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Role of Cluster Frontline Demonstration in Boosting the Production of Chickpea in Chambal Division of Madhya Pradesh

Sukhvir Singh Chauhan[1], Dharvendra Singh[2], Mahender Singh[3] and Arjun Singh[4]
1&2. Sr. Scientist, RVSKVV-KVK Morena &, Manawar, 3. Scientist, KVK, Dewas, (M.P.), 4. SMD College, Agra
Corresponding author e-mail : chauhansukhvirsingh@gmail.com

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ABSTRACT

The present study was conducted in Chamble division of Madhya Pradesh during the year 2016-17 to 2019-20 by Krishi Vigyan Kendra, Morena (M.P). conducted 190 Cluster frontline demonstrations on Chickpea in 76 ha area under real farming situations in the farmer's fields of six adopted villages of district Morena (M.P.). The objective was to transfer the technology to increase the productivity of chickpea through various types of interventions viz., *Varietal, Seed treatment, Plant Protection,* Rhizobium, *Irrigation, STV based nutrient management and IPM. High yielding variety of Chickpea RVG 202 was given to the farmers and basal application of 20 kg N + 60 kg P_2O_5+20 kg K_2O /ha in the form of DAP, MOP and Zinc sulphate @ 25 kg /ha as per demonstration were advised. The seed was treated before sowing. It was observed that in cluster front line demonstrations, the improved chickpea variety RVG 202 recorded an average yield of 1850, 1880, 2046 and 2123 kg/ha were much higher than as compared to the average yield of farmers practices 1440, 1660, 1630 and 1625 kg/ha respectively during 2016-17, 2017-18, 2018-19 and 2019-20. The average per centage increased in the yield over farmer's practices was 28.40, 13.3, 25.5 and 25 for the year 2016-17, 2017-18, 2018-19 and 2019-20 respectively. The technology gap was found 109 Kg to 590 Kg over the potential yield. The highest extension gap of 498 kg/ha was recorded in 2019-20 and the lowest was observed 220 kg/ha in 2017-18. From these results, it is evident that the performance of improved variety was found better than the local check under the same environmental conditions. Farmers were motivated by the results of agro technologies applied in the CFLDs trials and it is expected that they would adopt these technologies in the coming years.*

Key words : *CFLD; Technology gap; Extension gap; Technology index; STV based nutrient management.*

The total world acreage under pulses is about 85.40 million ha with a production of 87.40 million tons at 1023kg/ha yields level. India, with >29 million ha pulses cultivation area, is the largest pulse-producing country in the world. It ranks first in area and production with 35 *per cent* and 29 *per cent* respectively. During 2017-18 our productivity at 841kg/ha, has also increased significantly over the eleventh (662 kg/ha) and twelfth plan (745 kg/ha). Pulses are an important commodity group of food crops that can play a vital role to address national food and nutritional security and tackle environmental challenges. Protein malnutrition is prevalent among men, women and children in India. Pulses contribute 11 per cent of the total intake of proteins in India (*Reddy, 2010*). Pulses are a critical and inexpensive source of plant-based proteins, vitamins and minerals. Pulses are a smart Food as these are critical for food basket (dal-roti, dal-chawal), rich source of protein i.e. 20-25 per cent which is double the protein content of wheat and thrice that of rice and helps address obesity, diabetes malnutrition, etc.

This is the pro-active pulse programme implementation strategies and robust monitoring mechanism of Govt. of India, significant growth in the area, production and productivity of pulses has been recorded in the XIIth Plan (2012-13 to 2016-17), especially during the last 03 years of this Plan period, despite two consecutive drought years of 2014-15 to 2015-16. More visible and significant increasing trends during 2016-17 and 2017-18, whereby the pulses production reached at 23.13 Mt and 25.23 mt. respectively, is a grand success story in itself. The productivity of pulses has increased 13 *per cent* at 841 kg/ha during 2017-18 from the level of 743 kg/ha during 2014-15.

The production growth has been (47%) the ever highest. (Annual Report 2017-18 Govt of India). Cluster Frontline Demonstration may play a very important role in the proper transfer of technologies and changing the scientific temperament of the farmers. Cluster front-line demonstration is the new concept of cluster demonstration evolved by the Indian Council of Agricultural Research under the NFSM since 2016-17.

The main objective of Cluster front-line demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situations on a cluster basis. Cluster front-line demonstrations are conducted in a block of 10 to 30 hectares of land to have a better impact of the demonstrated technologies on the farmers and field level extension functionaries.

