DOI: 10.15740/HAS/AU/11.1/59-64 **Agriculture Update**
Volume 11 | Issue 1 | February, 2016 | 59-64
Visit us : www.researchjournal.co.in
e ISSN-0976-6847

RESEARCH ARTICLE :

Boosting summer moong productivity through front line demonstrations

GURMEET SINGH DHILLON

ARTICLE CHRONICLE :
Received : *01.01.2016;*
Revised : *08.01.2016;*
Accepted : *21.01.2016*

SUMMARY : The present study was conducted by Krishi Vigyan Kendra Bathinda in operational village Killi Nihal Singh under the project "National Initiatives on Climate Resilient Agriculture" (NICRA).The village was adopted under this project and operational area was village Killi Nihal Singh. Krishi Vigyan Kendra Bathinda has conducted total 58 front line demonstrations on summer moong in 20 hectares area during the *Rabi* season from year 2011 to 2015. The productivity and economic returns of summer moong in demonstrated plots were calculated and compared with the corresponding farmers' practices (local check). The data obtained were pooled for five years. The results of the study revealed that the average yield of summer moong under FLD plots varied between 10.80 q/ ha to 11.20q/ha, whereas, under the farmers' practice, it varied between 8.90 q/ ha to 10.00 q/ha. The FLD plots recorded a per cent increase in yield to the tune of 8.70 to 21.30. It was observed that on an average 13.4 per cent higher grain yield was recorded in demonstration plots than farmers' practices. The extension gap and technology gap were recorded 1.08 q/ha, 0.27 q/ha, respectively and technology index was measured 2.39 per cent, The additional investment of Rs.1,313/ha coupled with scientific monitoring of demonstrations and non-monitoring factors resulted in additional return of Rs. 5,617/ha over the farmer practice. The increment in yield of summer moong crop under front line demonstrations was due to dissemination of improved and latest technologies, HYV, recommended seed rate, fertilization and plant protection measures. Fluctuating minimum selling price of summer moong different years influenced the economic returns per unit area.

KEY WORDS :
Summer moong, Front line demonstrations, Extension gaps, Technology gaps, Technology index

How to cite this article : Dhillon, Gurmeet Singh (2016). Boosting summer moong productivity through front line demonstrations. *Agric. Update*, **11**(1): 59-64.

Author for correspondence :
GURMEET SINGH DHILLON
Krishi Vigyan Kendra (P.A.U.), BATHINDA (PUNJAB) INDIA
Email: kvkdhillon@gmail.com

BACKGROUND AND OBJECTIVES

India has been a major importer of pulses. Pulses for its high protein content and being environment friendly will play pivotal role in achieving nutrient security mainly in a pre-dominantly vegetarian society. The performance of pulses over year in terms of area and production has been lukewarm in relation to other crops. The stagnant production has contributed to declining per capita consumption of pulses over last few decades. The domestic pulse prices have also increased in comparison to other food items. The Government has focused on improving pulse production through various programmes like "Technology mission on pulses" in the year 1991 and National Pulses Development

Project was implemented in 30 states/UTs in the country up to the year 2003-2004 covering 356 districts and implemented prices support policies but no significant progress in pace with demand has so far been observed leading to rely heavily on imports to bridge the demand supply gap in pulses. Some of the factors discouraging pulses sector are stagnation in production, poor area expansion, low yield and relative low profitability, decrease in per capita land availability, increase in demand-supply gap, heavy dependence on imports, inefficient marketing, etc. India is importing pulses from last two decades. Moong is the major pulse crop of India. India has imported 379.69 thousand tones of moong in the year 2014-15 (DES, DAC and DOC 2015).It indicates that there is a vast scope of production of moong in the country. Hence, the role of front line demonstrations plays a pivotal role in dissemination moong cultivation. India has the distinction of being the top producer of this pulse crop in the world. (Ali and Kumar, 2006). Now-a-day's India alone accounts for about 65 per cent of the world's acreage and 54 per cent of the world production of this crop.

