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RESEARCH PAPER

Assessment of frontline demonstration programme on summer moong (*Vigna radiate* L.) on light to medium soil in South-western part of Punjab, India

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Abstract : The study was conducted by KVK, Ferozepur in different six blocks during 2015-16. The soil of district was light to medium in texture and soil pH varied from neutral to slightly saline in nature. Total hundred front line demonstrations (FLDs) were conducted on summer moong variety SML 668 (*Vigna radiate* L.). The demonstrations plots had more grain yield as compared to the control plots. Almost 18 per cent increase was recorded in the demonstration yield over farmer's practice. Even so in blocks of the district, higher grain yield was obtained in Ghal Khurd block (10.32 q/ha) followed by Zira block (9.35q/ha), Ferozepur block (8.98 q/ha), Makhu block (8.76 q/ha), Mamdot block (7.98 q/ha). Less grain yield was obtained in Guru Har Sahai Block (7.44 q/ha). In Ghal Khurd block where soil was medium in texture and moong crop was sown in advance which resulted highest yield as compared to remaining blocks. While on the contrary, gap between technology and extension was founded in all blocks. The demonstrations plots noticed higher net return as compared to check plot. Whereas benefit cost ratio (B: C ratio) was also recorded more in demonstrations as compared to farmer's practices. By growing summer moong crop with improved technologies in between other crops can help to achieve doubling farm income goal.

Key Words : Summer moong, Soil texture, Grain yield, Technology index, B:C ratio

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INTRODUCTION

In world, the largest producer, consumer and importer of pulses is India. It accounts for 33 per cent of world area and only 22 per cent of the world production of pulses (FAOSTAT, 2012). Good and cheap source of protein for a majority of our population is pulses. Consumption of pulses is much more as compared to other sources of protein available in India which shows great significance of pulses in routine habits of people. According to Patil *et al*. (2015) and Reddy (2010) in India pulses contributes 11 per cent of the total intake of proteins. It is in approach of every human being in country so it is very crucial to increase production of pulses for

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feeding balance diet to economical backward classes. Although production of pulses was increased significantly but consistent growth is a challenge to fulfil demand of burgeoning population in the country. According to Senanayake *et al*. (1987) and Zapata *et al*. (1987) besides its protein quality, moong has ability to fix atmospheric nitrogen (N) and adds organic matter in soil which improves soil health and, therefore, it also benefits in yield of succeeding crops. Sehrawat *et al.* (2013) mentioned that India is largest producer of summer moong and accounts for about 65 per cent of the world acreage and 54 per cent of the world production. Summer moong can be grown on larger range of environments due to short duration in nature (Islam *et al.,* 2008). The present exhaustive cereals cropping system such as rice-wheat or maize-wheat are deteriorating soil health at an alarming pace. So, an alternative of these cereal cropping systems with short duration crops is very much required. Summer moong has less fertilizer requirement because it has ability to fix N from atmosphere into soil. In 1991-92 to increase the production and productivity of pulses, a concept of front line demonstrations (FLD) in India was introduced under a "Technology Mission on Pulses". The main objective of FLD's is to demonstrate production technologies and its management practices on farmers' fields under different farming situations and climatic variations. This study was conducted by Krishi Vigyan Kendra (KVK) in different six blocks of Ferozepur district during 2015-16 to assess the diversity between demonstrated technologies and conventional practices in summer moong crop.

MATERIAL AND METHODS

These frontline demonstrations were conducted by KVK, Ferozepur in different six blocks on farmer's field during *Rabi* season 2015-16 to evaluate difference between farmer practice and demonstrated technologies in South-Western part of Punjab, India. This study was conducted on semi-arid type of climate with hot and dry from April to June. The mean maximum and minimum temperatures show variations during the year. During summer spell temperature exceeds upto 45^{o}C high in May from 38^{o}C in April. In this study, the data of total hundred FLDs of summer moong (var.SML 668) were collected and analysed. Summer moong crop was sown between 20th March to 20th April which is recommended time of sowing by Punjab Agricultural University (PAU), Ludhiana. Farmers' plots were sown crop with their own method kept as local standard controls. In district, different villages were selected in which summer moong was grown after potato crop to check performance as compared to moong sown after harvesting of wheat. Other activities were performed such as field days, farmers meeting, travelling seminars and awareness campaigns at demonstrations plots to provide the opportunities among the nearby farmers to witness the benefits of these frontline demonstrations. For soil fertility status, soil samples from all experimental sites were collected and analysed for pH, EC, OC, available P, available K. As per the improved technology which includes quality seed, seed treatment and maintenance of proper germination etc was checked by KVK scientists. The sowing of all demonstrations was completed as per PAU recommendations and fertilizers applied according to soil test bases. All set of observations were recorded from all frontline demonstrations and control plots like yield, gross return, net return, technology index, B: C ratio. To estimate the technology gap, extension gap and technology index following formulae used by Samui *et al*. (2000) were used:

