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Innovative Technological Interventions Coupled with Proper Management is the Need of the Day for Producing Summer Green Gram in the Tribal District of Madhya Pradesh

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ABSTRACT

A total of 100 demonstrations on summer green gram variety IPM 2-3 were conducted by KVK, Jhabua during 2016-17 and 2017-18 across 10 tribal villages of Jhabua hills zone of Madhya Pradesh for exploring the production potential and economic benefits of improved practices. The results showed that farmers significantly increased the green gram productivity by switching over to improved variety (IPM 2-3) and adoption of improved production technology. The higher yield (823.5 kg/ha) of green gram was recorded under front line demonstration as compared to farmers' practice (568.5 kg/ha). The increase in the demonstration yield over farmers' practice was 45.23%. Simultaneously higher net returns (Rs. 29396/ha) and B:C ratio (2.59) were recorded in front line demonstrations as compared to farmers practices (net return of Rs. 16089 and B:C ratio of 1.95). The average extension gap, technology gap and technology index were 255 kg/ha, 376.5 kg/ha and 31.37%, respectively.

Key Words: Economics, Front line demonstrations, Technology gap, Summer green gram, Yield.

INTRODUCTION

India is the largest producer, consumer and importer of pulses. Pulses are a good and chief source of protein for a majority of the Indian population. Pulses contribute 11% of the total intake of proteins in India (Reddy, 2010). Pulses production in India has not kept up with growth in demand calling for import to the tune of 2.0 to 4.0 million tonnes (Kumawat *et al*, 2009a,b). Green gram is an excellent source of high quality protein (25%) having high digestibility. It being a leguminous crop has capacity to fix the atmospheric nitrogen (30-40 kg N/ha). It also helps in preventing soil erosion. Being a short duration crop, it fits well in many intensive crop rotations (Kumawat *et al*, 2009c and Kumawat *et al,* 2010). Green gram can be used as feed for cattle. In North India, it is cultivated in both *kharif* and summer seasons.

Jhabua is the tribal district of Madhya Pradesh and green gram is the most important summer pulse crop but due to low productivity and high infestation of yellow vein mosaic virus is not popular among tribal farmers. Low productivity might be due to unavailability of improved seed, poor crop management practices as well as unawareness and non adoption of recommended package of practices. Therefore, it was very necessary to demonstrate the high yielding varieties with recommended new production technologies. Keeping above points in view front line demonstrations were conducted on summer green gram by Krishi Vigyan Kendra, Jhabua to exhibit the performance of recommended package of practices for harvesting the potential yields and higher returns.

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MATERIALS AND METHODS

This study was conducted at farmers field where 100 demonstrations on green gram were conducted during summer 2016-17 and 2017-18. These demonstrations were conducted in five blocks of Jhabua district *viz*., Rama (03 village), Ranapur (03 village), Jhabua (02 village), Meghnagar (01 village) and Petlawad (01 village). Each demonstration was conducted in an area of 0.4 ha and adjacent to the farmer's fields in which the crop was cultivated with farmer's practice/ local variety. In 100 demonstrations full package of practices were provided to the beneficiaries. The package of practices included were improved variety of green gram (IPM 2-3), seed treatment with carbendazim + mencozeb, seed rate (20 kg/ ha), optimum sowing time (Ist fortnight of March), recommended fertilizers dose (NPK @ 20:50:20 kg/ha), weed management, irrigation management, plant protection measures etc. The sowing was done during first fortnight of March with the seed rate of 20 kg/ha by seed cum fertilizer drill. All the participating farmers were trained on scientific aspects of green gram production management before implementing the FLDs at their field.

The primary data were collected from the selected farmers with the help of interview schedule and interpreted and presented in terms of percentage increased yield. Thus, a total sample size comprised of 100 respondents from 10 villages across Jhabua district. To estimate the technology gap, extension gap and technology index following formulae used by Samui *et al* (2000).

Extension gap (kg/ha) = DY (Demonstration Yield) - FY (Farmers' yield)

Technology gap (kg/ha) = PY (Potential yield) - DY (Demonstration yield)

Technology index (%) = (Technology gap/ Potential yield) X 100

RESULTS AND DISCUSSION

The major differences were observed between demonstration package (were varieties, seed rate, seed treatment, time of sowing, nutrient management and plant protection measures) and farmer's practices. Under the demonstrations seed of green gram (IPM 2-3), fungicide for seed treatment, NPK (19:19:19) for foliar spray and insecticides for plant protection measures and rest package and practices were timely performed by the farmer itself. Under farmers' practice, sown their own seed being used since long time and variety was not identifiable. Farmers use higher seed rate without seed treatment

Table 1. Particulars showing the details of summer moong grown under Front Line Demonstrations and farmers practices.

Sr. No.	Particular	Technological intervention	Existing practices
1	Variety	Improved variety IPM 2-3	Their own seed mixture/ Old variety K 851
2	Seed rate	20 kg/ha	30-40 kg/ha
3	Seed treatment	Carbendazim + Mencozeb @ 3g/kg seed	No seed treatment
4	Use of Culture	Seed treatment with Rhizobium culture	No culture use
5	Time of sowing	Ist fortnight of March	Ist fortnight of April
6	Nutrient management	NPK @ 20:50:20 (Apply NPK 12:32:16 @ 150 kg/ha)	Apply DAP @ 50 kg/ha (NPK @ 09:23:0)
7	Plant protection	Indiscriminate use of Quinolfos or Trizophos	Need based plant protection measures

Table 2. Yield Performance and gap analysis of front line demonstrations on summer green gram.

