RESEARCH NOTE

Evaluation and Analysis of Gaps in Adoption of Improved Pulse Production Technology in Punjab

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ABSTRACT

The present study was undertaken in Amritsar and Tarntaran districts of Punjab to analyze the status of summer moong production technology, constraints in its cultivation and the possibilities of increasing production. A fundamental problem to overcome the insignificantly increasing pulse production is to change the prevailing perceptions of their status as subsistence crop and to consider as commercial crop. This will require aggressive on-farm demonstration of the viable technical options to alleviate the gaps in production technology of pulse crops. It emphasizes the dissemination of improved varieties and low-cost, environment friendly crop husbandry techniques. Keeping this in view, front line demonstrations (FLDs) on summer moong involving existing technology v/s recommended technology were conducted to evaluate the adoption gaps by the Department of Agronomy, PAU, Ludhiana, during 2009-10 and 2010-11 and have proved immensely useful in increasing the production and productivity of pulse crops. The recommended technology produced 11.0 and 12.3 per cent more seed yield and 12.3 and 15.6 per cent higher net returns of summer moong than the crop raised by existing technology in first and second year, respectively.

***Key words**: Frontline demonstrations; Summer moong; Production technology; Seed yield; Net returns;*

Cultivation of pulses has been a traditional practice in India but, this practice has declined in recent decades due to substitution by the major cereal crops particularly rice and wheat since the advent of green revolution. Consequences of decreased pulse cultivation in the region include reduced opportunities for ameliorative effects of legumes on sustainability of cropping system and decreased local accessibility of legumes (pulses) as a nutritious dietary component. Due to large benefits of pulses for human health, the United Nations has proclaimed 2016 as the International Year of Pulses. Thus, due attention is required to enhance the production of pulses not only to meet the dietary requirement of protein but also to raise the awareness about pulses for achieving nutritional, food security and environmental sustainability.

Pulses are important component to sustain the agriculture production as the pulse crops possess wide adaptability to fit into various cropping systems and being leguminous in nature have been known for their soil ameliorative effects since time immemorial. They trap atmospheric nitrogen in the root nodules of their deep root system and add substantial amounts of nitrogen-rich biomass to the soil surface and rhizosphere and thus keep the soil productive and healthy. By including pulses (legumes) in cropping systems, the heavy nitrogen needs of modern intensive cereal-based cropping systems such as rice-wheat can at least be partly met, and the physical and chemical characteristics of the soil generally improved. Thus, to increase the production and productivity of pulse crops in India, there is great need to identify the technological gaps existing between recommended and farmers' adopted pulse production technology so that appropriate measures can be taken and after evaluating the gap, an emphasis can be made on new improved pulse production technologies, which will lead to increased production and productivity of pulse crops.

Moreover, the crop window period of summer moong range from end March to mid June when fields

remain vacated after the harvesting of wheat. With its adoption, farmers get additional income and at the same time it improves the soil fertility. Nowadays, the importance of summer moong has increased particularly due to ban of early transplanting of rice by the state government as it provides sufficient window period between rice and wheat which was not possible in the last many decades due to growing of long duration varieties or growing of two seasons of short duration varieties of rice in continuous succession. In view of aforementioned, the present study was conducted in Amritsar and Tarantaran districts of Punjab to analyze the status of pulses production technology, constraints in cultivation of pulses and the possibilities of increasing production in the district.

METHODOLOGY

Two districts of Punjab viz. Amritsar and Tarantaran located in North-Western part of the state were selected for the study. Both the districts have assured irrigation facilities and rice-wheat system is the pre-dominant cropping system. Six blocks were selected randomly viz. Ajnala, Majitha, Jandiala Guru, and Rayya in Amritsar and Naushera Panwan and Chohla Sahib in Tarantaran district. One front line demonstration (FLD) per farmer per block was conducted during 2009-10 and 2010-11. All the required agri-inputs were supplied to the farmers by the Department of Agronomy, PAU Ludhiana and funded by the Project Directorate for Farming System Research, Modipurum, Meerut. Each demonstration of one acre was divided into two plots having existing technology (ET) which was sown as per prevailing farmers' practices and recommended technology (RT) where the crop was raised based on package of practices for crops of Punjab (POP 2009). For both the technologies, SML 668, a determinate variety, was selected. Existing technology included the use of urea and DAP while under recommended technology, fertilizers used were urea and single super phosphate as the source of N and P_2O_5, respectively. Seed was inoculated with *Rhizobium* culture in the recommended technology. Under the existing technology, the sowing was done by broadcasting method and no thinning was done. In the existing technology, the row to row spacing was 22.5 cm and intra-row spacing was maintained at 7 cm by thinning operation. The economics were calculated on the basis of prevailing market prices whereas, the technological recommendations for the crop was used to ascertain the adoption gaps at farmers' level. To estimate the adoption gap, the following formula was used