Moong is an important pulse crop. Historically, India has been the largest global producer and consumer of moong. It has wider adaptability and low input requirements and the ability to fix the nitrogen in symbiotic association with rhizobia (58-109 kg/ha), which not only enables it to meet its own nitrogen requirement but also benefits the succeeding crops (Singh and Singh, 2011). Moong is a short duration crop that can be grown over a range of environments. Moong can be grown on fertile, sandy loam soils with good internal drainage and a pH in the range of 6.5 and 7.8 and it requires slightly acid soil for best growth. If they are grown in rotation, lime to attain pH of the most acid sensitive crop. Root growth can be restricted on heavy clays. The soils of the village is generally sandy loam in texture which is low to medium in organic carbon (0.3-0.6), pH ranges between (7.0-7.8) and available phosphorus (7-9 kg/ha). Summer moong can be taken as cash crop in between the rice-wheat crop rotation. But majority of the farmers do not go for summer moong cultivation and they leave the field vacant for a period of 50-65 days after harvesting of wheat crop. Summer moong is grown in the last fortnight of March to third week of April month. This crop takes 65 to 75 days for maturity. After harvesting of summer moong, rice especially basmati rice varieties can be transplanted in that fields. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. The KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situation in a district (Das, 2007).

The FLD is an important tool for transfer of latest package of practices in totality to farmers and the main objective of this programme is to demonstrate newly released crop production and protection technologies and management practices at the farmers' field under the real farming situation. Through this practice, the newly improved innovative technology having higher production potential under the specific cropping system can be popularized and simultaneously feedback from the farmers may be generated on the demonstrated technology. The present study has been undertaken with the following objectives :

- To study the differences between demonstrated packages of practices *vis-à-vis* practices followed by the local farmers (farmers' practices) in terms of extension gaps/technology gaps.
- To compare the yield of summer moong of demonstrated plots with the farmers' practices for its economic analysis.

RESOURCES AND METHODS

The front line demonstrations were conducted in the adopted village Killi Nihal Singh of district Bathinda (Punjab). This village was adopted in the year 2011 by Krishi Vigyan Kendra Bathinda under the "National Initiatives on Climate Resilient Agriculture" (NICRA) project. These demonstrations were conducted under the technology demonstration component (TDC) of the project. Third week of March to mid April may be considered as optimum time for sowing of summer moong and late planting after mid April may result in damage during maturity period (Dharmalingam and Basu, 1993). The summer mong can be grown in the fields which became vacant after harvesting of fodder crops. It also fits best in those fields where the wheat crop is harvested in the first fortnight of April. Moreover, summer moong can be fitted very well in different cropping systems (Sarveshwara Rao *et al.*, 2009). The soils of the village is generally sandy loam in texture which is low to medium in organic carbon (0.3-0.6), pH ranges between (7.0-7.8) and available phosphorus (7-9 kg/ha).The innovative farmers of the village were selected for conducting these demonstrations. The list of the innovative farmers was made and scrutinized according their level of knowledge and finally selected for demonstrations. Despite from the other demonstrations conducted in the village, the front line demonstrations on summer moong were initialized by the KVK Bathinda in *Rabi* season in the year 2011. This was the newly intervention made by the KVK Bathinda because before the year 2011, no single farmer was cultivating summer moong. The total 58 front line demonstrations on summer moong in 20 hectares area were conducted to assess its performance from the initial year 2011 to 2015. Each year the selected farmers were given training on cultivation methods of summer moong production including integrated pest and disease management. Besides this, the farmers were also guided for marketing of moong at appropriate time on the basis of marketing advisories given by PAU. The well structured interview schedule was developed to collect the required information right from seed rate to harvesting. The grain yield from each plot was calculated separately as the harvesting was done under the supervision of Krishi Vigyan Kendra's scientists. Each demonstration was of 0.2 to 0.4 ha area and the critical inputs were applied as per the package of practices for *Rabi* crops recommended by the Punjab Agricultural University, Ludhiana. The quality seed of summer moong variety SML-668 was made available to the farmers during all the years of study for conducting front line demonstrations, whereas, only those farmers were considered for farmers' practice who also cultivated summer moong variety SML-668 for sowing at farmers' fields. The sowing period of crop was mid April to last week of April under assured irrigation conditions and harvested during the fortnight of June. The demonstrated plots as well as the farmer's fields were also regularly monitored by the scientists of KVK Bathinda right from sowing up to harvesting. The grain yield of both demonstration plots as well as of farmers' field was calculated separately for economic analysis. The primary data were collected from the respondent farmers with the help of structured interview schedule. The data were interpreted and presented in terms of percentage, the qualitative data were converted into quantitative form by using different statistical methods and expressed in terms of per cent increase yield. Different parameters were calculated to find out technology gaps (Yadav *et al.*, 2004) as follows :

