RESEARCH NOTE

Enhancing Yield and Economics of Field Pea through Front Line Demonstration

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ABSTRACT

Front line demonstration on field pea was conducted by Krishi Vigyan Kendra Datia (M.P.) during the period from 2016-17 to 2019-20 in eleven villages of two blocks with 200 numbers of farmers. FLD on Prakash (IPFD 1-10) variety during 2016-17, 2017-18; variety Aman (IPF5-19) in 2018-19 and variety IPFD 4-9 in 2019-20 were taken with full package of practice. Front line demonstration conducted in a 80 ha during the all four years with recommended improved practices. A control plot was also kept where farmers practices was carried out. The critical inputs were identified in existing production technology through meetings and discussions with farmers. In the same sequence the other parameters like technological impact, economical impact and extension gap were analyzed for impact assessment of front line demonstration on field pea crop and feasibility of demonstrated technologies at grass root levels. The results of four years study revealed that the yield under demonstration plots 23.24q /ha as compared to17.53 q/ha in traditional farmer practices plots. This additional yield 5.72 q/ha and the increase in average field pea productivity by 32.69 per cent may contribute to present pulse requirement on national basis. The average of technology gap, extension gap and technology index were found to be 98.00 q /ha, 5.72 q/ha and 4.04 per cent respectively. An additional investments of Rs.1225 per ha coupled with scientific monitoring of demonstrations and non-monetary factors resulted in additional return of Rs.17768 per ha. Fluctuating sale price of field pea during different years influenced the economic returns per unit area. On the four years overall average basis incremental benefit cost ratio was found as 3.48. The results clearly indicate the positive effects of FLDs over the existing practices. Benefit cost ratio was recorded to be higher under demonstrations against control treatments during the years of experimentation.

Key word **:** *Technology gap; Extension gap; Technology index; Benefit cost ratio;*

Field Pea (*Pisum sativum* L.) of family Leguminosae is a very common crop cultivated throughout the world. It is one self-pollinated diploid (2n=14) most important annual cool season pulse crop of India. Field pea is the cheapest source of dietary protein (22.5%), carbohydrate (62.1%), fat (1.8%), vitamins (riboflavin, thiamin etc.), minerals (calcium iron) and having a amino acids (*Nawab et al., 2008, Dahl et al., 2012*).This crop is mostly grown in the cooler temperate zones and in the highlands of tropical regions of the India.

Madhya Pradesh is the second largest pea producer state in India. It is cultivated in 3.12 lakh ha area with 3.22 lakh tonnes production and the productivity of field pea has also shown an irregular trend, but it increased from 498 kg/ha in 2008-09 to 1032 kg/ha in 2017-18 *Anoymous (2019)*.

However, field pea crops has given the importance by the government because vast yield gap exists between potential yield and yield under real farming situation. Less or uncertain productivity mainly due to faulty sowing practices, improper crop geometry, avoid use of bio- fertilizers, other intercultural operations and climatic variability's are predominant reasons for limiting the potential yield. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven produce technologies under different micro farming situations in a district (*Das, 2007*). KVK Datia had

done intensive efforts on training about scientific cultivation, demonstration on new variety and other interventions. The present study was conducted to impact assessment of front line demonstration on field pea crop in the operational area of the KVK. The aim of the front line demonstration is to convey the scientific technical message to farmers that if they use recommended package and practices then the yield of this crop can be easily doubled than their present level.

METHODOLOGY

The present study was carried out by the KVK, Datia (M.P.) in *Rabi* seasons at the farmers' fields of eleven villages in Datia district of Bundelkhand zone during the period from 2016-17 to 2019-20. FLD on Prakash (IPFD 1-10) variety during 2016-17, 2017-18; variety Aman (IPF5-19) in 2018-19 and variety IPFD 4-9 in 2019-20 were taken with full package of practice. All 200 front line demonstrations in 80 ha area were conducted in eleven villages. Technology for the present study with respect to FLD was on following:

Variety	Prakash, Aman, IPFD 4-9
Seed treatment	Carbendazim @ 2g/kg + Rhizobium and PSB 20,20 gram/Kg seed
Sowing Method	Through Seed drill
Seed & spacing	100 kg/ha and 30 × 10 cm
Time of sowing	First fortnight of October
Fertilizers	20:50:20:20:: NPKS kg/ha
Weed control	Pre-emergence application of Pendimethalin 30 EC 3.3 l/ha followed by weeding at 30 days after sowing
Plant protection	Wettable sulphur 90% WDG @ 2.5 kg/ha. for powdery mildew

The improved technology included improved varieties, treatment of seed and plant protection measures were maintained during period of research study. In general, soils of the area under study were medium black clay with medium to low fertility status Seed treatment is done with Rhizobium and PSB after Carbendazim. The fertilizers doses were also given as basal dose. Weed management through weedicides was done at 18 to 20 hour after sowing. The data were collected through personal contact with farmers at farmer's field and after that tabulated and analyzed to find out the findings and conclusion. The statistical tool like percentage used in this study for analyzed data. The technology gap, extension gap and technology index were calculated as suggested by *Samui, et al. (2000).*

Extension gap = Demonstration yield- farmers' yield (control)

Technology gap = Potential yield- Demonstration yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

