

Grain yield and economics of mungbean (*Vigna radiata* L.) as influenced by different varieties and previous crops

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ABSTRACT

A field experiment was conducted at the farmer's field to study the effect of previous crop on mungbean varieties yield during rabi 2016-17 at Sri Muktsar District of Punjab, India. In this experiment demonstrations were conducted with two mungbean varieties (SML 832 and SML 668) and growing after three previous crops (Potato, Wheat and Mustard). Among varieties, SML 832 gave higher grain yield (8.1 q/ha) over SML 668 (7.5 q/ha). SML 832 variety produced 8% higher grain yield from SML 668. As we compared these demonstrations with check farmer's field plot, SML 832 and SML 668 recorded 14.9 and 22.6% higher grain yield respectively, over the check. Summer moong variety SML 832 gave more yield after potato crop (9.8 q/ha) followed after mustard (7.1 q/ha) and lower after wheat (6.5 q/ha). Also, SML 668 recorded higher grain yield after potato crop (9.4 q/ha) from wheat and mustard crops. In SML 832 Technology gap and extension gap was 3.4 q/ha and 1.1 q/ha, respectively. Whereas, in SML 668 variety Technology gap and extension gap was 5.1 q/ha and 1.4 q/ha. The technology index was 29.57% in SML 832 and 44.9% in SML 668. The demonstrated technology gave higher net return of Rs 20900/ha, 16250/ha in SML 832 and SML 668, respectively over the check plots Rs 14460/ha and 10890/ha. Net returns were higher due to higher grain yield obtained with demonstration. Similarly both of these varieties gave higher B:C ratio over the farmers fields. As there is lot of technological gaps in adoption of pulse technologies. The Pulses grain yield could be increased by demonstrating different cultivation practices at farmer's field. Among three previous crops, summer moong sown after potato had more productivity than sown after wheat and Mustard crop. Among two mungbean varieties, SML 832 performs better than SML 668 in Muktsar District of Punjab.

Key words: FLD, Economics, Mungbean, Net return, Yield

Pulses are very economically important crops for farmers, in both developing as well developed countries. India is largest consumer and producer of pulses in the world accounting for about 25 percent of global production. The country has 33% of world area and 22% of the world production of pulses (FAOSTAT, 2012). Pulses are nutritionally having very high protein content (20-25%) compared to cereals. These are very suitable for dry land due to its deep root system even under limited soil moisture conditions (Reddy, 2010; Pandit *et al.* 2015). Also,

environmental friendly by biologically fixing the atmospheric nitrogen into the soil (Hoorman *et al.* 2009; Jat *et al.* 2012; Singh, *et al.* 2011; Biyan *et al.* 2012). Due to this these have adopted by small and marginal farmers in many parts of world. It plays an important role for resource poor people in the country. Increase in area in general will not only boost farmer's income but also tackle the protein rich food availability and nutritional security for rural community in future (Shalendra *et al.* 2013). Although the demand among pulses was high but the production has not risen up So it is a challenge for our government to fulfill the domestic demand (Roy *et al.* 2006; Singh *et al.* 2012; Raj *et al.* 2013).

The Mungbean [*Vigna radiata* (L.) wilczek] is an important grain legume crop that plays a key role in meeting the requirements of dietary protein in India (Kumar *et al.* 2005). India is the largest producer of Mungbean in the world (Sehrawat *et al.* 2013). The unavailability of quality seed and lack of technological awareness were major issues as reported by 94.2 and 74.2 percent farmers (Purushottam *et al.* 2011). The present yield of improved varieties is not enough to attract the farmers or consumers because of relatively smaller seed size, low yield potential and susceptibility to disease (Shrivastva and Singh 2013). The adoption of improved varieties itself can enhance productivity by 20 to 25% in *rabi* pulses (Chaturvedi *et al.* 2010; Samra *et al.* 2011).

