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TECHNOLOGY TRANSFER THROUGH FLDS ON MUNG BEAN IN SEMI-ARID REGION OF RAJASTHAN

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ABSTRACT

This study was undertaken in Jaisalmer district, situated in semi-arid region of Western Rajasthan, to evaluate the economic feasibility of technology transfer and adoption in mung bean through 130 front line demonstrations conducted during 2005 to 2011. Adoption of improved technology had significant impact on seed yield vis-à-vis yield gaps in Mung bean. Improved technology enhanced Mung bean yield from 585 kg/ha (farmers practice) to 751 kg/ha (improved practice), with an overall increase of 29.82 per cent. The overall adoption index of various inputs increased from 7.64 per cent (2005) to 17.82 per cent (2011). Among the critical inputs, variety/genotype ranked first followed by fertilizer, pesticide, hoeing-weeding and irrigation. The incremental benefit cost ratio due to improved technologies was 2.75. Further, to bridge up the gap between technology developed and technology transferred, there is need to strengthen the extension network besides emphasis on specific local recommendations.

INTRODUCTION

India is the largest producer and consumer of pulses in the world contributing around 28 per cent of global production. Pulses being rich in quality protein, minerals and vitamins are inseparable ingredients of diet of majority of Indian population. Despite high nutritive value of pulses and their role in sustainable agriculture desired growth rate in production could not be witnessed. The domestic production of pulses is consistently below the targets and actual domestic requirements are also higher, due to this pulses are being imported. Presently, the production of pulses in India is 18.09 million tones from an area of 26.28 million hectares and productivity is 68.9 kg/ha. In India Mung bean covers an area of 3.44 million hectares, production is 1.2 million tones and productivity is 351 kg/ha. In Rajasthan Mung bean is grown in 0.86 million hectares area, production is 0.28 million tones and productivity is 325 kg/ha. Whereas, in Jaisalmer district it is grown in 2244 ha area, production is 336 tones and productivity is 149 kg/ha. Due to stagnant production, the net availability of pulses has came down from 60 gm/day/person to 31 gm/ day /person. The low production of pulses is primarily due to erratic distribution of mansoon and relegation of pulses on marginal lands with low fertility status. Non-availability of quality seeds of promising cultivars and more susceptibility of pulses to disease and pest are also the major constraints limiting the pulses production. In light of the above facts, to boost Mung bean production and productivity in India as well as in the state of Rajasthan the present study was undertaken with following specific objectives:

1. To know the impact and constraints of technologies transfer through FLDs on Mung bean crop.

RESEARCH METHODOLOGY

During 2005 to 2011, a total of 130 Front Line Demonstrations (FLDs) were conducted on Mung bean crop at cultivators field in Jaisalmer district situated in semi-arid region of Western Rajasthan. The soils of demonstration sites were sandy loam, low in organic carbon (0.1%), ,medium in P_2O_5 (22 kg/ha) and high in K_2O (310 kg/ha) with alkaline reaction (pH 8.4). The demonstrations were laid out

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on irrigated fields with fallow Mung bean, wheat-mung bean and mustard-mung bean rotations which are prevalent in the area. Recommended inputs package was provided to the farmers in an area of 0.4 ha each in adopted villages.

Sowing in demonstration plots was done during first fortnight of July every year with improved Mung bean varieties RMG-62 and SML-668 using seed rate of 15 kg/ha and 18 kg/ha with row to row spacing of 30 cm and plant to plant spacing of 10 cm, respectively. Basal application of 20 kg/ha N and 40 kg/ha was P_2O_5 done at the time of sowing. To protect the crop from seed borne pathogens, seed treatment with Thiram @ 3 gm/kg seed was done. The soils of demonstration site having probability of termite infestation the Chloropyriphous 20 E.C. was used for the seed treatment @ 6 ml/kg seed. Incidence of yellow mosaic was kept below thresh hold level by controlling sucking pest through foliar application of Monocrotophous 36W.S.C.@ 1.0 lit./ha. To check bacterial and fungal invasion, spray of mixture of Streptocycline 5 g and Copper oxychloride 300 g in 100 litres of water was used. Finally yield data were obtained and cross sectional data on output and input/ha were collected from FLD blocks. Similar, observations were also collected on traditional practices followed by the farmers of the corresponding locations. Different parameters as suggested by Yadav *et al.* (2004) were used for calculating gap analysis, costs and returns. The detail of different parameters is as follows:

