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Impact of front line demonstration of chickpea (*Cicer arietinum* L.) in Shajapur District of Madhya Pradesh

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Abstract
The study was carried out in rabi seasons in operational area in Krishi Vigyan Kendra Shajapur in Shajapur district of Madhya Pradesh during 2019-20 and 2020-21 for chickpea variety RVG-202. The improved technologies consisting use of modern variety, seed treatment with rhizobium and PSB culture, balanced fertilizer application and integrated pest management. CFLD recorded higher yield as compared to farmer's local practice. The average results of two pooled data revealed that the front line demonstration on chickpea an average yield was recorded 17.9 q/ha under demonstrated plots as compare to farmers practice 15.05 q/ha for RVG 202 variety. The improved technology gave higher gross return, net return with higher benefit cost ratio as farmer's practices.

Keywords: Demonstration, chickpea, extension gap, technology gap

1. Introduction
Chickpea is one of prominent pulse crop in India, accounting 75 percent of world production. It is an important rabi season food legume having extensive geographical distribution and contributing 39 per cent to the total production of pulse in the country (Singh *et al*., 2014) [12], It is grown in cool season having good yield potential under both rainfed and irrigated condition. Pulses contribute 11% of the total intake of proteins in India (Reddy, 2010) [11], Dhakad *et al*., (2018) [3], concluded that Front line demonstration (FLDs) play a very important role to disseminate recommended technologies is shows the potential of technology resulting in an increased in yield at farmers level. The results convincingly brought out that the yield of chickpea can be increase with the intervention on recommended package of practices. These practices may be popularized in this area by the extension agency to bridge the higher extension gaps. Dhakad *et al*., (2020) [4], concluded that the FLDs programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of chickpea adoption. Chauhan *et al.,* (2021) [2], concluded from the study that there exists a gap between the potential and demonstration yields in wilt tolerant chick pea mainly due to technology and extension gaps and also due to the lack of awareness about new technology. The FLD produced a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. Looking of above fact its yield productivity is far below the potential yield, so front line demonstration were undertaken by the Krishi Vigyan Kendra Shajapur on the improved package of practices of chickpea in the district. Therefore, this investigation was carried out in this area for popularizing of pulse production with objective of providing nutritive diet and increase availability of pulse per capita.

2. Material and Methods
Front line demonstration (FLDs) on chickpea was conducted by Krishi Vigya Kendra, Shajapur (MP) during the year 2019-20 and 2020-21 in operational area in Krishi Vigyan Kendra Shajapur to evaluate the productive performance of improved varieties of chickpea. In general soil of the area under study was medium black with medium fertility status. The component demonstration of front line technology in chickpea was comprised of improved variety RVG 202 with proper seed rate and sowing method, balance dose of fertilizer (18 kg Nitrogen + 46 kg P2O5 /ha), use of Trichoderma @ of 5g/kg of seed as seed treatment, proper irrigation, weed management and protection measure.

In the demonstration, one control plot was also kept where farmers practices was 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 practice and technology index. The plant growth characters as well as yield data were collected from both the Front Line Demonstration (FLD) and farmers practice by random crop cutting method and analyzed by using simple statistical tools. Site selection, farmers selection were considered as suggested by Choudhary (1999) [1], the observation on seed yield, straw yield per ha were recorded. Other parameters like harvest index, technology index were worked out as suggested by Kadian *et al*., (1997) [6], the gross return, net return, cost of cultivation and benefit cost ration were also calculated. Training to the farmers of respective villages was imparted before conducting the demonstrations with respect to envisaged technological.