RESULTS AND DISCUSSION

Grain yield : The increase in grain yield under demonstration was 26.69 to 35.89 per cent than farmers' local practices. On the basis of four years, 32.69 per cent yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmers' traditional way of field pea cultivation. The results indicated that the front line demonstrations have given a good impact over the farming community of Datia district as they were motivated by the new agricultural technologies applied in the FLD plots (Table 1). However, the obtained seed yield in FLD's was low as compared to potential yield of the varieties due to drought like situation at the time of flowering and pod formation stage of the crop. *Dahmardeh et al. (2010)* showed that seed rate and cultivar are important factors affecting yield and quality of grain legumes. *Kumar et al., 2011* find that *Rhizobium* inoculation effective for seed germination, growth promotion and may be an efficient, safe and economic alternative to fungicides as bio-control agent in plant disease management. Related findings were obtained by *Mukherjee (2016)* who reported significant increase in plant height and number of branches of field pea with full dose of RDF along with rhizobium and PSB. *Diwedi et al. (2010)* also observed that technology adoption is the key to increase crop productivity.

Gap analysis : An extension gap of 483 to 618 kg per hectare was found between demonstrated technology and farmers practices during different four years and on average basis the extension gap was 571.50 kg per hectare (Table 1). The extension gap was lowest (483 kg/ha) during *rabi* 2019-20 and it was highest (618 kg/ha) during Rabi 2016-17 (Table 1). Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmers' practices.

Technology Gap : Wide technology gap were observed during different years and this was lowest (60 kg/ha) during *rabi* 2017-18 and was highest (135 kg/ha) during *rabi* 2018-19. On four years average basis the

Table 1. Grain yield and gap analysis of front line demonstrations on Field pea at farmers field from 2016-17 to 2019-20

Year	Demo.	Variety	Potential Yield	Demo. yield (kg)	FP Yield (kg)	Yield increase (%)	Extn. gap (kg)	Tech. gap (kg)	Tech. index (%)
2016-17	50	Prakash	2420	2340	1722	35.89	618	80	3.31
2017-18	50	Prakash	2420	2360	1780	32.58	580	60	2.48
2018-19	50	Aman	2440	2305	1700	35.59	605	135	5.53
2019-20	50	IPFD 4-9	2410	2293	1810	26.69	483	117	4.85
Average	-	-	2422.50	2324.50	1753.00	32.69	571.50	98.00	4.04

Table 2. Economic analysis of front line demonstrations on pea at farmers' field from 2016-17 to 2019-20

Year	Cost of cultiv. (Rs.)		Gross return (Rs.)		Net return (Rs.)		Net Return (Rs.)	B: C ratio	
	Imp.Tech.	LFP	Imp.Tech.	LFP	Imp.Tech.	LFP		Imp.Tech.	LFP
2016-17	20700	19800	51480	37884	30780	18084	70.21	2.49	1.91
2017-18	21700	20200	66080	49840	44380	29640	49.73	3.05	2.47
2018-19	23000	21800	89895	66300	66895	44500	50.33	3.91	3.04
2019-20	23800	22500	107007	84467	83207	61967	34.28	4.50	3.75
Average	22300	21075	78615	59623	56315	38548	51.13	3.48	2.79

Note : Imp.Tech.= Improved technologies; LFP=Local farmers practices

technology gap of total 200 demonstrations was found as 98.00 kg per hectare (Table 1). The observed technology gap may be attributed dissimilarity in soil fertility status, rainfall distribution, disease and pest attacks as well as the change in the locations of demonstration plots every year. The difference in technology gap during different years could be due to more feasibility of recommended technologies during different years. Technological yield gap of crops due to variation in the soil fertility and weather conditions is reported by *Raj, et.al (2013).*

Technology index : The technology index for all the demonstrations during different years were in accordance with technology gap. The highest technology index per cent of 5.53 was recorded in the year *rabi* 2018-19 and the lowest was observed in the year *rabi* 2017-18 which is 2.48 per cent. The technology index shows the feasibility of the evolved technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology (Table 1).

Economic return : The input and output prices of commodities prevailed during the demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit cost ratio. Use of pricey seeds for crop sowing, seed treatment, recommended dose of chemical fertilizers, proper pest management etc, all of these are the main reasons for high cost of cultivation in demonstration fields than local check. Therefore, the average cost of cultivation of four years increased in demonstration practice (22300 Rs/ha) as compared to Local check (21075 Rs/ha). The cultivation of field pea under improved technologies gave higher net return of Rs. 56315/ha (51.13% more) as compared to farmers' practices which was Rs. 38548/ha. The benefit cost ratio of field pea under improved technologies was 3.48 as compared to 2.79 under farmers' practices. The lowest and highest incremental benefit cost ratio depends on grain yields obtained and sale rates under improved technologies compared to local check (farmers' practice). The similar results were also observed by earlier investigator. This finding is in corroboration with the findings by *Mokidue et al., 2011* (Table 2).

CONCLUSION

The above results showed that the integration of improved technology along with active participation of farmer has a positive effect on increase the grain yield and economic return of field pea crop production. The suitable technology for enhancing the productivity of pea crop and need to conduct such demonstrations may lead to the improvement and empowerment of farmers. These demonstration trails also enhance the confidence between farmers and KVK scientists. The recipient farmers of FLDs also play an important role as source of information and quality seeds for wider dissemination of the improved varieties of field pea for other nearby farmers. It is concluded that the FLD programme is a successful tool in enhancing the production and productivity of field pea crop through changing the knowledge, attitude and skill of farmers.

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