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Research Article

Boosting summer mungbean production through frontline demonstration

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SUMMARY : Among the different transfer of technologies, Front line demonstration (FLD) is one of the most powerful tools to disseminate the latest technologies or crop varieties to the farmers through Krishi Vigyan Kendras (KVKs'). Keeping in view of an effective extension approach of FLDs for dissemination of summer mungbean technology, FLDs on mungbean were conducted in different villages of Ambala district in Haryana state during 2006 to 2011 at farmers' fields. Rice-wheat cropping system is prevalent in the Indo-Gangetic plains for the last three or more decades. The continuous dominance of rice-wheat cropping sequence in irrigated agro-ecosystem particularly in Punjab and Haryana has resulted in many types of agro-ecological problems *viz.,* depleting status of soil physical, chemical and biological health, herbicide resistant in wheat, excessive use of water resources and over exploitation of underground water. The practice of cultivation of summer rice has further worsened the situation. The burning of combine-harvested residues of both rice and wheat has altered the biological properties of soil resulting in decrease of nutrient use efficiency and decrease of organic matter. The all-apparent consequences of this cropping system are reflected in either stagnating or decreasing productivity of rice and wheat crops. There is great scope of judicious utilization of fields vacated by wheat before transplanting of rice during summer. The summer mungbean can be easily infused in rice-wheat cropping sequence.

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BACKGROUND AND OBJECTIVES

Mungbean (*Vigna radiata* L.) or green gram which commonly known as Moong is an important pulse crop grown in our country. Mungbean is generally of short duration crop compared to other pulses and is easily accommodated in most of the crop rotations which provides a small niche between two major crops during summer or *Kharif*. Mungbean is delicious pulse and is considered as first choice among pulses particularly in northern parts of the country. Green gram is generally recommended by doctors for growing children, old persons and patients due to its easy digestibility. Eating mungbean sprouts is indeed a very important part of healthy eating. Half a cup of almost any sprouted seed provides vitamin C equivalent to six glasses of orange juice. Therefore, a plateful of sprouted moong Chat and Salads is a tasty and healthy way of getting daily dose of vitamins. Mungbean is also a good source of protein thiamin, iron, magnesium, phosphorus, potassium, copper, folate and manganese (Kokate *et al.*, 2010).

Mungbean plant is annual, herbaceous, erect or semi-erect, 45-120 cm tall, sometimes with slight tendency of twining. Numerous slightly hairy peduncle, straight pods around 10 cm long without a beak are produced on each flowering axis, they are often pendant and each contains 10-15 green or golden yellow seeds which have flat white hilum. The germination of mungbean is epigeal. Being a tropical crop, it cannot tolerate low temperature. It thrives well at 25-35^{0}C. It is grown in our country during *Kharif*. But it is also grown in spring or summer season in irrigated northern plains and as a *Rabi* crop in southern and south-eastern parts, where the winter is quite mild. The grains (whole or split) are used as *dal* or to make flour. The straw and husk are used as

fodder for cattle. Unlike other pulses, it does not produce heaviness or flatulence (Anonymous, 2008). Mungbean is an excellent source of high quality protein. It contains about 25 per cent protein. Mungbean is also used as green manuring crop. Being a leguminous crop, it has the capacity to fix the atmospheric nitrogen. It also helps in preventing soil erosion. It is best suited to areas having an annual rainfall of 60 to 70 centimetres. Mungbean is considered to be the hardest of all pulse crops. It is a crop, which is grown on variety of soils from red-laterite soils of south India to black cotton soils of Madhya Pradesh and sandy soils of Rajasthan. A well drained loamy to sandy loam soil is best suited for mungbean cultivation. Saline and alkaline soils are not suitable for mungbean cultivation (Singh, 1999).