Year	No. of Demonstration	Area (ha)	Average yield (kg/ha)		% increase	Extension gap (kg/ha)	Technology gap (kg/ha)	Technology index (%)
			FLD	Farmer practice				
2016-17	50	20	817	575	42.46	242	383	31.91
2017-18	50	20	830	562	48.01	268	370	30.83
Average			823.5	568.5	45.23	255	376.5	31.37

* Potential yield of IPM 2-3 is 12.0 q/ha

and there is no nutrient management and unaware about proper plant protection measures. It was also observed that under farmer situation, normally sowing of green gram was delayed due to lack of field preparation timely. Regarding fertilization, fertilizers were given on soil test value while in farmers' practice, used under and imbalance dose of fertilizer in pulses, thus leading to reduction in yield. Similar finding was also observed by Chandra (2010)

The results of demonstrations showed that farmers could increase the green gram productivity notably by switching over to improved variety and adoption of improved packages of practices. A comparison of yield performance between demonstrated practices and farmers' practices (Table 2). It was observed that higher grain yield (823.5 kg/ha) was recorded in demonstrated plot with improved variety IPM 2-3 and recommended packages of practices as compared to their local farm practices (568.5 kg/ha). The increase in the demonstration yield over farmer's practices was 45.23per cent. Farmer's practices were treated as control for comparison with recommended practices. During both the years, yield was recorded higher by 42.46 and 48.10 per cent over farmers' own practices, respectively (Table 2). It was evident from the results that the yield of demonstrations was better due to adoption of improved variety, seed treatment, nutrient management and proper plant protection measures. Farmers were motivated by results of demonstrated technologies applied in the FLDs and is anticipated that they would adopt these technologies in future. Singh *et al* (2016a) reported that the innovative intervention in front line demonstrations may have significant enhancement in productivity of soybean. These findings were in the conformity of the results carried out by Morya *et al* (2016), Singh *et al* (2016b) , Verma *et al* (2016) and Meena and Dudi (2018). Similar results were also observed by Bezbaruah and Deka (2020) and Khedkar *et al* (2017).

An extension gap between demonstrated technology and farmers' practices ranged from 242 to 268 kg/ha during 2016-17 and 2017-18, respectively and on average basis the extension gap was 255 kg/ha (Table 2). This gap might be attributed to adoption of improved technology in

Table 3. Economic analysis of demonstrated plots and farmer practices.

Year	Average seed yield (kg/ha)		Gross Return (Rs./ha)		Net Return (Rs./ha)		B: C ratio	
	FLD	Farmer practice	FLD	Farmer practice	FLD	Farmer practice	FLD	Farmer practice
2016-17	817	575	47394	33319	29144	16469	2.60	1.98
2017-18	830	562	48397	33009	29647	15709	2.58	1.91
Average	823.5	568.5	47896	33164	29396	16089	2.59	1.95

Table 4. Economic analysis for additional cost and incremental B:C ratio.

Year	Cost of cult		Additional cost in demonstration (Rs/ha)	MSP (Rs/q)	Average yield (kg/ha)		Gross Return (Rs)		Additional return in demo	Effective gain (Rs/h)	INC B:C ratio
	Demo	Farmer practice			FLD	Farmer practice	Demo	Cont			
2016-17	18250	16850	1400	5400	817	575	47394	33319	14075	12675	10.05
2017-18	18750	17300	1450	5575	830	562	48397	33009	15388	13938	10.61
Average	18500	17075	1425		823.5	568.5	47896	33164	14732	13307	10.33

* INC-Incremental benefit cost ratio

demonstrations which resulted in higher grain yield than the traditional farmers' practices.

The technology gap is the difference or gap between the demonstration yield and potential yield and it was average technology gap observed 376.5 kg/ha. The technology gap was observed 383 and 370 kg/ha in 2016-17 and 2017-18, respectively. The difference in technology gap in different years could be due to more feasibility of recommended technologies and also due to variation in the soil fertility and climatic conditions. Hence location specific recommendations are necessary to bridge the gap. These findings are similar to the findings of Patel *et al* (2013) and Kumari *et al* (2014).

Technology index shows the feasibility of the technology at the farmer's field. The lower the value of technology index more is the feasibility. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology. Results revealed that the technology index value was 31.37. The results of demonstrations were in accordance with technology gap. The results of the present study were in recurrence with the findings of Kaur *et al* (2014).

The economics of green gram production under front line demonstrations have been presented in Table 3. The results revealed that the front line demonstrations recorded higher gross returns (Rs. 47896/ha), net return (Rs. 29,396/ha) and benefit cost ratio (2.59) were more than the farmer's practice. Further, additional cost of Rs.1425/ha in demonstration has increased additional net returns Rs.14732/ha with incremental benefit cost ratio of 10.33 (Table 4) suggesting its higher profitability and economic viability of the demonstration. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, timely operations of crop cultivation and scientific monitoring. The results confirm the findings of frontline demonstrations on oilseed and pulse crops by Yadav *et al* (2004) and Lathwal (2010).

CONCLUSION

Front line demonstration program was very effective in changing attitude of farmers towards cultivation of summer green gram. Cultivation of demonstrated plots of summer green gram with improved technologies has increased the skill and knowledge as well as net returns of the farmers. The findings of the study revealed that yield of summer green gram could be increased by 45.23 per cent by innovative technology interventions coupled with the proper management of demonstrations field. Further improved practices captured net

returns of Rs. 29396/ha with B:C ratio of 2.59 as against Rs. 16089/ha and B:C ratio of 1.95 only in farmers practices. Under FLD improved practices create great awareness and motivated the other farmers to adopt improved production technologies for summer green gram. The selection of suitable variety, critical inputs and participatory approach in planning and conducting the demonstrations help in the transfer of technology to the farmers.

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