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Enhancing Pulse Yields through Front Line Demonstrations (FLDs): A Comprehensive Analysis

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Abstract

The study was carried out during *kharif* and summer seasons in different villages of Banaskantha, Sabarkantha, Gandhinagar, Ahmadabad and Surendranagar district of Gujarat during 2020-2021 to 2022-23. All 450 demonstrations on pigeon pea, green gram, cowpea, cluster bean and moth bean crops were carried out in area of 180 ha by the active participation of farmers with the objective to demonstrate the improved technologies of pulses production potential. The improved technologies included use of new variety and full package of practices i.e. seed treatment with *rhizobium* and PSB culture, fertilizer management, weed management and insect pest management. FLD plot recorded higher yield as compared to farmer's local practice. The mean data revealed that an average yield recorded was 10.89q/ha under demonstrated plots as compare to farmers practices 9.15 q/ha. In spite of increase in yield of pulse, technology gap, extension gap and technology index existed. The improved technologies gave higher gross return, net return with higher benefit cost ratio as compare to farmer's practice.

Key words: Pulses, FLDs, Technology gap, Extension gap, Technology index, Yield

India is the largest producer, consumer and importer of pulses. Pulses are a good and chief source of protein for a majority of the population in India. Protein malnutrition is prevalent among men, women and children in India. While the traditional cropping pattern almost always included a pulse crop either as a mixed crop on in rotation, the commercialization of agriculture has encouraged the practices of sole cropping. Pulses contribute 11% of the total intake of proteins in India [1]. In India, frequency of pulses consumption is much higher than any other source of protein, which indicates the importance of pulses in their daily food habits. Keeping the cheapest source of protein, it is important to increase pulses production to increase balanced diet among the socially and economically backward classes. India is the largest producer (25% global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. Although it is the world' largest pulses producer. India is importing 4-6 million tons (MT) and consumer (26-27 MT) of pulses every year to meet its domestic demand [2]. India achieved a record 25.23 MT productions in 2017-18 with pigeon pea 21.10 percent, chickpea 40.55 percent, green gram 9.38 percent, black gram 12.23 percent and other pulses 16.77 percent share in total production [3]. Front Line demonstrations (FLDs) is a unique approach to provide a direct interface between researcher and farmers as the scientists are directly involved in planning, execution and monitoring of the demonstrations for the technologies developed by them and get direct feedback from the farmers' field. Keeping in view the importance of pulses production technology the present study was conducted to establish the production potential of high yielding varieties of pulses by Technology gap, Extension gap, Technology index and economic impact of pulses and comparing the yield level of FLDs plot with non FLD plots.

MATERIALS AND METHODS

The present study was carried out by the Pulses Research Station, S. D. Agricultural University, Sardarkrushinagar district of Banaskantha, Sabarkantha, Gandhinagar, Ahmadabad and Surendranagar in kharif and summer seasons in the farmer's fields 2020-2021 to 2022-23. All 450 demonstrations on pigeon pea, green gram, cowpea, cluster bean and moth bean crops were carried out in area of 180 ha area were conducted by the active participation of farmers with the objective to demonstrate the improved technologies of pulse production potential in different villages. The component demonstration of front-line technology in pulses was comprised of improved variety, proper seed rate, seed treatment, sowing method, nutrient management, proper irrigation, weed management, protection measures, harvesting and post-harvest management. The yield and economic performance of front-line demonstration, the data on output were collected from FLDs as well as local plots and finally the production, cultivation cost, gross return, net returns with the benefit cost ratio were worked 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 exiting practice and technology index.

The yield data were collected from both the demonstration and farmers practice by random crop cutting method and analyzed by using simple statistical tools for different parameters using following formula as given below:

Per cent increase in yield (%) = Yield gain in IT plot (kg/ha) - Yield gain in FP plot (kg/ha) / Yield gain in FP plot (kg/ha) × 100

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The technology gap and technological index [4] were calculated by using following formula as given below:

Extension gap (q/ha) = Demonstrated yield - Farmer's practice yield

Technology gap (q/ha) = Potential yield - Demonstration yield

Technology index (%) = Technology gap / Potential yield × 100

Additional return = Demonstrated return - Farmer's practice return

% Increase over farmers practices = Improved practices – Farmers practices / farmers practices × 100

% Increase yield = Demonstration yield-Farmer practice yield × 100 / Farmer practice yield

RESULTS AND DISCUSSION

Mean data of (Table 2) indicated that potential yield of pulse crops was 12.14 q/ha followed by demonstration yield (10.89 q/ha) and farmer's yield (9.15 q/ha) whereas, additional yield over local check was 1.74 q/ha and percent increase yield over local check is 19.18 percent. This result clearly indicated that the higher average grain yield in demonstration plots over the years compared to farmer's practice was achieved due to knowledge and adoption of full package of practices i.e. appropriate variety, sowing time, seed rate, seed treatment, sowing method, spacing, weed management, irrigation practices and need based plant protection techniques [5-11].