Extension gap=Demonstration yield–Farmers' practice yield

Effective gain=Additional return–Additional cost

Technology gap=Potential yield–Demonstration yield

Additional return = Demonstration return – Farmers practice return

$$\text{Incremental B : C ratio} = \frac{\text{Additional return}}{\text{Additional cost}}$$

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \text{x100}$$

OBSERVATIONS AND ANALYSIS

Summer moong is generally grown in the mid March to mid April and is considered as *Rabi* crop. On account of their ability to reduce protein malnutrition, improve soil health and conserve natural resources, have special role in sustainable agriculture. The short duration moong offer the most viable option for diversification both in intensive agriculture and rainfed area beside introduction

Table 1 : Particulars showing the details of summer moong grown under front line demonstration and farmers practices

Sr. No.	Particulars	Farmers' practice (Local check)	Front line demonstration (Improved technology)
1.	Variety	SML-668	SML-668
2.	Seed rate (kg/ha)	30kg/ha	37.5kg/ha
3.	Seed treatment	No treatment	Captan/Thiram @3g/kg seed
4.	*Rhizobium* culture	Not used	Seed treatment with Rhizobium culture
5.	Line spacing	30cm	22.5 cm
6.	Sowing time	Mid April	March 20 to April 15
7.	Weed management	Not used herbicide	Stomp @ 2.5 l/ha
8.	Spray technology (amount of water for spray)	1/2-1/3 of recommended	375-500 l/ha
9.	Nutrient management(N:P:K)	12.5:40:0	62.5:0:0
10.	Pest management	Un-recommended pesticide and over dose	Rogar @250ml/ha

in new niches. India has the distinction of being the top producer of this pulse crop in the world.The moong variety SML-668 was grown under the front line demonstrations as well as at the farmers' fields (Table 1). This variety is developed by Punjab Agricultural University (PAU) Ludhiana and fits best for summer moong production under Punjab conditions. Before the introduction of front line demonstrations, even single farmer was not growing summer moong. The data in table 1 revealed that the farmers were using less seed rate (30 kg/ha) as compared with demonstration plots (37.5 kg/ha). The scientists of KVK Bathinda motivated the farmers for seed treatment with captain/thiram @ 3g/kg of seed, where as the seed was not treated which was sown at farmers' fields. This is one of the reasons why the crop under demonstration plots were less affected by diseases as compared to moong sown at farmers' fields. Similarly the farmers under demonstrations were also used the *Rhizobium* culture and this culture was mixed with moong seed to increase the production of moong.

The data from Table 1 showed that the line spacing of moong crop sown at farmers' fields was also not sown at proper spacing. It was sown at 30 centimeters where as the recommendations of PAU is at 22.5 centimeters spacing from line to line. Proper sowing time was not followed at farmers' practices while the recommended sowing time was followed under front line demonstrations. The manual hoeing was done and the farmers do not used any herbicide for control of weeds where as stomp @ 2.5lit/ha was used at demonstrated plots. The nutrient and pest management were properly followed under demonstrated plots where these were not taken into consideration at farmers' fields. Regarding the method of fertilization, under demonstration, all fertilizers were drilled at the time of sowing,whereas, under farmers' practice, broadcast method of fertilization was adopted. Similar findings have also been observed by Khan and Chohan (2005), Kirar *et al.* (2006), Yadav *et al.* (2007) and Asiwal and Hussain (2008). The NPK were calculated on the basis of chemical fertilizers used by farmers and its availability in the market.

Grain yield :

The moong crop from all the plots was harvested under the supervision of the KVK people. The yield from both the plots *i.e.* demonstration and farmers' practices were compared and it is evident from the data in Table 2 that an average yield of 13.36 per cent of demonstrated plots was recorded higher than that of farmer practices. The highest increase in grain yield (21.3%) was observed in year 2012. The grain yield was lowest in year 2013

Table 2 : Grain yield and gap analysis of front line demonstrations on summer moong (SML 668) and farmer practices