Technology gap = Potential yield-Demonstration yield

Extension gap = Demonstration yield-Farmers yield

Technolgy index= (Technology gap/Potential yield) x100

Poetntial yield of summer moong crop in Punjab is 11.25 q/ha

RESULTS AND DISCUSSION

These demonstrations were conducted in all blocks of Ferozepur district during 2015-16. Total one hundred demonstrations carried out to cover whole district to encourage farmer for cultivation of summer moong crop. Out of all demonstrations 22 were in Ghal Khurd block, 16 in Ferozepur block, 19 in Zira, 15 in Mamdot, 12 in Guru Har Sahai block and 16 in Makhu. In all blocks total 15 demonstrations failed due to poor germination and earth crust formation after rain and these failed demonstrations were eliminated to generate a quality data.

Crop yield :

Higher average yield of summer moong in demonstration was 8.81 q/ha and among the farmers practice higher average yield recorded was 7.45 q/ha. Grain yield was 18.90 per cen higher in demonstration plots as compared to farmers practice fields (Table 1).

Same findings were reported by Singh *et al.* (2012) and Chandra (2010) where demonstrations plots yielded more summer moong crop. The variation between demonstrations and farmer practice yield was mainly due to seed treatment, time of sowing, right dose and right method of fertilizer application and by taking plant protection measures. Blockwise summer moong production recorded as higher grain yield (10.32 q/ha) was founded in Ghal Khurd block of district followed by Zira block (9.35 q/ha), Ferozepur block (8.98 q/ha), Makhu block (8.76 q/ha), Mamdot block (7.98 q/ha). Low grain yield was obtained in Guru Har Sahai Block (7.44 q/ha) as compared to other blocks. The frontline demonstrations recorded more yield in field where summer moong was sown after potato as compared to wheat-moong rotation due to sufficient and optimum time for sowing of moong crop. Although among farmer practice higher grain yield was recorded in again Ghal Khurd (9.68 q/ha) block of district followed by Zira block (7.63 q/ha), Ferozepur block (7.12 q/ha), Mamdot block (6.81 q/ha), Makhu block (6.78 q/ha) and Low yield was founded in Guru Har Sahai block. The higher yield in demonstration over control plots of farmer's practices is a strong evident of better management in same climatic conditions. The results of demonstrations and advanced agro-technologies were astonished the farmers and they felt motivated and promised to adopt these techniques on their own fields. Whereas low yield in check plots were due to no-adoption of proper plant protection measures and optimum date of sowing without adopting right methods of moong sowing.

Technology gap:

It is the difference or gap between the demonstrations yield and potential yield. The technology gap was 2.45 q/ha in Ferozepur district. In Punjab state, the potential yield of summer moong crop is 11.25 q/ha. The location specific findings are necessary to fill this gap. Raj *et al.* (2013) and Mukharjee (2003) have noticed same outcomes. In different blocks technology gap in Ferozepur block was 2.27 q/ha, in Ghal Khurd block 0.93 q/ha, for Zira block1.90 q/ha, in Mamdot block it was 3.27 q/ha, for Guru Har Sahai block 3.81 q/ha and in Makhu technology gap was 2.49 q/ha (Table 1).

Extension gap:

Summer moong crop extension gap was 1.36 q/ha in Ferozepur district. Within district highest extension gap was recorded in Makhu block (1.98 q/ha) and lowest extension gap was founded in Ghal Khurd block (0.64 q/ha) (Table 1). So, wider extension gap has to decrease through advanced latest technologies.

Technology index:

The technology index shows the possibility of new technology at the farmer's field. Lower the value of technology index more is the feasibility of the technology (Jeengar *et al.*, 2006). It was 21.73 per cent in operational district. Bar and Das (2015) concluded similar findings.