1. Extension gap= Demonstration yield (D1)-Farmers practice yield (F1)
2. Technology gap = Potential yield (P1) - Demonstration yield (D1).
3. Technology index = Potential yield (P1)-Demonstration yield (D1) x 100/ Potential yield (P1)
4. Additional return = Demonstration return (Dr)-Farmers practice return (Fr)
5. Effective gain = Additional return (Ar)-Additional cost (Ac)
6. Incremental B: C ratio = Additional return (Ar)/ Additional cost (Ac)

RESULTS AND DISCUSSION

During the period under study, a total of 130 FLDs were conducted, out of 150 allotted to Krishi Vigyan Kendra , Jaisalmer by the ICAR-New Delhi. Out of 130 demonstrations, 04 were in the yield range of more than 1000 kg/ha and 15 yielded between 750-1000 kg/ha. Fifty nine demonstrations were found in the range of 500-750 kg/ha where as forty two were found in the low yielding category i.e. less than 500 kg/ha which might be attributed due to biotic and abiotic stresses during different years (Table-1).

(A) Grain yield

The increase in grain yield under demonstrations was 18.73 to 44.87 per cent over the farmers local practices. On an average, 29.82 per cent yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmers traditional way of Mung bean cultivation.

(B) Gap analysis

An extension gap of 138 to 218 kg/ha in yield was found between demonstrated technology and farmers practices during different years. Average extension gap was 166 kg/ha (Table-2). The lowest extension gap was 138 kg/ha. Such gap might be attributed due to adoption of improved technology in demonstrations which resulted in higher seed yield than the traditional farmers practices. Wide technology gaps were observed during different years the lowest (68 kg/ha) being during 2009-10 and the highest (164 kg/ha) during 2005-06. On seven years average basis, the technology gap of total 130 demonstrations was found as 120 kg/ha. The difference in technology gap during different years could be due to more feasibility of recommended technologies during different years. Similarly the technology index for all the demonstrations during different years were in accordance with technology gap. Higher technology index reflected the inadequacy proven technology for transferring to the farmers and insufficient extension services for transfer of technology.

(C) Economic analysis

Different variables like seeds, fertilizers,

Table 1. Details of demonstration under different yield range in Mung bean

No. of demonstrations conducted during 2005-11		No. of demonstration in different yield range (kg/ha)			
Allotted	Conducted	<500	500-750	750-1000	1000<
150	130	42	69	15	04

Table 2. Yield gaps between technology and extension gap for Mung bean crop in different years (Kharif-2005 to 2011)

Year	Allotted	conducted	Yield(kg/ha)			% increase over control	Tech.gap	Ext.gap	Tech.Index(%)
			Potential	I/P	F/P				
2005-06	10	10	800	636	439	44.87	164	197	20.5
2006-07	20	20	800	728	510	42.75	72	218	9.0
2007-08	20	20	800	664	515	28.93	136	149	17.0
2008-09	30	20	800	691	542	27.49	109	149	13.6
2009-10	30	20	1000	932	785	18.73	68	147	6.8
2010-11	20	20	1000	857	694	23.49	143	163	14.3
2011-12	20	20	900	751	613	22.51	149	138	16.6
Average	150	130	871	751	585	29.82	120	166	13.97

Table 3. Economic analysis of front line demonstrations on Mung bean at farmer's field

