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Research Article

Enhancing yield and economics of field pea through front line demonstration

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SUMMARY : Field pea (*Pisum sativum* L.) is a good source of dietary protein to complement the cereal based diet, particularly for vegetarian masses in the country. It is a *Rabi* pulse crop which is highly productive and is grown for food, feed and vegetable. Present study was carried out in different villages (17) and blocks (03) of Sant Ravidas Nagar district. Fifty nine front line demonstrations on Malviya Matar-15, a promising cultivar of field pea developed from B.H.U., Varanasi were conducted during 2011 -12 and 2012-13 by KVK, Sant Ravidas Nagar. Appropriate interventions *viz.*, improved variety of seed, balance application of fertilizers, weed control, proper seed rate, sowing methods, plant protection measures were adopted under front line demonstration on field pea. The results revealed that improved variety gave 32.9 and 36.89 per cent higher yield with net income Rs. 38402 and Rs. 46419 per hectare over local check variety 'Rachna' during respective years. However, benefit cost ratio was observed as 2.2 and 2.28 during 2011-12 and 2012-13, respectively. In the line of promotion of such improved technology, extensive field days were organized where the farmers of adjoining villages had seen the impact of improved technology at their own or nearby field. Presently, 48 per cent farmers are growing this variety successfully in adopted villages of KVK. Thus, the results of front line demonstration of field pea clearly indicated that by adoption of appropriate interventions, production and productivity of field pea could be enhanced substantially and providing suitable and sustainable option to farmers of eastern Uttar Pradesh.

KEY WORDS :
Economics,
Field pea,
Front line demonstration,
Technology gap

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BACKGROUND AND OBJECTIVES

Pulse crops occupy a significant place in Indian agrarian economy, only next to food grains. India is endowed with a wide variety of agro-climatic zones and soil types that enable cultivation of various kinds of pulse crops. India is the largest producer, importer and consumer of pulses in the world. It accounts 25 per cent of global production (FAO STAT, 2010). Pulse crops are cultivated in about 18.52 per cent of the total cropped area in India. In India, pulse crops are grown in 26.3 m ha, with a total production of 18.1 mt and a very low productivity of only 690 kg/ha during 2010- 2011 (Anonymous, 2012). A sudden increase in pulse prices at national level during past three to four years becomes a serious challenge to meet out the daily needs of poor families. In Uttar Pradesh, the total cultivated area under pulse crops, total production and yield/ha are 2.22 m ha, 2.00 mt and 899 kg/ha, respectively, (Anonymous, 2010).

Field pea (*Pisum sativum* L.) is a good source of dietary protein to complement the cereal based diet, particularly for vegetarian masses in the country. It is highly productive crop and is grown for food, feed and vegetable during *Rabi* season. During 2010-11, field pea was grown in 1127 ha with a total production of only 1375 q and a very poor productivity of 1220 kg/ha in Sant Ravidas Nagar (Anonymous, 2013). The key reasons, for such a poor productivity in Uttar Pradesh and particularly in Sant Ravidas Nagar, are cultivation of field pea in marginal areas, non- adoption of

Table A : Package of practices followed by farmers under FLD and in general

Particulars	Technology interventions	Farmer's practices
Variety	Malviya Matar-15	Local cultivar (Small seeded)
Seed rate	100 kg/ha	160 kg/ha
Seed treatment	*Trichoderma* @ 8-10 g/kg +*Rhizobium* culture @ 200g/10 kg	No use
Time of sowing	Second fortnight of October	Last week of October to last week of November
Method of sowing	20-25 cm (row to row), 8-10 cm (plant to plant) and east west direction of sowing	Broadcasting, no direction of sowing methods
Fertilizer management	20: 60: 20 (N:P:S) kg/ha	Either no use of fertilizers or use only DAP (40-50 kg/ha)
Weed management	Pre-emergence application of pendimethalin 30 EC 3.3 l/ha followed by manual weeding at 30 days after sowing	No use
Water management	Light irrigation before flowering and after podding (at the time of no rainfall)	No use
Plant protection	Need based application of sulphur @ 3g/l of water for the management of powdery mildew	No use

improved farming techniques, minimal adoption of high yielding improved varieties and an overall lack of awareness among farmers about improved packages of practices. There is wide scope for extension machinery to educate the farmers of eastern Uttar Pradesh for higher adoption of improved and specific production technology of field pea by front line demonstration. Demonstrations are one of the practical approaches to maximize the production by display of relevant technologies at farmers field under close supervision of agricultural experts helped to narrow down the technological gaps to a considerable extent (Katare *et al.*, 2011).