METHODOLOGY

Through the survey, farmers' meeting and field diagnostic visits during the cropping period, low yield of Chickpea was conceived due to use of old varieties, imbalanced use of fertilizer and indiscriminate practice to manage the wilt and pod borer on the crop. In light of the survey, this study was conducted in Morena (Chambal Division) district of Madhya Pradesh during the year 2016-17 to 2019-20. Krishi Vigyan Kendra, Morena conducted 190 Cluster frontline demonstrations on Chickpea in 76 ha area under real farming situations in the farmer's fields of six adopted villages (Rithorakala, Bhoru ka pura, Pachokhara, Gahtowli, Dhoda and Bhatpura) of district Morena (M.P.). The objective was to transfer the technology to increase the productivity of chickpea through various types of interventions *viz*., Varietal, Seed treatment, Plant Protection, *Rhizobium*, Irrigation, STV based Fertilizers application and IPM. All demonstrations were conducted on alluvial soils on 0.40 ha. The input like improved variety *viz*., RVG 202 were supplied to the farmers and recommended doses of fertilizers, biofertilizers and insecticides/pesticides, IPM, kits were used by the farmers on their own (Table 1). Farmers were advised to use the proper seed rate 75 kg/ha. The sowing method keeping 30×10 cm spacing was demonstrated on their fields. A basal application of 20 kg N + 60 kg P_2O_5+20 kg K_2O /ha in the form of DAP, MOP and Zinc sulphate @ 25 kg /ha as per demonstration were advised. The seed was treated before sowing with Carboxin 75 per cent WP 2g + Trichoderma 5 g/kg seed and Rhizobium 5g + PSB 5g+ Ammonium Molybdate 1 g/kg of seed as per recommendations to control seed infection. The data on the output of high

Table 1. Comparison of cultural practices adopted by farmers and CFLD on Chickpea

Particulars	CFLD employing improved cultivation practices	Prevailing practices
Farming situation	Irrigated	Irrigated
Variety	RVG 202	Vishal
Time of sowing	The first fortnight of November	Second fortnight of November
Method of sowing	Raised bed	Line sowing
Seed rate	75 kg/ha	80 kg/ha
Fertilizer dose	20 kg N+60 kg P2O5+20 kg K2O+20 kg S/ha and seed treatment with Ammonium Molybdate 1 g/kg seed	10 kg N+20 kg P2O5/ha
Plant protection	Seed treatment with Carboxin 75 per cent WP 2 g + Trichoderma 5 g/kg seed and Indoxacarb 15.8% EC @ 500 ml/ha to protect the crop against pod borer	Nil

yield variety of Chickpea crop and inputs used per hectare have been collected from the cluster front line demonstration. All the participating farmers were trained on various aspects of chickpea production technologies. Recommended agronomic practices and genuine seeds of chickpea were used for CFLDs in 0.4 ha area/ demonstration. The same area was also devoted to growing local standard checks.

To study the impact of cluster front line demonstrations, data of all 180 participating farmers were taken. In addition to this, data on traditional practices followed by farmers have also been collected. In the present study, the technology index was operationally defined as the technical feasibility obtained due to the implementation of cluster front-line demonstrations in Chickpea. To estimate the technology gap, extension gap and technology index following formulae used by *Samui et al. (2000)* have been used:

Technology gap = Potential yield - Demonstration yield)

Extension gap = Demonstration yield - Farmer's yield

$$\text{Technology index} = \frac{\text{Technology gap}}{\text{Potential gap}} \times 100$$

RESULTS AND DISCUSSION

Adoption of recommended package of practices : The data presented in Table 2 indicated that after front line demonstrations majority of the farmers got aware of the importance of variety to increase the yield. Out of total beneficiary farmers, 81.6 per cent farmers reported the importance of variety in the enhancement of yield. Likewise, significant awareness was reported by the beneficiary farmers in the field of insect pest management (78.9%), nutrient management (68.4%) and seed rate (65.8%). The highest adoption was reported in the awareness of variety.

Before the conduction of the demonstration only 50 per cent of farmers were aware of the improved variety of gram but after the demonstration majority of the farmers got aware of improved varieties. Before the introduction of demonstrations in the area vary few farmers were aware of the use of culture (18.4%), spray technology (21.1%), seed treatment (26.3%) and sowing method (28.9%). The majority of the farmers raised their crops without seed treatment either culture or pesticides and they sow their crop with the broadcasting method. After the introduction of front-line demonstrations, farmers become aware in these areas also and reported an increase in awareness to the tune of 44.7 per cent in the use of culture, 36.8 per cent in spray technology, 47.7 per cent in seed treatment and 55.3 per cent in the sowing method. An increase in awareness in agronomical practices due to demonstrations was also reported by *Yadav et al (2012)* and *Singh et al (2016 a)*.

Table 2. Extent of adoption of recommended technology (N=190)

Improved technology	Before FLD		After FLD		Rank
	No.	%	No.	%	
Selection of suitable variety	95	50.0	155	81.6	1
Seed rate (Kg/ha)	110	57.9	125	65.8	4
Seed treatment	50	26.3	90	47.4	7
Use of culture	35	18.4	85	44.7	8
N:P:K management	100	52.6	130	68.4	3
Insect Pest management	105	55.3	150	78.9	2
Weed management	75	39.5	120	63.2	5
Spray technology	40	21.1	70	36.8	9
Sowing method	55	28.9	105	55.3	6