3. Results and Discussion

Growth character of Chickpea variety RVG 202 at operational area of KVK presented in Table-1 which show that various plant growth character of Chickpea variety RVG 202 are better that variety used in farmers practices. Grain Yield, technology gap, Extension gap and Technology index of Chickpea in district Shajapur was presented in Table-2. Full gap was observed in case of use of HYVs, sowing method, seed treatment, fertilizer dose and weed management and partial gap was observed in irrigation and plant protection measure, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. 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 broadcast method of sowing against the recommended line sowing and because of this, they applied higher seed rate than the recommended. The results revealed that the front line demonstration on chick pea an average yield was recorded 17.9 q/ha under demonstrated plots as compare to farmers practice 15.05 q/ha during year 2019-20 and 2020-21 for RVG 202 variety. This results clearly 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 i.e. appropriate varieties such as RVG 202 timely sowing, seed treatment with *Trichoderma* @ 5g/kg of seed, use of balanced dose of fertilizer (18 kg N and 46 kg P2O5 ha-1), method and time of sowing, timely weed management and need based plant protection. The average yield of chickpea increased 17 to 20 percent. The yield of chick pea could be increased over the yield obtained under farmer's practices (use of non-descriptive local variety, no use of the balanced dose of fertilizer, untimely sowing and no control measure adopted for pest management) of chick pea cultivation. The above findings are in similarity with the findings of Singh (2002) [13], Poonia and Pithia (2011) [9], and Dhakad *et al*., (2018, 2020 and 2021) [3, 4, 2], the technology gap the differences between potential yield and yield of demonstration plots were 2.50 and 1.70 q/ha during 2019-20 and 2020-21 respectively. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation. Extension gap of 2.6 and 3.1 q/ha were observed during 2019-20 and 2020-21 respectively for RVG 202 variety which emphasized the need to educate the farmers through various extension means i.e. front line demonstration for adoption of improved production and protection technologies, to revert the trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap. The technology index shows the feasibility of the demonstrated technology at the Farmers field. The technology index varied from 8.5 to 12.50 percent for RVG 202 variety (Table-2) which shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of chick pea. The FLD produces a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. This could be circumvent some of the constraints in the existing transfer of technology system in the district, Sidhi of Madhya Pradesh. Similar findings were reported by Kirar *et al*. (2006) [7], Singh *et al*. (2014) [12], 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 (Table 3). The cultivation of chickpea variety of RVG 202 variety under improved technologies gave higher net return of Rs. 51544 and 53600 respectively as compared to farmers practices of Rs 42425 and Rs 42595 respectively during the during rabi 2019-20 and 2020-21. The benefit cost ratio of chickpea variety of RVG 202 variety under improved technologies were 3.79 and 3.75 as compared to 3.45 and 3.34 under farmers practices respectively during the during rabi 2019-20 and 2020-21. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of Mokidue *et al*., (2011) [12], and Raj *et al*. (2013) [12], the extension activities during the study period i.e. farmers training, field day, kisan sangosthi were organized in these villages under operational area in Krishi Vigyan Kendra Shajapur.

Table 1: Growth character of Chickpea variety RVG 202 at operational area of KVK

Important Parameters	2019-20		2020-21	
	FLD (Front Line Demonstration)	FP (Farmers Practice)	FLD (Front Line Demonstration)	FP (Farmers Practice)
Germination	89.50%	78%	93%	84%
Plant population (par m^2)	29.50	23.23	31..22	21.50
Weed count (par m^2)	3.50	5.42	2.1	3.45
Pest infestation (par m^2)	1.26	3.25	2.16	4.51
Plant height (cm)	39.08	31.02	40.8	32.8
Pods/plant (No.)	45.4	32.8	48.6	34.2
Yield (q/ha)	17.50	14.9	18.3	15.2

Table 2: Productivity, Extension Gap, Technology gap and technology index of chickpea variety RVG 202

Year	Crop	Variety	Area (ha)	No of farmers	Grain Yield (q/ha)			% increase over FP	Technology Gap (q/ha)	Extension Gap (q/ha)	Technology Index (%)
					Potential	FLD	FP				
2019-20	chickpea	RVG 202	30	75	20	17.5	14.9	17.45	2.5	2.6	12.50
2020-21	chickpea	RVG 202	20	50	20	18.3	15.2	20.39	1.7	3.1	8.50
				Pool data	20	17.9	15.05	18.922	2.1	2.85	10.5

Table 3: Economic analysis of demonstration and farmers practices for chickpea variety RVG 202

Ti	Yield (q/ha)		% Increase over FP	Gross Expenditure (Rs/ha)		Gross Return (Rs/ha)		Net Returns (Rs/ha)		B:C Ratio	
	FLD	FP		FLD	FP	FLD	FP	FLD	FP	FLD	FP
2019-20	17.5	14.5	20.69	18500	17300	59725	70044	51544	42425	3.79	3.45
2020-21	18.3	15.2	20.39	19500	18200	60795	73100	53600	42595	3.75	3.34
Pool data	17.9	14.85	20.5422	19000	17750	60260	71572	52572	42510	3.77	3.395

4. Conclusion

The study was under taken to ascertain the economics of chickpea production technologies. Front line demonstration (FLDs) play a very important role to disseminate recommended technologies is shows the potential of technology resulting in an increased in farm income at farmers level. The results convincingly brought out that the yield of chickpea can be increase with the intervention on recommended package of practices. These practices may be popularized in this area by the extension agency to bridge the higher extension gaps.

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