RESOURCES AND METHODS

Krishi Vigyan Kendra (KVK) Sant Ravidas Nagar conducted 59 front line demonstrations on field pea at farmer's fields in 17 villages under 3 blocks of Sant Ravidas Nagar (U.P.) during 2011-12 and 2012-13. Farmers were identified as suggested by Choudhary (1999). The required inputs were supplied and regular visits to the demonstration fields by the KVK scientists ensured proper guidance to the farmers. The recommended package of practices under FLD and farmer's practices are depicted in text box as under. The sowing was done during second fortnight of October under assured irrigated conditions and harvested during first fortnight of March. Seeds were sown in rows 20-25 cm apart by drill or bullocks placed at 4-5 cm depth. However, the practices followed by farmers in general use local cultivar (small seeded), seed rate @ 160 kg/ha, no seed treatment, sowing from last week of October to last week of November, in broadcasting manner, no use of fertilizer pattern to under dose application that's to only use of DAP, no weed, water and plant protection measures followed.

Field days and group meetings were also organized to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data output were collected from both FLD plots as well as control plots and cost of cultivation, net income, and benefit cost ratio were also worked out (Samui *et al*., 2000). The technology gap has been computed on a three point scale of full, partial and no gap.

OBSERVATIONS AND ANALYSIS

Socio-economic profile and psychological parameters of the respondents has been depicted in Table 1. It reveals that most of the respondents belonged to middle (33.90 %) and old age (38.98 %) category. Young aged respondents poorly related to agriculture. Overall 88.14 per cent respondents were literate out of which 67.80 per cent respondents belonged to up to Higher Secondary and more than graduation. Thus, a major group of respondents were well educated and able to understand the technologies. 62.72 per cent respondents belonged to medium family size having 6-10 members of the family. Therefore, agricultural activities may be performed well with the medium group of family type. However, marginal (66.10 %) and small (18.64 %) land holding size farmers were actively engaged in agricultural activities. High (45.76 %) and medium (32.20%) farming experience groups were the major respondents. Major occupation as agriculture was concerned with 61.02 per cent respondents. However, 25.42 per cent respondents belonged to agriculture and private services. Thus, a major group of respondents related to agriculture activities. Annual income of respondents came under low (52.54 %), medium (28.81 %) and high (18.64 %) income group category. Similarly, major respondents belonged to low (61.02 %), medium (27.12 %) and high (11.86 %) category as for as social participation is concerned. Therefore, the group of respondents was not actively socially participated. The probable reason might be that the respondents were engaged in agricultural activities and they found comparatively less time to participate in such type of activities (Khandare, 2002). The group of respondents also needs to be enhanced social participation so that they may learn new skills and exposed to

Table 1: Distribution of respondents according to their socio-economic profile and psychological parameters (n=59)

Sr. No.	Variables	Categories and respective scores	Frequency	Per cent
1.	Age	Young (< 35 yrs.)	16	27.12
		Middle (35-50 yrs.)	20	33.90
		Old (> 50 yrs.)	23	38.98
2.	Education	Illiterate	7	11.86
		Primary School	8	13.56
		Middle School	4	6.78
		Up to Higher Secondary	20	33.90
		Graduate and above	20	33.90
3.	Family type	Small (< 5 members)	16	27.12
		Medium (6-10 members)	37	62.72
		Large (> 10 members)	6	10.17
4.	Land holding	Marginal (< 1 ha)	39	66.10
		Small (1 - 2 ha.)	11	18.64
		Medium (2 – 4 ha)	7	11.86
		Large (> 4 ha)	2	3.39
5.	Farming experience	Low (< 10 years)	13	22.03
		Medium (11-20 years)	19	32.20
		High (> 20 years)	27	45.76
6.	Occupation	Only agriculture	36	61.02
		Agriculture + Govt. Service	08	13.56
		Agriculture + Private Service	15	25.42
		Only service	0	0.00
7.	Annual income	Low (< Rs. 30000)	31	52.54
		Medium (Rs. 30001-60000)	17	28.81
		High (> Rs. 60000)	11	18.64
8.	Social participation	Low (< 118)	36	61.02
		Medium (119-175)	16	27.12
		High (> 175)	7	11.86

Table 2: Level of technical gap in field pea cultivation under FLD and farmers practices (n=59)

