducted in twenty villages. In general, soil of the area under study was loam or sandy-loam with low to medium fertility status.

The component demonstration of Cluster Frontline Technology in chickpea was comprised of improved variety, GNG 1581, BGM 547, PG 186 with proper tillage, proper seed rate, sowing method, balance dose of fertilizers (20 kg N+20kgP_2O_5/ha), and plant protection (Table 1). Total 60 ha area was covered during the period. In the demonstration, one control plot was also kept where farmers practices were carried out. The FLD was conducted to study the technology gap between the potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practices and technology index. The yield data were collected from both the demonstration and farmers practices by random crop cutting method and analysed by using simple statistical tools.

The technology gap, extension gap and technology index (Samui *et al.*, 2000) were calculated by using formula (eq 1 to 4) as given below.

$$\text{Percent increase yield} = \frac{\text{Demonstration yield-Farmers Yield}}{\text{Farmers yield}} \quad \text{-Eq.1}$$

$$\text{Technology gap} = \text{Potential yield-Demonstrated yield} \quad \text{-Eq.2}$$

$$\text{Extension gap} = \text{Demonstrated yield-yield under existing practices} \quad \text{-Eq.3}$$

$$\text{Technology Index} = \frac{\text{Potential yield-Demonstrated yield}}{\text{Potential yield}} \times 100 \quad \text{-Eq.4}$$

[1]SMS,KVKHarnaut, Nalanda, Bihar, India
[2]Former Senior scientist and Head KVK Harnaut, Nalanda, Bihar, India
[3]SMS, KVK, Jahanabad, Bihar, India
*Corresponding author email : sanju_kvk@yahoo.co.in

RESULTS AND DISCUSSION

The gap between the existing and recommended technologies of chickpea in district Nalanda is presented in Table 1. Full gap was observed in the case of use of HYV's sowing methods, seed treatment fertilizer dose and plant protection measures, which was the reason for not achieving potential yield. The farmer was not aware of the recommended technology. Farmers, in general, used local or old age varieties- instead of the recommended high yielding resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons farmers followed the broadcast method of sowing against the recommended line sowing and because of this, they applied higher seed rate than recommended.

Table 1: Differences between technological intervention and farmers practices under CFLD on Chickpea

Particulars	Technological Intervention	Existing practices	Gap
Variety	GNG 1581 BGM -547& PG-186	Traditional/old	Full gap
Land preparation	Two ploughing	Two ploughing	Nil
Seed rate	75-100 kg/ha	130 -140 kg/ha	Higher seed rate
Sowing method	Line sowing	Broadcast	Full gap
Seed treatment	*Trichoderma* 5 gm/kg	No seed treatment	Full gap
Fertilizer dose	20kgN+20kg P_2o_5/ha	No use of fertilizer	Full gap
Plant protection	As per need	No Plant Protection	Full gap

Yield

During three years of Cluster Frontline technologies result obtained are presented in Table 2. The results revealed that due to cluster frontline demonstration on chickpea on average yield was recorded 18.60q/ha under demonstration plots as compared farmers practices 14.73 q/ha.The highest yield in the CFLD plot was 19.78 q/ha and in farmers practice 16.12q/ha during 2015-16 and lowest yield was recorded 16.60q/ha in CFLD plots during 2017-18 and in farmers practice 13.88 q/ha in 2016-17. This results indicated that the higher average grain yield in demonstration plots over the years compare to local check due to knowledge and adoption of full package of practices that is appropriate varieties such as GNG1581, BGM-547 and PG-186, timely sowing seed treatment with trichoderma@5gm/kg of seeds, use of balanced dose at fertilizer (20 kgN+20kg P_2o_5/ha) and need-based plant protection. The average yield of chickpea varieties GNG 1581, BGM-547 and PG-186 increased 26.66 %.