Extension Gap = Yield from recommended technology – yield from existing technology

RESULTS AND DISCUSSION

Front line demonstrations based on recommended technology clearly revealed a good scope of summer moong in crop diversification. Data presented in Table 1 indicated an overall increase of 11.0 per cent and 12.3 per cent in yields due to adoption of improved technology in the year 2009-10 and 2010-11, respectively. During the year 2009-10, the average yield obtained under existing and recommended technology was 10.9 and 12.1 q/ha with expenses of Rs 15,660 and 17,151, respectively (Table 2). In the year 2010-11, the average yield obtained in existing and recommended technology was 10.6 and 11.9 q/ha with expenses of Rs 16,189 and 17,660, respectively. The gross returns obtained in recommended technology were Rs 42,467/- and Rs 41,750/- which were 11.1 and 12.2 per cent higher than that of existing technology in 2009-10 and 2010-11, respectively (Table 3). In similar order, the net returns obtained under recommended technology were Rs. 25,316/- and Rs. 24048/- which were higher by 12.3 and 15.6 per, respectively over existing technology. The superiority of recommended practices in frontline demonstration over farmers' practice was also reported by *Sagar and Chandra (2004)*, *Vaghasia et al (2005)*, *Mitra and Samajdar (2010)*, *Balai et al (2012)* and *Kumar et al (2014)*.

Table 1. Average yield of existing v/s recommended technology on summer moong

Year	No. of Farmers	Area (ha)	Farming Situation	Crop	Variety	Average Yield (q/ha) ET	RT	% increase
2009-10	6	0.2	Irrigated	Moong	SML-668	10.9	12.1	11.0
2010-11	6	0.2	Irrigated	Moong	SML-668	10.6	11.9	12.3

ET=Existing technology(Local check) RT=Recommended technology(FLDs)

Table 2. Economics of existing v/s recommended technology on summer moong

Particulars	2009-10	2010-11
Average yield under existing technology (q/ha)	10.9	10.6
Average yield under recommended technology (q/ha)	12.1	11.9
Increase in yield over existing technology (q/ha)	1.2	1.3
Average sale price (Rs./q)	3500	3500
Total incremental income over existing technology (Rs. /ha)	4259	4550
Cost of cash inputs under existing technology (Rs./ha)	15660	16189
Cost of cash inputs under recommended technology (Rs./ha)	17151	17660
Additional cost of cash inputs from existing technology (Rs./ha)	1491	1471
Cost Benefit Ratio under existing technology	1:2.48	1:2.20
Cost Benefit Ratio under recommended technology	1:2.44	1:2.28

Table 3. Grain yield and economic analysis of existing technology (ET) v/s recommended technology (RT) in summer moong

Block	Grain yield (q/ha)		Ext. gap (q/ha)	Gross returns (Rs/ha)		Av. COC (Rs/ha)		Net returns (Rs/ha)	
	ET	RT		ET	RT	ET	RT	ET	RT
2009-10									
Jandiala Guru	11.3	12.8	1.5	39550	44800	15660	17151	23890	27649
Majitha	9.8	11.0	1.2	34300	38500	15660	17151	18640	21349
Rayya	12.0	12.7	0.7	42000	44450	15660	17151	26340	27299
Ajnala	11.3	12.5	1.2	39550	43750	15660	17151	23890	26599
Naushera Panwan	10.3	12.2	1.9	36050	42700	15660	17151	20390	25549
Chohla Sahib	10.8	11.6	0.8	37800	40600	15660	17151	22140	23449
Average	10.9	12.1	1.2	38208	42467	15660	17151	22548	25316
2010-11									
Jandiala Guru	9.9	11.6	1.7	34650	40600	16189	17660	18461	22940
Majitha	11.3	12.8	1.5	39550	44800	16189	17660	23361	27140
Rayya	10.8	12.3	1.5	37800	43050	16189	17660	21611	25390
Ajnala	9.4	10.8	1.4	32900	37800	16189	17660	16711	20140
Naushera Panwan	10.3	11.3	1.0	36050	39550	16189	17660	19861	21890
Chohla Sahib	11.7	12.7	1.0	40950	44450	16189	17660	24761	26790
Average	10.6	11.9	1.3	37200	41750	16189	17660	20794	24048