On account of mungbean short-duration, photo-insensitivity and dense crop canopy, it assumes special significance in crop intensification and diversification, conservation of natural resources and sustainability of production system. Therefore it is considered as an excellent intercrop, catch crop, cover crop and also soil fertility restorer. Improvement in mungbean was initiated during 1950s when breeders evaluated land races on the basis of pure line selection (Katiyar *et al.*, 2007). Front line demonstration (FLD) is the new concept of field demonstration evolved by the Indian Council of Agricultural Research (ICAR) with the inception of the Technology Mission on Oilseed crops during mid-eighties. The field demonstration conducted under the close supervision of scientists of the National Agricultural Research System (NARS) is called front line demonstration because the technologies are demonstrated for the first time by the scientists themselves before being fed into the main extension system of the State Department of Agriculture. Front line demonstration is one of the most powerful tools of extension because farmers, in general, are driven by the perception that "seeing is believing" (Sharma *et al.*, 2011). Keeping in view the importance of FLDs, the Krishi Vigyan Kendra (KVK), Tepla, Ambala conducted demonstrations on summer mungbean at farmers' field under irrigated situation from 2006 to 2011. The objectives of study were:

- To exhibit the performance of recommended high yielding varieties in summer mungbean and performance of recommended dose of phosphatic fertilizer in harvesting higher crop yields.
- To compare the yield levels of local check and FLD fields.
- To collect feedback information for further improvement in research and extension programmes.

RESOURCES AND METHODS

Farmers of operational area of Krishi Vigyan Kendra (KVK), Ambala were selected as per allotment of FLDs to KVK by Zonal Project Directorate (Zone-1), Ludhiana (Punjab). Accordingly, the FLDs under summer mungbean were laid out in the villages namely, Chudiala, Harda, Haldari, Baragarh, Kesri, Naggal, Langar Chhanni, Teja Mohri, Majri and Mardon Sahib. Regular visits by the KVK scientists to demonstration fields were ensured and made to guide the farmers. These visits were also utilized to collect feedback information for further improvement in research and extension programmes. Field days and group meetings were also organized at the demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The critical inputs were duly supplied to the farmers by the KVK. Data were collected from the FLD farmers and analysed with suitable statistical tools to compare the yield of farmers' fields and FLD fields.

OBSERVATIONS AND ANALYSIS

The results obtained from the present investigation has been discussed below:

Performance of recommended high yielding variety of summer mungbean (SML-668):

The progress of front line demonstration on summer mungbean during summer 2006 to summer 2011 to exhibit the performance of recommended high yielding variety *i.e.*, SML-668 is presented in Table 1. The data revealed that in the summer season (2006), 5 demonstrations of summer mungbean covering 2.0 ha. in Chudiala village with variety SML-668 and local check (Pusa Vishal) were planted. The farmers of FLD plots were also given *Rhizobium* and Phosphate Solubilising Bacteria (PSB) as bio-culture for seed treatment. The farmers of Ambala district generally use diammonium phospahte (DAP) instead of single super phosphate (SSP). Considering the above point, under FLD on summer mungbean, SSP were also provided as critical inputs to farmers to exhibit the benefits of SSP as this fertilizer also contains 12 per cent sulphur. Sulphur improves the yield and quality of pulse, as it is a building block of sulphur containing amino acids such as cystine and methionine. An average yield of 5.75 qt/ha. of test variety (SML-668) was obtained, as compared to 4.37 qt/ha. of local check (Pusa Vishal) where per cent increase was accounted at 31.00. During crop season summer 2007 to 2009, total 15 demonstrations (5 in each year of 2007, 2008 and 2009) were exhibited in Chudiala, Harda, Haldari and Baragarh villages. Each year, recommended high yielding variety of SML-668 and SSP fertilizer were provided as critical inputs to FLD farmers. The performance of test variety was compared with local check (Asha). Table 1 shows that average yield of 8.00, 5.31 and 14.95 qt/ha. was obtained in comparison to 6.16, 4.37 and 11.67 qt/ha. of local check in the crop season 2007, 2008 and 2009, respectively. The percentage increase in yield over local check was noticed as 29.87, 21.14 and 28.10 in 2007, 2008

Table 1: Performance of recommended high yielding variety of mungbean (SML 668)