Year	No. of demons.	Area (ha)	Yield (q/ha)		Increase (%)	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
			Demo.	Farmers practice				
2011	15	04	11.10	10.00	11.0	1.10	0.15	1.33
2012	10	04	10.80	08.90	21.30	0.90	0.45	4.00
2013	10	04	11.20	10.30	8.70	0.90	0.05	0.44
2014	12	04	11.00	09.80	12.20	1.20	0.25	2.22
2015	11	04	10.80	09.50	13.60	1.30	0.45	4.00
Average	13.6	04	10.98	9.70	13.36	1.08	0.27	2.39

Table 3 : Economic analysis of demonstrated plots and farmers' practice

Year	Cost of input (Rs./ha)		Additional cost in demons. (Rs./ha)	MSP (Rs./q)	Yield (q/ha)		Total returns (Rs./ha)		Additional return in demo (Rs/ha)	Effective gain	INC B:C ratio
	Demons.	Farmers practice			Demons.	Local check	Demons.	Local check			
2011	13,600	12,300	1,300	3,500	11.10	10.00	38,850	35,000	3,850	2,550	2.96
2012	13,900	12,535	1,365	4,400	10.80	08.90	47,520	39,160	8,360	6,995	6.12
2013	14,200	12,960	1,240	4,500	11.20	10.30	50,400	46,350	4,050	2,810	3.26
2014	14,500	13,120	1,380	4,600	11.00	09.80	50,600	45,080	5,520	4,140	4.00
2015	14,800	13,520	1,280	4,850	10.80	09.50	52,380	46,075	6,305	5,025	4.92
Average	14200	12,887	1,313	4,370	10.98	09.70	47,950	42,333	5,617	4,304	4.25

(8.70%) which was due to frequent rains which disturbed the agronomic operations.The reasons behind the increase of yield under demonstrated plots might be due to quality seed, proper spacing and adoption of other recommended technologies about which the farmers were ignorant.

Extension gap :

To fulfill the objective number 1, an extension gap between demonstrated technology and farmers practices was also calculated and it ranged from 0.90 to 1.30q /ha during different five years and on average basis the extension gap of 1.08 q/ha was calculated (Table 2). This gap might be attributed to adoption of improved technology practices such as proper seed rate, use of *Rhizobium* culture, nutrient management, pest management etc. in demonstrated plots which resulted in higher grain yield than the traditional farmers, practices. On the basis of extension gap, the farmers were motivated to adopt recommended package of practices to reduce the extension gap and to increase their grain yield.

Technology gap :

The technology gap was calculated by deducting the demonstrated plot yield from potential yield of moong crop. The technology gap was recorded during five years and this was lowest (0.05 q/ha) during 2013 and was highest (0.45 q/ha) in 2012 and 2015 (Table 2). The average technology gap was found (0.27 q/ha). The difference in technology gap during five years could be due to more feasibility of recommended technologies like sowing time, seed rate, seed treatment and plant protection measures especially IPM. Similar findings were reported by the Biyan *et al*. (2012). Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology.

Economic analysis :

Cultivation of summer moong is now becoming more and more popular with farmers in northern India as their practices enables them to use the land and the water resources which otherwise would have remained unutilized during this period and farmers are earning additional income apart from the rice and wheat crops.To fulfill the objective number 2 of the study, different variables like seed, fertilizers, bio-fertilizers and pesticides were considered as critical inputs for the demonstrations as well as farmers practice and on average an additional investment of Rs. 1313/ha were made under demonstrations. The prevailing rates of the inputs during the consecutives years (2011-2015) were calculated accordingly to work out the expenditure cost. Economic returns as a function of grain yield and minimum support price (MSP) and sale price varied during different five years. The MSP varied between Rs.3500/q to Rs. 4850 /q during the reported period. Maximum returns (Rs. 52380/- ha) during the year 2015 was obtained due to higher MSP (Rs. 4850/q) sale rates as declared by Govt. of India (Table 3).The average returns of 5 years from demonstrated plots was Rs.47950 whereas average returns from farmers' practices were Rs.42333.The higher additional returns and effective gain obtained under demonstrations could be due to improved technologies, timely operations of crop cultivation, non-monetary factors and scientific monitoring. The highest incremental B:C ratio was 6.12 during the year 2012. It depends on grain yield and MSP. Overall average of incremental B: C ratio was found to be 4.25:1.The results confirm the findings of front line demonstrations on oil seed and pulse crops by Yadav *et al.* (2004) and Lathwal (2010).

