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Research Article

Comparative evaluation of front line demonstration on yield and economics of field pea (*Pisum sativum* L.) in eastern U.P.

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SUMMARY : Field pea (*Pisum sativum* L.) is a premier winter season grain legume crop largely confined to cooler temperate zones and widely consumed in India. Hiking of prices enhanced its ranking among the pulses and considered as poor man meat in daily diet. It also plays an important role in promoting conservation agriculture and sustainability by enriching the soil through biological nitrogen fixation. Azamgarh district of Uttar Pradesh occupies 7033 hectares of land and 8925 metric tones production with average productivity of 1,269 kg ha^{-1} of field pea. Looking of facts that the productivity is far below when compared to potential yield, farmer fields provided an opportunity to demonstrate proven technologies of field pea under front line demonstration (FLD) by the Krishi Vigyan Kendra, Azamgarh (U.P.). The FLDs were carried out at 54 farmers field in 5 villages for four consecutive years *viz.*, 2007-08, 2008-09, 2009-10 and 2010-11. The highest grain yield 28.4 qha^{-1} was recorded in the year 2010-11 followed by 25.8 qha^{-1} during 2007-08 over farmers practices 19.7 and 18.3 qha^{-1}, respectively. The aforesaid years also recorded marked increase in yield (44.2 and 41.0 %) over control and found more profitable on economic parameter with higher benefit cost ratio (BCR) in both the years. An abrupt increase in BCR (4.36) during year 2010-11 was noticed due to increase in yield as well as prices of pulses in comparison to rest of the years. The variation in the percent increase in yield was found due to variation in agro-climatic parameters under rainfed condition.

KEY WORDS :
Field pea, FLD programme, Technology gap, Technology index

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BACKGROUND AND OBJECTIVES

Uttar Pradesh is the largest producer of pea, occupying 4.44 lakh ha with annual production of 5.76 lakh tones and average productivity of 1,297kg/ha. The area, production and productivity of field pea in district Azamgarh of U.P. is 7033 ha, 8925 metric tones and 1,269 $kgha^{-1}$, respectively. While there is no significant change in area in the last three decades, the production has registered significant increase due to improvement in productivity. However, the productivity at both level are almost same and also higher than the average productivity of field pea is 906 kg ha^{-1} of India. There is further scope for extension machinery to educate the farmers of eastern UP for wide adoption of improved and specific production technology of field pea by field demonstrations. A sudden increase in pulse (*dal*) prices at nation wide in past three-four years becomes a serious challenge to meet out the daily needs of poor families. Demonstrations are one of the practical approaches to maximize the production by display of relevant technologies at farmers' field under strict supervision of agricultural experts helped to narrow down the extension and technological gaps to a considerable extent. (Katare *et al.*, 2011). The present investigation was conducted with an objectives to popularize and extend the adoption

Table A: Differences between technological intervention and existing practices under FLD on field pea

Sr. No.	Component	Technological intervention	Existing practices	Gap analysis
1.	Variety	KPMR 400	Local	Full gap
2.	Seed treatment	*Trichoderma* powder @ 10 g kg^{-1} of seed	No seed treatment	Full gap
3.	Fertilizer dose	20 kg N, 60 kg P_2O_5 and 20 kg Sulphur per hectare	Use of under dose fertilizer	Partial gap
4.	Weed control	Pendimethalin 3.5 litre ha^{-1}	No use of weedicide	Full gap
5.	Irrigation	Light irrigation before flowering and after poding if winter rain not noticed	Uncontrolled irrigation	Partial gap
6.	Powdery mildew	Use of resistant varieties and spray wettable sulphur 3g per litre water	No measurement adopted	Full gap

Table B: Production and protection technologies applied in the demonstrated and control plots (Farmers practice) at the farmer field

Sr. No.	Particulars	Production technologies
1.	Seed rate	100 kg ha^{-1}
2.	Sowing method	Line sowing (R x R 25 cm) (P x P 10 cm)
3.	Situation	Irrigated
4.	Soil type	Sandy loam
5.	Weed management	Pre - emergence application of Pendimethalin 3.5 litre ha^{-1} followed by manual weeding, one at 30 days after sowing
6.	Plant protection	Need based chemical fungicide sprayed for powdery mildew control. No use of any control measure for wilt management

of better crop management practices through farmers participatory mode in traditional as well as non-traditional areas of eastern UP.