Crop season	Village	Area (ha.)	No. of FLDs	Variety demonstrated	Local check	Other critical inputs	Yield (q/ha.)		% increase in yield
							Demon.	Local check	
Summer 2006	Chudiala	2	5	SML 668	Pusa Vishal	Rhizobium, PSB and SSP	5.75	4.37	31.00
Summer 2007	Chudiala and Harda	2	5	SML 668	Asha	SSP	8.00	6.16	29.87
Summer 2008	Haldari	2	5	SML 668	Asha	SSP	5.31	4.37	21.14
Summer 2009	Baragarh	2	5	SML 668	Asha	SSP	14.95	11.67	28.10
Summer 2010	Kosri, Langar Chhanni and Naggal	4	10	SML 668	K 851		10.50	9.20	14.13
Summer 2011	Teja Mohri, Mardon Sahib and Majri	8.4	21	SML 668	K 851		8.75	7.00	25.00

Table 2: Economics of FLD plots and local check plots under summer mungbean

Crop season	Cost of cultivation (Rs./ha.)		Gross returns (Rs./ha.)		Net returns (Rs./ha.)		B: C Ratio	
	Demon.	Local check	Demon.	Local check	Demon.	Local check	Demon.	Local check
Summer 2006	4798	4062	18400	13984	13602	9922	3.83	2.81
Summer 2007	6710	6788	20000	15400	13290	8612	2.98	2.26
Summer 2008	3125	2525	11682	9614	8557	7089	3.73	3.80
Summer 2009	8182	8234	32890	25674	24708	17440	5.41	5.19
Summer 2010	8854	9068	38850	34040	29996	24972	4.38	3.75
Summer 2011	8375	8525	30625	24500	22250	15975	3.65	2.87

and 2009 respectively. In the crop season of summer 2010 and 2011, performance of variety SML-668 was exhibited in comparison to K-851 (local check). In these two years, only quality seeds of SML-668 were provided as critical inputs to the FLD farmers. No SSP or other critical inputs was given to the FLD farmers. An average yield of 10.50 qt/ha. and 8.75 qt/ha. was obtained in summer 2010 and 2011, respectively. The per cent increase in yield of test variety over local check was noticed as 14.13 and 25.00 in the year 2010 and 2011, respectively.

Economics:

The cost of cultivation (Rs./ha), gross returns (Rs./ha.), net returns (Rs./ha.) and benefit cost (B: C) ratio of FLD plots and local check are presented in Table 2.

Table 2 reveals that net returns (Rs./ha.) was higher in all the crop seasons for FLD plots as compared to local check plots and it was obtained as 13602, 13290, 8557, 24708, 29996 and 22250 Rs./ha in the year 2006, 2007, 2008, 2009, 2010 and 2011, respectively. Highest net returns of Rs. 29996 per ha. was obtained in summer 2010 and lowest net returns (8557 Rs./ha.) was obtained in summer 2008 for FLD plots. B: C ratio was also higher in the case of FLD plots as compared to local check plots except in the summer 2008 where FLD plots got B: C ratio of 3.73 whereas local plots got B: C ratio of 3.80. The highest B: C ratio (5.41) was observed in summer 2009 and lowest B: C ratio (2.98) was obtained in summer 2007 for FLD plots.

Conclusion:

- The yield of demonstrated plot (FLD plots) was higher than that of local check plots.
- Due to combined efforts of KVK, Ambala and State Department of Agriculture, the area under summer mungbean is increasing every year. The area under summer mungbean was around 50 ha. in 2006 in Ambala which has now increased up to 3500 ha.
- The farmers are dependent on single variety SML-668 till today. There are need of more concentrated research efforts on evolving more varieties, which can mature in 60 or less days to fit in rice-wheat cropping sequence.
- Higher yield is obtained from summer mungbean when SSP is applied to it as compared to application of DAP.
- The scope of introduction of summer mungbean in other regions likes Uttarakhand, Uttar Pradesh and Bihar where rice-wheat cropping system prevails.
- Sound policy on procurement of produce at minimum support price (MSP) may accelerate the pace of its adoption because price fluctuations in the market sometimes dishearten the farmers.
- Summer mungbean can be incorporated as intercrop with sugarcane if sugarcane is planted with sugarcane trench digger, where a bed of 3 feet to 3.5 feet is made and it can be used for sowing of summer mungbean.

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