Performance of CFLD : In the study, a comparison of productivity levels between demonstrated variety and local checks is shown in Table 3. It was observed that in cluster front line demonstrations, the improved chickpea variety RVG 202 recorded an average yield of 1850, 1880, 2046 and 2123 kg/ha were much higher than as compared to an average yield of farmers practices 1440, 1660, 1630 and 1625 kg/ha respectively during 2016-17, 2017-18, 2018-19 and 2019-20. The average per centage increased in the yield over farmer's practices was 28.4, 13.3, 25.50 and 25.0 for the year 2016-17, 2017-18, 2018-19 and 2019-20 respectively. From these results, it is evident that the performance of improved variety was found better than the local check under the same environmental conditions. Farmers were motivated by the results of agro technologies applied in the CFLDs trials and it is expected that they would adopt these technologies in the coming years. This finding is in corroboration with the findings of *Prajapati and Kumar (2012)* and *Singh et al (2016 b)* highlighted that adoption of an improved package of practices can fetch the gap between production potential and production obtained.

Technology gap : Data reveals in Table 3 that the technology gap shows the gap in the demonstration yield over potential yield and it was 400, 590 and 109 kg/ha

Table 3. Productivity, technology gap, extension gap and technology index of chickpea under CFLDs

Year	Area (ha)	No. farmers	Yield (q/ha)			% increase over FP	Tech. gap (q/ha)	Ext. gap (q/ha)	Tech. index
			Potential	RP	FP				
2016-17	12.8	32	20-25	18.50	14.40	28.4	4.0	4.1	17.7
2017-18	24.0	60	20-25	18.8	16.6	13.3	5.9	2.2	0.26
2018-19	19.2	48	20-25	20.46	16.30	25.5	1.09	4.16	4.8
2019-20	20.0	50	20-25	21.23	16.25	25.0	1.27	4.98	5.6

Table 4. Cost of cultivation (Rs./ha), gross return (Rs./ha), net return (Rs./ha) and B:C ratio as affected by improved and local Technologies

Year	Cost of cultivation		Gross return		Net return		B:C ratio	
	RP	FP	RP	FP	RP	FP	RP	FP
2016-17	19525	18690	111000	86400	91475	67710	5.6	4.6
2017-18	19200	18000	91650	80925	72450	62925	4.9	4.4
2018-19	20123	19200	94525	75306	74402	56106	4.7	3.9
2019-20	30500	29500	98951	82560	68451	53060	3.24	2.79

FP = Farmers practice, RP = Recommended practice,

for the year 2016-17, 2017-18 and 2018-19 respectively while in 2019-20 yield of the demonstration was 127 kg/ha more than potential yield. The cluster front-line demonstrations were laid down under the supervision of KVK scientists at the farmer's field. There exists a gap between the potential yield and demonstration yield first three years. This may be due to soil fertility and weather conditions. Hence, location-specific recommendations are necessary to bridge the gap. These findings are similar to the findings of *Prajapati and Kumar (2012)* were also reported that frontline demonstration plays a vital role in minimizing the technological gap through the supply of critical input with updating of technological aspects

Extension gap : The highest extension gap of 498 kg/ ha was recorded in 2019-20 followed by 416 kg/ha in 2018-19 and the lowest was observed in 220 kg/ha and 410 kg/ha in 2017-18 and 2016-17 respectively. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of the wide extension gap. More and more use of the latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead the farmers to discontinue the old technology and to adopt new technology (Table 3).

This finding is in corroboration with the findings of *Lepcha et al (2015).*

Technology Index : The technology index shows the feasibility of the evolved technology at the farmer's fields and the lower the value of the technology index more is the feasibility of the technology (*Jeengar, et al., 2006*). The technology index was 17.7, 0.26, 4.8, and 5.6 per cents for in 2016-17,2017-18, 2018-19 and 2019-20 respectively (Table 2).

Economic return : The economics of chickpea production under cluster frontline demonstration was estimated and the result of the study has been given in Table 3. The inputs and outputs prices of commodities prevailed during the study of demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit: cost ratio. The cultivation of chickpea under improved technologies gave a higher net return of Rs. 91475, 72450, 74402 and 68451/ha in 2016-17, 2017-18,2018-19 and 2019-20 respectively as compared to farmers practices of Rs. 67710, 62925, 56106 and 53060. The benefit-cost ratio of chickpea under improved technologies was 5.6, 4.9, 4.7 and 3.24 as compared to 4.6, 4.4, 3.9 and 2.79 under farmer's practices. This may be due to higher yields obtained under improved technologies compared to local checks (farmer's practice). This finding is in corroboration with the findings of *Mishra et al. (2009)* and *Raj et al, (2013).*

CONCLUSION

Thus, the findings of the study revealed that a wide gap existed in potential and demonstration yield in high-yielding chickpea varieties due to the technology and extension gap in Morena District of Madhya Pradesh.

By conducting cluster front line demonstrations of proven technologies, the yield potential of chickpea can be increased to a great extent. This will substantially increase the income as well as the livelihood of the farming community. The study emphasizes the need to educate the farmers in the adoption of improved technology to narrow the extension gaps through various technology transfer centers. Therefore, it is suggested that these factors may be taken for consideration to increase the scientific temperament of the farmers.

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