Table 2: Gap in grain yield production of chickpea under CFLD's

Year	Variety	No. of CFLD	Area (ha)	Average yield		% Increase
				Demo	FP	
2015-16	GNG 1581	60	20	19.78	16.12	23%
2016-17	BGM547	54	20	19.43	13.88	40%
2017-18	PG-186	50	20	16.60	14.20	17%
Total average		164	60	18.60	14.73	26.66

The yield of chickpea could be increased over the yield of obtained under CFLD on chickpea (GNG1581, BGM-547, and PG 186) farmers practices (use of non-descriptive local variety, no use of the balanced dose of fertilizers. Untimely sowing and no control measures adopted for pest and disease management of chickpea cultivation.

Technology Gap

In the technology gap the differences between potential yield and yield of demonstration plots were 4.22 q/ha, 4.57q/ha and 7.40 q/ha during 2015-16, 2016-17 and 2017-18, respectively. On an average technology gap under three years, CFLD programmer was 5.39 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climate situation (Table 3).

Table 3: Technological and Extension Gap in Chickpea production under CFLD's

Year	Variety	Tech gap (q/ha)	Ext. Gap (q/ha)	Tech Index (%)
2015-16	GNG 1581	4.22	5.78	17.58
2016-17	BGM547	4.57	5.43	22.62
2017-18	PG-186	7.40	2.60	30.83
Total average		5.39	4.60	23.67

Extension gap

Extension gap of 5.78, 5.43 and 2.60q/ha was observed during 2015-16, 2016-17, and 2017-18, respectively. On an average extension gap was observed 4.60 q/ha which emphasized the need to educate the farmers through various extension means, *i.e.* Cluster frontline demonstration for the adoption of improved production and protection technologies to revert the trend of wide extension gap. More and more use of the latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap (Table 3).

Technology index

The technology index shows the fertility of demonstrated technology at the farmer's field. The technology index varied from 17.58 to 30.83 per cent (Table 3). On an average technology index was observed 23.67% during the three years of CFLD programmes, shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technological intervention to increase the yield performance of chickpea.

Economic Return

The inputs and outputs prices of commodities prevailed during the study of the demonstration were taken for calculating net return and benefit cost ratio (Table 4). The cultivation of chickpea under improved technologies gave a higher net return of Rs. 68300, 92900 and Rs. 53900 per ha, respectively as compared to farmers practices. Similar findings were reported by Kirar *et al.* (2006). The benefit cost ratio of chickpea cultivation under improved cultivation practices were 3.54, 4.27 and 3.01 as compared to 3.19, 3.30,

and 2.72 under farmer practices. This may be due to the higher yield obtained under improved technology compared to local check (Farmer practices). This finding is in sync with the finding of Mokidue *et al.* (2011) and Singh *et al.* (2018).

Year	Variety	No. of CFLD	Area (ha)	Net Return (Rs/ha)		BC Ratio	
				Demo	FP	Demo	FP
2015-16	GNG 1581	60	20	68300	53900	3.54	3.14
2016-17	BGM547	54	20	92900	61800	4.27	3.30
2017-18	PG-186	50	20	53900	44200	3.01	2.72

CONCLUSION

The producers of CFLD is a significant positive result and provided the researchers with an opportunity to demonstrate the productivity potential and profitability of the latest technology (Interventions) under the real farming situation which they have been helping in the transfer of technology for a long time. This could circumvent some of the constraints in existing transfer of technology for a long time in the district Nalanda of Bihar. The productivity gain under CFLD over current practices of chickpea cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of chickpea in the district. The constraints faced by the farmers were different for different technologies. Therefore, efforts should be made by extension agencies in their transfer of technology programmes to consider the limitations as perceived by the farmers in this investigation as well as personal. Therefore, for enhancing the production and productivity of chickpea crop, the strategy should be made for getting the more and more recommended technologies adopted by the farmers. The variation in percent increase in the yield was due to the lack of knowledge, and poor socio-economic condition. Under sustainable agricultural practices, with this study, it is concluded that the CFLD Programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of chickpea adoption under drought condition.

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