The concept of front line demonstrations (FLD) in India was introducing under a "Technology Mission on Pulses" in 1991-92 to increase the production and productivity of pulses. The main objective of FLD's is to demonstrate newly released crop production technologies and its management practices in farmers' field under different agroclimatic regions and different farming situations. Therefore, it is very essential to demonstrate the high yielding varieties through FLD programme. Keeping the importance of FLDs, the KVK, Sri Muktsar Sahib conducted demonstrations on Mungbean at farmers' fields under irrigated situations. Mungbean crop was grown after three previous crops *i.e.* Wheat, Potato and Mustard crop. The present study has been undertaken to evaluate the difference between demonstrated technologies and farmer practices in Mungbean grown after different crops.

MATERIALS AND METHODS

The present study was carried out in operational area of Krishi Vigyan Kendra, Sri Muktsar sahib (lie between 30° 69' and 29° 87' latitude and 74° 21' and 74° 86' longitude) located in south-west of Punjab. 50 front line demonstrations (0.4ha each) were conducted on Mungbean crop. In this experiment demonstrations were conducted with two mungbean varieties (SML 832 and SML 668) and growing after three previous crops (Potato, Wheat and Mustard). 10 demonstration on variety SML 832 and 40 on variety SML 668 were conducted. Out of these 10 demonstration under SML 832, 4 were grown after potato, 3 after wheat and 3 after mustard crop. Among 40 demonstration of SML 668, 15 were grown after potato, 10 after wheat and 15 after mustard crop. The field after potato, wheat and mustard crops were selected from different villages of the district. The improved technology included latest varieties, seed treatment and maintenance of optimum plant population etc. The sowing was done between 20 March to 20th April with 30 Kg seed/ha in SML 832 and 37.5 Kg seed/ha in SML 668 with 22.5 cm row to row spacing. All P, K and N were applied according to soil test bases. Recommended weed control methods were applied and irrigations were applied according to requirement of the crop. The crops were harvested at maturity. Desired yield data were collected through field observations. Gross return was calculated by multiplying yield into prevalence market price of the basmati crop obtained by farmers. For obtaining input cost, the sum of expenditure on land preparation, fertilizer, insecticide, herbicide, fungicide, irrigation cost, harvesting cost, labour, etc. were calculated from each demonstration. Further net return and benefit cost were calculated from these data.

To estimate the technology gap, extension gap and technology index following formulae used by Samui *et al.* (2000) have been used: Technology gap = Potential yield - Demonstration yield, Extension gap = Demonstration Yield - Farmers yield, Technology index = (Technology gap/Potential yield) X 100.

RESULTS AND DISCUSSION

Total 50 demonstration, 1 demonstration out of 10 in SML 832 variety failed, in SML 668, 13 out of 40 were failed

due to poor germination and earth crust formed after rain.

Grain Yield: The average grain yield of mungbean was higher among demonstrations (7.7 q/ha) over farmer practices (6.65 q/ha). Among different varieties, SML 832 and SML 668 recorded 14.9 and 22.6% higher grain yield respectively, over the check plot 7.05 q/ha and 6.2 q/ha respectively. As we compared about different varieties, SML 832 gave higher grain yield (8.1 q/ha) over SML 668 (7.5 q/ha). SML 832 variety produced 8% higher grain yield from SML 668. Chanda (2010), Sandhu and Dhaliwal (2016), Singh *et al.* (2012) and Patil *et al.* (2015), where demonstration plots gave higher yield in mungbean crop.

In SML 832 variety higher grain yield was recorded after potato crop (9.8 q/ha) followed after mustard (7.1 q/ha) and lower after wheat (6.5 q/ha). This variety performs 16.67, 4.84 and 33.96 percents higher grain yield over the check after potato, wheat and mustard crop, respectively. Whereas, SML 668 recorded higher grain yield after potato crop (9.4 q/ha) from wheat and mustard crops. This variety also gave 42.42, 18.40 and 32.63 percents higher grain yield over the check after potato, wheat and mustard crop, respectively.

The major differences were observed between demonstration package and farmer's practices are regarding seed treatment, time of sowing, fertilizer dose, method of fertilizer application and plant protection measures.