COC=cost of cultivation

Table 4. Level of use and gap in adoption of recommended technology in summer moong

Item	ET	RT	Gap in adoption
Variety and source of purchase	SML-668 from local market	SML-668 from seed farm	Considerable
Seed rate (kg/ha)	20 kg/ha	30 kg/ha	Considerable
Seed treatment	No seed treatment	Captan/thiram @ 3g/kg seed	Considerable
Seed inoculation	No inoculation	Inoculation with *Rhizobium*	Considerable
Source of fertilizer	Urea and DAP	Urea and SSP	onsiderable
Spacing	Broadcast	22.5 x 7 cm	Considerable
Thinning	No	Yes	Considerable
Plant protection measures	No consideration of economic threshold level	On economic threshold level	Considerable
Sowing implements	Manual broadcast	Seed drill	Considerable

Data were collected from the farmers of Amritsar district about the prevalent pulse production technologies. The production technologies of different crops were described and compared with the recommended technologies. The existing and recommended technologies of moong and gap between them have been presented in Table 4. A substantial gap was observed in the source of purchase of improved variety, weeding, irrigation and plant protection, which definitely was the reason for not achieving the potential yield. Farmers in general purchased local seeds available with local shopkeepers without any variety name. Seed of improved varieties was not available to them; neither had they had the habit to take seeds of improved varieties from Government institutions. They rely only on local shopkeepers for seeds, fertilizers, insecticides, pesticides and other chemicals. Similar observations were also recorded by *Roy et al (2010)*.

Farmers generally use less seed rate than recommended and usually go for broadcast sowing of pulse crops rather than line sowing which make the intercultural operations difficult and optimum plant population cannot be achieved that lead to undue competition between the plants and ultimately reduction in yield. To protect the crop from seed borne diseases, seed treatment was done but none of the farmers adopted this practice and it resulted into more number of sprays without taking care of the economic threshold levels which increased the cost of cultivation per unit area. Considerable gaps were observed in almost all crop operations starting from source of purchase of variety, seed rate, seed treatment, method of sowing, plant protection measures, etc. Similar observations for gap in improved technologies and farmers' practices were also observed by *Burman et al (2010)* in different crops.

CONCLUSION

Gap in adoption of improved pulse production technologies had been identified. Aggressive on-farm demonstrations are the viable technical options to alleviate the gaps in production technology of pulse crops. It emphasizes dissemination of improved varieties from a reliable source and of improved, low-cost, and environment friendly crop husbandry techniques. Front line demonstrations have proved immensely useful in increasing the production and productivity of pulse crops.

REFERENCES

Balai, C.M.; Meena, R.P.; Meena, B.L; and Bairwa, R.K. (2012). Impact of frontline demonstrations on rapeseed and mustard yield improvement. *Indian. Res. J. Ext. Edu.* **12** (2): 113-116

Burman, R.R.; Singh, S.K. and Singh, A.K. (2010). Gap in adoption of improved pulse production technologies in Uttar Pradesh. *Indian Res. J. Ext. Edu.* **10** (1): 99-104

Kumar, S.; Singh, R. and Singh, A. (2014). Assessment of gaps in pulse production in Hamirpur district of Himachal Pradesh. *Indian Res. J. Ext. Edu.* **14** (2): 20-23

POP (2009). Package of practices for crops of Punjab (Rabi)-2009-10. Punjab Agricultural University, Ludhiana

Roy, B.R.; Singh, S.K. and Singh, A.K. (2010). Gap in adoption of improved pulse production technologies in Uttar Pradesh. *Indian Res. J. Ext. Edu.* **10** (1):99-104

Mitra, B. and Samajdar, T. (2010). Yield gap analysis of rapeseed and mustard through frontline demonstrations. *Agril. Ext. Review,* **22** (2):16-17

Sagar, S.L. and Chandra, G. (2004). Frontline demonstration on sesame in West Bengal. *Agril. Ext. Review,* **16** (2):7-10

Vaghasia, P.M.; Savalia, R.L. and Kelaiya, G.R. (2005). Evaluation of frontline demonstrations on groundnut in Saurashtra region of Gujarat. *J. Oilseed Res.* **22** (1):238-239

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