Conclusion :

The cultivation of summer moong is more sensitive to increase in temperature because in the month of May and June when temperature go above 46 ºC, the flower drop also increases and this may leads to decline in the yield. But with preventive measures, we can get a good yield of summer moong. From the results of front line demonstrations conducted for five years, it is concluded that the FLD programme is an effective tool for increasing the production and productivity of summer moong crop and changing the knowledge, attribute and skill of farmers. FLDs also helped in replacement of local un-recommended varieties with improved recommended varieties. The study also indicates that by adopting package of practices, farmers can get more yield than their traditional method of cultivation. The per cent increment in yield of summer moong to the extent of 2.96 to 6.12 in FLDs over the farmers practice created greater awareness and motivated the other farmers to adopt the improved package of practices of summer moong. The farmers reported that the yield of succeeding rice crop was higher with proceeding moong. These demonstrations also built the relationship and confidence between scientists and farmers. Such large profit within 65 days enthused many farmers to take up spring/ summer moong cultivation.The beneficiary farmers of FLDs also play an important role as source of information and quality seeds for wider dissemination of high yielding varieties of summer moong for other nearby farmers. The concept of front line demonstrations 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.

REFERENCES

Ali, Masood and Kumar, Shiv (2006). Mungbean and urdbean: Retrospect and prospects. In : *Advances in Mungbean and Urdbean* (Edited). Indian Institute of Pulses Research, Kanpur, India, pp. 1-19.

Asiwal, B.L. and Hussain, Akhter (2008). Demonstrations- An effective technology for increasing the productivity of gram. *Rajasthan J. Extn. Edu.*, No-6

Das, P. (2007). Proceedings of the meeting of DDG (AE).ICAR, with officials of state departments, ICAR institutes and Agricultural Universities, NRC Mithun, Jharmapani, Zonal Coordinating Unit, Zone-III, *Barapani,Meghalaya, India.*pp 6.

Dharmalingam, C. and Basu, R.N. (1993). Determining optimum seasons for the production of seeds in mungbean. *Madras Agric. J.*, **80**: 684-688.

Directorate of Economics and Statistics (2015). (DES), Department of Agriculture & Co-operation (DAC) & Department of Commerce (DOC), Annual report .

Economic Survey (2012-13). Prices and monetary management 45-49pp.

Khan, B.S., Nashine, R.,Gupta, A.K. and Mukharjee, S.C. (2006). Demonstrations: An effective tool for increasing the productivity of Urd. *Indian Res. J. Extn. Edu.,* **3**: l-6.

Lathwal, O.P. (2010). Evaluation of front line demonstrations on black gram in irrigated agro-eco system. *Ann. Agric. Res.,* **31** (1&2) : 24-27

Rao, D. Sarveshwara, Pyari, D. Soami and Biyan, Subhash C. (2009). Retrospective and prospective of agricultural systems models in the eco-village paradigm. Proceedings of Joint International Conference on Applied Systems Research and 33 National Systems Conference (ASR-NSC-2009), DEI Agra: 136-140.

Roy, R. Burman, Singh, S.K., Singh, Lakhan and Singh, A.K. (2006). Adoption of improved pulses production technologies and related constraints in Uttar Pradesh. *Indian J. Pulses Res.*, 19 (1) : 104-106.

Singh, D.P. and Singh, B.B. (2011). Breeding for tolerance to abiotic stresses in mungbean. *J. Food Leg.,* **24** (2): 83-90.

Statistical Abstract of Punjab (various issues).

Subhash, C., Biyan, Basanti Chintapalli, Pooja, Dhuppar and Rao, D. Sarveshwara (2012) . Summer mung crop production in the context of climate change: *An Appr. Indian Res. J. Extn. Edu., Special Issue.,* **2** : 46-48.

Yadav, D.B., Kamboj, B.K. and Garg, R.B. (2004). Increasing the productivity and profitability of sunflower through front line demonstartions in irrigated agro-eco system of eastern Haryana. *Haryana J. Agron.,* **20** (1&2): 33-35.

Yadav, V.P.S., Kumar, R., Deshwal, A.K., Raman, R.S., Sharma, B.K. and Bhela, S.L. (2007). Boosting pulse production through frontline demonstrations. *Indian Res. J. Extn. Edu.*, **7** (2&3): 12-14.