Year	Cost of cash input (Rs/ha)		Additional cost of demo. (Rs./ha)	Sale price (MSP) (Rs./ha)	Total returns(Rs./ha)		Additional return in demo. (Rs./ha)	Effective gain (Rs./ha)	Incremental B:C ratio (IBCR)
	Demo.	Farmers practice			Demo.	Farmers practice			
2005-06	2265	1110	1155	2250	14310	9878	4433	3278	2.84
2006-07	2310	1235	1075	2310	16817	11781	5036	3961	3.68
2007-08	2450	1252	1198	2560	16998	13184	3814	2616	2.18
2008-09	2565	1398	1167	2670	18450	14471	3979	2812	2.41
2009-10	2692	1489	1203	2810	26189	22059	4131	2928	2.43
2010-11	2817	1609	1208	2950	25281	20473	4808	3600	2.98
2011-12	2993	1785	1203	3250	24407	19923	4485	3282	2.73
Average	2585	1411	1173	2686	20350	15967	4384	3211	2.75

Table 4. Adoption Index per cent in FLD Mung bean during 2005-11 for different components

S. No.	Components	Years		Difference in adoption index	Ranks
		2005	2011		
1.	Variety/Genotype	2.3	16.3	14	1
2.	Fertilizer	5.4	17.4	12	111
3.	Pesticides	6.8	19.6	12.8	11
4.	Hoeing/Weeding	11.5	17.5	6	V
5.	Irrigation	12.2	18.3	6.1	1V
	Overall Adoption index per cent	7.64	17.82		

Table 5. Per cent increase in yield of Mung bean by individual factors over traditional practices

S No.	Components	Per cent increase in comparison to traditional practices
1.	Variety/Genotype	35.9
2.	Fertilizer	30.1
3.	Pesticides	26.9
4.	Hoeing/Weeding	20.3
5.	Irrigation	16.5

pesticides and herbicides were considered as cash inputs for the demonstrations as well as farmers practice. On an average , an additional investment of Rs.1173/ha was made under demonstrations. Economic returns as a function of seed yield and minimum support price (MSP) i.e. sale price varied during different years. Maximum returns were obtained during the year 2006-07 due to higher seed yield and higher MSP sale rates as declared by GOI. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit cost ratio (IBCR) were 2.18 and 3.68 in 2007-08 and 2006-07, respectively (Table-3). Overall average IBCR was found as 2.75 The results confirm the findings of FLDs on oilseed and pulse crops by Singh et. al. (2000), Singh *et al.* (2002), Yadav *et al.* (2004), Lathwal, O.P. (2010) and Dayanand *et al.* (2011).

(D) Impact of Front Line Demonstrations on adoption index

The comparative study of adoption index percentage of different inputs revealed maximum increase of 35.9% under varietal component where adoption index increased from 2.3 per cent (2005) to 16.3 per cent (2011) after completion of study. Fertilizer component ranked third exhibiting overall increase in yield of 30.1 per cent. The adoption index under this component increased from 5.4 to 17.4 per cent over a decade period. The other input component which were ranked III, IV and V in terms of per cent increased yield in decending order of merit were pesticide(26.9 %), hoeing/weeding (20.3 %) and irrigation (16.5 %). The adoption index percentage under these components increased from 6.8 to 19.6 per cent (pesticide), 11.5 to 17.5 per cent (hoeing/weeding) and 12.2 to 18.3 per cent (irrigation). The overall adoption index percentage of various inputs increased from 7.64 per cent (2005) to 17.82 per cent (2011). Similar observations have been made by Singh *et al.* (2002) in chick pea crop.

CONCLUSION

The study on impact of improved Mung bean production technologies on demonstrations, resulted in increase of 29.82 per cent grain yield over the local check. Such increase was recorded with extra expenditure of Rs.1173/ha. This amount is so less that even a small and marginal farmer can afford. This proved that it is not the cost that deters the farmers from adoption of latest technology but ignorance is the primary reason and it is quite appropriate to call such yield gap as extension gap. The extension gap was found to be 166 kg/ha. The IBCR (2.75) is sufficiently high to motivate the farmers for adoption of the technologies. Therefore, FLD programme was effective in changing attitude, skill and knowledge of farmers towards improved/ recommended practices of Mung bean cultivation including adoption. This also improved the relationship between farmers and scientists and built confidence between them. The demonstration farmers acted also as primary source of information on the improved practices of Mung bean cultivation and also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of FLD may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community. This will help in the removal of cross-sectional barriersS of the farming population.

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