Table 1 Year wise detail of front-line demonstrations on pulses

Year	Crop	Variety	Area (ha)	No. of FLDs
2020-21	Mungbean	GM 4, GM 6	15	37
	Cowpea	GC 4, GC 6	4	10
	Clusterbean	GG 2	6	15
	Pigeonpea	GT 101, GT 103, BDN 2	20	50
2021-22	Mungbean	GM 4, GM 6	28	70
	Cowpea	GC 6	6	15
	Clusterbean	GG 2	6	15
	Pigeonpea	GT 101, BDN 2	20	50
2022-23	Mungbean	GM 4, GM 6	20	50
	Cowpea	GC 6	4	15
	Clusterbean	GG 2	4	15
	Pigeonpea	GT 103	20	50
		Total	153	392

Table 2 Yield performance of different pulses under demonstration (Pooled data)

Crop	Yield (q/ha)			Additional yield over local check (q/ha)	Percent increase yield over local check (%)
	Potential yield (PY)	Check yield (FP)	Demo yield (RP)		
Mungbean	9.71	06.44	07.88	1.44	22.36
Cowpea	13.39	10.99	13.02	2.03	18.47
Clusterbean	9.94	07.35	08.62	1.27	17.28
Pigeonpea	15.50	11.83	14.03	2.20	18.60
Mean	12.14	09.15	10.89	1.74	19.18

Table 3 Technology gap, extension gap and technology index of pulses under FLD

Crop	Technology gap (q/ha) TG = PY - RP	Extension gap (q/ha) EG = RP - FP	Technology index (%) T_I = Tech. Gap / PY × 100
Mungbean	1.83	1.44	18.85
Cowpea	0.37	2.03	2.76
Clusterbean	1.32	1.27	13.28
Pigeonpea	1.47	2.20	9.48
Mean	1.25	1.74	11.09

Table 4 Economic analysis of the demonstrated plot of pulses under FLDs (Pooled data)

Crop	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		Net return (Rs/ha)		B: C ratio	
	FP	RP	FP	RP	FP	RP	FP	RP
Mungbean	15000	17000	45080	55160	30080	38660	2.00	3.24
Cowpea	14000	15500	43960	52080	29960	36580	2.14	3.36
Clusterbean	16000	18000	36750	43100	20750	25100	1.29	1.39
Pigeonpea	19000	22500	65060	86960	46060	64460	2.42	2.86
Mean	16000	18250	47713	59325	31713	41200	1.96	2.71

Mean data of (Table 3) reveals that technological gap in pulses crop is 1.25 q/ha, extension gap is 1.74 q/ha. This may be due to the soil fertility, managerial skills of individual farmer's and climatic condition of the area. Hence, location specific recommendations are necessary to bridge these gaps. Technology index is 11.09 percent which shows the effectiveness of technical interventions. This accelerates the adoption of demonstrated technical interventions to increase the yield performance of pulse crop [12-14].

Mean data of (Table 4) clearly shows economics of FLD. Cost of cultivation of pulses in demo plot is 18250 Rs/ha and check plot are 16000 Rs/ha, Gross return is 59325 Rs/ha as compare to check plot 47713 Rs/ha, Net return 41200 Rs/ha as compare to check plot 31713 Rs/ha and B:C ratio is 2.71 and of 1.96 of check plot for front line demonstrations. This may be due to higher yield obtained and lower cost of cultivation under improved technologies compared to local check (farmer practice) [15-17].

CONCLUSION

The study was under taken to ascertain the economics of pulses production technologies. Front line demonstration (FLDs) played a very important role to disseminate recommended technologies resulting in an increased in yield at farmer's level and proved the potential of technology. The result convincingly brought out the yield of pulses can be increased with the intervention on recommended package of practices. This also linkages between farmers and scientists and built confidence for adoption of the improved technology. Productivity enhancement under FLDs over farmer practices of pulses cultivation created a greater awareness and motivated other farmers not growing pulses to adopt improved technologies. These practices may be popularized in this area by the extension agency to bridge the higher extension gaps. The study suggests that these successful practices should be popularized in the region by extension agencies. By doing so, they can effectively bridge the existing extension gaps and ensure that more farmers in the area benefit from these advancements in pulses production. Overall, the study underscores the importance of technology transfer through field level demonstrations (FLDs) in improving agricultural practices, enhancing productivity, and fostering collaboration between farmers and scientists.

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