RESOURCES AND METHODS

Front line demonstration on field pea was conducted by Krishi Vigyan Kendra, Azamgarh, U.P. with an objective to enhancing the production potential of field pea during the period from 2007-08, 2008-09, 2009-10 and 2010-11 in five villages *viz.*, Kariya Gopalpur, Sikraur, Newada, Pandri, and Jagdispur of Lalganj, Martinganj and Ahiraula block of district Azamgarh. The total 54 numbers of farmers were associated under this programme. The component demonstration of front line technology in field pea *i.e.* improved variety KPMR 400, balanced dose of fertilizer (20 kg nitrogen + 60 kg P_2O_5 ha^{-1}), use of *Trichoderma* @ 10 g kg^{-1} of seed as seed treatment and application of pendimethalin 3.5 litre ha^{-1} with knape sac sprayer fitted with flat fan nozzle by using 500 litres of water within 48 hours of sowing were taken in an area of 0.2 to 0.4 ha of each farmers. A total of 15 hectares area was covered in four consecutive years. These demonstrations were conducted at farmers field with local check plot where farmers practices was carried out for comparative study (Table A). All the production and protection technologies other than interventions were applied in similar manner in demonstrated as well as in existing practices. These production and protection technologies are given in the Table B. The yield data were collected from the selected FLD farmers by random crop cutting method and analyzed by using simple statistical tools. The technology gap, extension gap and technological index were calculated by using following formula as given below:

$$\textbf{Technology gap} = \textbf{Potential yield} - \textbf{Demonstrated yield}$$

$$\textbf{Extension gap} = \textbf{Demonstrated yield} - \textbf{Yield under existing practice}$$

$$\textbf{Technology index} = \frac{\textbf{Potential yield} - \textbf{Demonstrated yield}}{\textbf{Potentialyield}} \textbf{x100}$$

Table 1: Productivity, technology gap, extension gap and technological index (%) in field pea

Year	No. of farmers	Area (ha)	Yield ($q\ ha^{-1}$)		Yield Increase %	B:C ratio	Technology gap	Extension gap	Technological Index (%)
			FLD	Existing practices					
2007-08	13	3.0	25.8	18.3	41.0	3.20	6.2	7.5	19.4
2008-09	13	4.0	24.2	17.6	37.5	3.97	7.8	6.6	24.4
2009-10	13	5.0	17.5	14.1	24.1	3.10	14.5	3.4	45.3
2010-11	15	3.0	28.4	19.7	44.2	4.36	3.6	8.7	11.3
Mean	54	15.0	24.0	17.4	36.7	3.70	8.03	6.60	25.1

OBSERVATIONS AND ANALYSIS

The perusal of data given in Table 1 revealed that the highest yield in the FLD plot as well as farmers practices was 28.4 q ha^{-1} and 19.7 q ha^{-1}, respectively during 2010-11 followed by yield obtained during starting year to subsequent year *i.e.* 2007-09. However, the drastic reduction in demo yield (17.5 q ha^{-1}) was only associated with 2009-10 and this shortfall varied from 6.7 to 10.9 q ha^{-1} over rest of the years. This results clearly indicate that due to knowledge and adoption of improved variety *i.e.* KPMR 400, use of balanced dose of fertilizer (20 kg N and 60 kg P_2O_5 ha^{-1}), seed treatment with *Trichoderma* @10 g kg^{-1} of seed, pre emergence application of pendimethalin 3.5 litre ha^{-1} etc. enhanced field pea yield by 41.0, 37.5, 24.1 and 44.2 per cent over the yield obtained under farmers practices (use of the non-descriptive local variety, no use of the balanced dose of fertilizer and no control measure adopted for wilt management etc). As for as farmers benefits are concerned, that all the years were found more profitable by gaining higher benefit cost ratio, while *Rabi* 2010-11 was a unique year for better returns. The present results are in the close conformity with the findings of Singh *et al.* (2002).

As per the analysis of technological gap in the demonstration fields ranged in between 3.6 q to 14.5 q ha1 during four consecutive years of study. A higher value (14.5 q ha1) of technological gap was observed only in year 2009-10. On an average technology gap under four year FLD programme was 8.03q ha^{-1}. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and location specific micro climatic situation.

The extension gap of 7.50, 6.60, 3.40 and 8.70 q ha^{-1} were observed during 2007-08, 2008-09, 2009-10 and 2010-11, respectively. On an average extension gap was observed 6.55 q ha^{-1}, 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 farmer's field. The technology index varied from 11.3 to 45.3 per cent (Table 1) with an average technology index was observed 25.10 per cent during the four years of FLD programme, 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 field pea. Similar findings were also observed by Chauhan (2012) at Tapi, Gujarat on yield gap analysis of gram cultivation under FLD programme.

Conclusion:

The FLD programme was effective in changing attitude skill and knowledge of recent technology for high yielding varieties, balanced dose of the fertilizer and biological disease management of field pea including their adoption. This also improved the relationship between farmers and scientist and built confidence between them. The selected farmers of the demonstration acted also as a source of information and producer of pure seeds of wider dissemination of improved varieties of field pea to the other farmers. The average productivity gain 36.7 per cent under FLD over conventional practices of field pea cultivation created greater awareness and aggravated the other farmers to adopt appropriate recent production and protection technologies of field pea in the district. The selection of critical input and participatory approach in planning and conducting the demonstration definitely help in the transfer of technology to the field pea growers for maximum production and to get wider benefit cost ratio on sustainable basis.

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