Technology gap: The technology gap is the difference or gap between the demonstrations yield and potential yield. In SML 832 it was 3.4 q/ha and in SML 668 it was 5.1 q/ha. SML 832 gave lesser technology gap when planted after potato (1.7 q/ha) as compared to planted after wheat (5q/ha) and mustard crop (4.4 q/ha). SML 668 also produced similar results. This technology gap exists due to the variation in the soil fertility and climatic conditions. Due to this location specific recommendations are necessary to decrease this gap. These findings are similar to the findings of Sandhu and Dhaliwal (2016).

Extension gap: The extension gap is the difference or gap between the demonstrations yield and check plot. In SML 832 it was 1.1 q/ha and in SML 668 it was 1.4 q/ha. There is a need to decrease this wider extension gap through latest

Table 1. Yield, technology gap, extension gap and technology Index of summer moong in District Muktsar

Treatments	Demonstration		Yield (q/ha)			% Increase over check	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
	Total No.	Failed	Demonstration	Check	Potential				
Potato-Summer Moong 832	4	-	9.8	8.4	11.5	16.67	1.7	1.4	14.78
Wheat-Summer Moong 832	3	-	6.5	6.2	11.5	4.84	5	0.3	43.48
Mustard-Summer Moong 832	3	1	7.1	5.3	11.5	33.96	4.4	1.8	38.26
Total/Average of SML 832	10	1	8.1	7.05	11.5	14.9	3.4	1.1	29.57
Potato-Summer Moong 668	15	4	9.4	6.6	11.25	42.42	2.1	2.8	18.67
Wheat-Summer Moong 668	10	4	7.4	6.25	11.25	18.40	5	1.15	44.44
Mustard-Summer Moong 668	15	5	6.3	4.75	11.25	32.63	6.5	1.55	57.78
Total/Average of SML 668	40	13	7.5	6.2	11.25	22.6	5.1	1.4	44.89
Average of both varieties	50	14	7.7	6.65	11.25	15.8	-	-	

Table 2. Gross return, Cost of cultivation, net return and B:C ratio of summer moong in District Muktsar

Treatments	Yield (q/ha)		Gross Return (Rs.)		Net Return (Rs.)		B:C ratio	
	Demonstration	Check	Demonstration	Check	Demonstration	Check	Demonstration	Check
SML 832	8.1	7.05	36450	29610	20900	14460	1.34	0.95
SML 668	7.5	6.2	31500	26040	16250	10890	1.07	0.72

techniques. This finding is in corroboration with the findings of Hiremath and Nagaraju (2010).

Technology index: The technology index shows the feasibility of new technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology (Jeengar *et al.* 2006). The technology index in SML 832 was 29.57% and in SML 668 it was 44.89%. SML 832 gave lesser technology index when planted after potato (14.78%) as compared to planted after wheat (43.48%) and mustard crop (38.26 q/ha). SML 668 also produced similar results. The results of the present study are in recurrence with the findings of Bar and Das (2015).

Economic return: The economics of summer moong production under front line demonstration have been presented in Table 2. In SML 832 variety produced higher gross return with demonstration plots (Rs. 36450/ha) from check plots (Rs. 29610/ha). Similarly in SML 668 higher gross return was recorded with demonstration plots (Rs. 31500/ha) from check plots (Rs. 26040/ha). However the net return was also higher under demonstration plots in SML 832 and SML 668 (Rs 20900/ha and 16250/ha respectively) as compared to demonstration plot (Rs. 14460 and 10890/ha). Higher net returns among demonstration was due to higher grain yield obtained and lower cost of cultivation from check plots. Sandhu and Dhaliwal (2016) also prove the similar results in which demonstration plot gave higher net return from the check farmer practices. As we considered about the benefit: cost ratio, In SML 832 variety produced higher B:C ratio with demonstration plots (1.34:1) from check plots (0.95:1). Similarly in SML 668 higher B:C ratio was recorded with demonstration plots (1.07:1) from check plots (0.72:1).

CONCLUSION

From this study it is concluded that variety SML 832 gave higher grain yield from variety SML 668 in Muktsar District of Punjab. Whereas, both these varieties performs better under demonstration than farmer's practices. Among three previous crops, summer moong sown after potato had more productivity than sown after wheat and Mustard crop. Yield obtained after potato crop is too higher as compare to wheat and mustard crops. So, sowing of mungbean afer potato is very profitable in the district.

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