Sr. No.	Improved practices	Extent of technology gap					
		Gap in demonstrated technology			Gap in farmer's practices		
		Complete	Partial	No	Complete	Partial	No
1.	Field preparation	-	-	59 (100.0)	-	48 (81.36)	11 (18.64)
2.	Used improved varieties	-	-	59 (100.0)	37 (62.71)	22 (37.29)	-
3.	Seed treatment	-	-	59 (100.0)	53 (89.83)	06 (10.17)	-
4.	Seed rate	-	-	59 (100.0)	-	41 (69.49)	18 (30.51)
5.	Time of sowing	-	05 (8.47)	54 (91.53)	-	49 (83.05)	10 (16.95)
6.	Method of sowing	-	08 (13.56)	51 (86.44)	56 (94.92)	03 (05.08)	-
7.	Application of fertilizers	-	-	59 (100.0)	11 (18.64)	48 (81.36)	-
8.	Water management	-	07 (11.86)	52 (88.14)	-	47 (79.66)	12 (20.34)
9.	Weed management	-	06 (10.17)	53 (89.83)	35 (59.32)	15 (25.42)	09 (15.26)
10.	Pest and disease management	-	04 (06.78)	55 (93.22)	50 (84.75)	09 (15.25)	-

* Figures in parenthesis are percentage

modern technologies.

It is evident from Table 2 about the technical gap in cultivation of field pea that almost all the cultivation practices followed no gap in demonstrated technology however, time of sowing (8.47%), method of sowing (13.56%), water management (11.86 %), weed management (10.17 %) and pest and disease management (6.78 %) followed partial gap among the identified farmers. It is clear from the data contained in Table 2 that 89.83 per cent gap was observed under seed treatment along with 84.75 per cent gap under pest and disease management practices. In addition, a huge gap 94.92 per cent was observed under method of sowing. The method of sowing includes line sowing and the direction of sowing *viz.*, east-west direction. Almost all the farmer's practices under observation come under partial to complete gap. Therefore, it is essentially required to minimize these gaps through various modes of extension. Being a key component of extension, Front line demonstrations were followed to exhibit a clear picture about demonstrated technology v/s farmer's practice (Prakash *et al.*, 2004). Similar observations for gap in improved technologies and farmers practices were also observed by Burman *et al.* (2010) in different crops.

The analysis presented in Table 3 exhibited that average yield of field pea was 24.35 and 24.64 q/ha during 2011-12 and 2012-13, respectively under demonstrated technology however, under farmer's practices the average yield was 18.32 and 18.00 q/ha during respective years. However, per cent increase over local yield was 32.90 and 36.89 during 2011-12 and 2012-13, respectively.

Table 3: Yield and economics of field pea in Sant Ravidas Nagar

Particulars	Demonstrated technology		Farmer's practices	
	2011-12	2012-13	2011-12	2012-13
Highest yield (q/ha)	27.30	26.18	21.50	20.54
Lowest yield (q/ha)	21.40	21.11	17.20	16.25
Average yield (q/ha)	24.35	24.64	18.32	18.0
Per cent increase over local yield	32.9	36.89	-	-
Gross cost (Rs./ha)	33430	36125	31630	35720
Gross return (Rs./ha)	71832	82544	53944	60300
Net return (Rs./ha)	38402	46419	22314	24580
B/C ratio	2.20	2.28	1.70	1.69

As far as economics of field pea is concerned; gross cost, net income and benefit cost ratio were Rs. 33430/ha, Rs. 38402/ha and 2.20, respectively during 2011-12 and Rs. 36125/ha, Rs. 46419/ha and 2.28, respectively during 2012-13. However, Rs. 31630/ha gross cost, Rs. 22314/ha net return with 1.70 benefit cost ratio during 2011-12 and Rs. 35720/ha gross cost, Rs. 24580/ha net return with 1.69 benefit cost ratio observed during 2012-13 under farmer's practices. The superiority of recommended package of practices under frontline demonstration over farmers' practice was also reported by Sagar and Chandra (2004), Vaghasia *et al*. (2005), Mitra and Samajdar (2010) and Balai *et al*. (2012).

Conclusion :

The successfulness of demonstrations mainly depends upon the technology gap. In this study, the gap is presented well to understand the drawbacks of existing technology. Almost partial to complete gap was observed under the present study. To overcome these gaps front line demonstrations were carried out to show the promising potential of different technologies. It was apparent from the study that there is a huge scope to improve the yield and economics of field pea in eastern U.P. conditions which could be obtained by adopting the improved variety Malviya Matar-15 along with recommended package of practices. The selected farmers of the demonstration acted also as a source of information and producer of seeds for wider dissemination of improved varieties of field pea to the other farmers of adjoining areas. In addition, various extension activities should be organized to encourage the farmers about improved practices of cultivation.

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