Economic return:

Economics of summer moong crop production under frontline demonstration and farmers practices is presented in Table 2. In Ferozepur higher average gross return was Rs.39622/- per ha over Rs. 33510/- per ha in check plot. In Ghal Khurd block higher gross return produced which was Rs. 46440/- per ha whereas minimum gross return recorded in Guru Har Sahai block Rs. 33480/- per ha. The higher cost of cultivation was noticed in check plot of district Rs. 16466/- per ha as compared to demonstration cost of cultivation Rs. 16250/

Table 1: Evaluation of frontline demonstrations by calculating crop yield, technology gap and extension gap in summer moong in Ferozepur district

Blocks	Demonstration		Yield (q/ha)			% Increase over check	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
	Number	Failed	Potential	Demonstration	Check				
Ferozepur	16	2	11.25	8.98	7.12	26.12	2.27	1.86	20.18
Ghal Khurd	22	3	11.25	10.32	9.68	6.61	0.93	0.64	8.27
Zira	19	1	11.25	9.35	7.63	22.54	1.9	1.72	16.89
Mamdot	15	4	11.25	7.98	6.81	17.18	3.27	1.17	29.07
Guru Har Sahai	12	2	11.25	7.44	6.66	11.71	3.81	0.78	33.87
Makhu	16	3	11.25	8.76	6.78	29.20	2.49	1.98	22.13
Total/average	100	15	11.25	8.81	7.45	18.90	2.45	1.36	21.73

- per ha. On contrary, net return was calculated in demonstration Rs. 23372/- per ha as compared to Rs. 17043/- per ha in check plots (Table 2). The similar trend of yield in which demonstration had more net return than farmers practice was reported by Patil *et al*. (2015). The district benefit: cost ratio was recorded 1.45:1 in demonstration plots and 1.04:1 in check plots. Among the blocks higher B:C ratio found in block Ghal Khurd which was 1.96:1 in demonstration plots and in check it was 1.75:1. Guru Har Sahai block recorded lowest B:C ratio (1:1) in demonstration plot and (0.77:1) in check plots (Table 2).

Soil fertility status:

In Ferozepur district soil texture is sandy loam to loamy sand which varies according to blocks. The study conducted in Ferozepur district clearly indicated that soil fertility plays a significance role to achieve higher yield of summer moong crop. Higher grain yield in Ghal Khurd illustrates that soil fertility enhanced the capability of soil to produce more which plays a significant role in yield. The main reason for low yield of summer moong crop in Guru Har Sahai block was low soil fertility which adversely affects crop performance and huge penalty in yield were recorded (Table 3). As already mentioned exhaustive cereal-cereal system has deleterious effect on soil quality from last few decades and agricultural sustainability has been confronting a big challenge in future. Therefore, summer moong crop can play a big role to enhance and revitalize soil health by fixing atmosphere N into available form in soil which also benefits to the succeeding crops.

Conclusion:

It is found that FLDs programme is an effective tool for increasing the production and productivity of summer moong crop in South Western part of Punjab. The per cent increase in yield of summer moong sown after potato crop created greater awareness and motivation in the other potato grower to adopt these techniques. Summer moong crop fits very well due to its short duration between *Rabi* and *Kharif* season crops. It will play a major role between exhaustive cropping systems by improving soil health and conserving natural resources. To enhance balanced diet among economical backward classes, increase production of summer moong

Table 2: Economics data of frontline demonstrations including gross return, cost of cultivation, net return and B:C ratio in summer moong (SML 668) in Ferozepur district

Block	Gross return (Rs./ha)		Cost of cultivation (Rs./ha)		Net return (Rs./ha)		B:C ratio	
	Demonstration	Check	Demonstration	Check	Demonstration	Check	Demonstration	Check
Ferozepur	40410	32040	16440	16750	23970	15290	1.46	0.91
Ghal Khurd	46440	43560	15700	15830	30740	27730	1.96	1.75
Zira	42075	34335	15820	16100	26255	18235	1.66	1.13
Mamdot	35910	30645	16650	16840	19260	13805	1.16	0.82
Guru Har Sahai	33480	29970	16740	16950	16740	13020	1.00	0.77
Makhu	39420	30510	16150	16330	23270	14180	1.44	0.87
Total/average	39622.5	33510	16250	16466.7	23372.5	17043.3	1.45	1.04

Table 3 : Physico-chemical properties of demonstrated fields in district Ferozepur

	Soil characteristics					
Block	pH	EC (dS/m)	OC (%)	P (kg/acre)	K (kg/acre)	Texture
Ferozepur	7.63	0.94	0.84	12.11	82.14	Loamy sand
Ghal Khurd	7.38	0.32	0.91	14.78	101.4	Loamy sand
Zira	7.36	0.36	0.89	12.04	101.52	Loamy sand
Mamdot	7.69	0.96	0.73	10.56	145.8	Sandy loam
Guru Har Sahai	7.94	0.86	0.42	9.68	71.42	Sandy loam
Makhu	7.32	0.5	0.79	8.92	70.4	Loamy sand

is much required. Growing summer moong crop with improved technologies in between other crops can help to achieve doubling farm income goal.

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