Impact assessment of frontline demonstrations on green gram in Arunachal Pradesh

ABSTRACT:

The Krishi Vigyan Kendra Tirap, Arunachal Pradesh, India has carried out frontline demonstrations on greengram covering an area of 30 ha of farmers' field to exhibit latest production technologies and compared it with farmer's practice during Kharif season of 2022. The study in total 75 frontline demonstrations were conducted on farmers' fields in villages *viz.*, Deomali, Namsang, Soha, Makat, Paniduria, Sipini and Chomoithung villages of Tirap district of Arunachal Pradesh state during 2022-23 to demonstrate production potential and economic benefit of improved technologies. The demonstrated technology recorded a mean yield of 640 kg/ha which was 20.75% higher than obtained with farmers' practice (530 kg/ha). Higher mean net income of Rs. 17500/ha with a Benefit: Cost ratio of 1.76 was obtained with improved technologies in comparison to farmers' practices (Rs. 10300/ha). The farmers' should be encouraged to adopt the recommended package of practices realizing for higher returns.

Keywords: Adoption, Economics, Frontline demonstration, Greengram, Rainfed condition

INTRODUCTION:

Pulses have important role in human health; specially for vegetarian population due to good amount of protein (Ofuya *et al.*2005). India contributes 25–28% of the total global pulse production, and it is the largest producer and consumer of pulses in the world. In total pulse production, chick pea stands first with 48%, followed by red gram with17%, black gram with 10%, and green gram with 7%. The remaining quantity is contributed by other pulses. In India during 2022, green gram was cultivated in an area of 4.50 million hectares with a production of 2.50 million tons, resulting in a productivity of 548 $kgha^{-1}$(Project Coordinator report, 2023).This productivity gain could be attribute to improved cultivars and the use of inputs.

The greengram belongs to family *legueminoseae*. It is a tropical and sub-tropical grain legume, adapted to different types of soil conditions and environments (*kharif*, spring, summer). It ranks third in India after chickpea and pigeonpea (Meena et al. 2017). It has

strong root system and capacity to fix the atmospheric nitrogen into the soil and improves soil health and contributes significantly to enhancing the yield of subsequent crops (Tomar *et al.* 2012). Greengram yield is also affected by insect- pests and diseases, especially by greengram yellow. mosaic virus (MYMV) and *Cercospora* leaf spot (Rakhode *et al.*2017). There is a strong need to develop the lines/ varieties which give outstanding and consistent performance in *kharif* season over diverse environment. Development of varieties with high yield and stable performance is a prime target of all green gram improvement programmes.

The seed is the primary and pivotal link in the food production chain. The food security is mainly dependent on crop production. The population projections confirm that agriculture will need to feed 9 billion people by 2050. Of the several factors vital for enhancing the production and productivity of crops, seed (a living product that must be grown, harvested, and processed appropriately to make the best use of its viability and consequent crop productivity) is a vital factor for ensuring sustainable agriculture (Chauhan et al. 2016). A vital component of all crop production, seeds are essential to the sustainability of green value chains, rural development, global food security, and farmer livelihoods. Each farmer has different standards for what constitutes "good seed," therefore freedom of choice and sustainable seed availability are important issues for all farmers. It is essential for guaranteeing food security and a fundamental need for each planting season (Louwaars et al. 2022).

The Frontline Demonstration is an important method of transferring the latest package of practices in totality to farmers. By which, farmers learn latest technologies of oilseeds and pulses production under real farming situation at farmer's field. The prime objective of the Front line Demonstration is to demonstrate newly released crop production and protection technologies and management practices at the farmers' field under different agro climatic regions and farming situations. After considering all facts, the present study was carried out to analyze the performance and to promote the Frontline Demonstration (FLD) on greengram production.

MATERIALSANDMETHODS

This study was conducted on FLD greengram in rainfed condition in Tirap district of ArunachalPradesh, India. In total 75 frontline demonstrations were conducted on farmers' field in villages of Deomali, Namsang, Soha, Makat, Paniduria, Sipini and Chomoithung villages of Tirap district of Arunachal Pradeshstate Tirap district of Arunachal Pradesh, during *kharif* season 2021under rainfedcondition.Eachdemonstrationwas conducted on an

area of 0.4 ha and demonstration plot was having plot of farmers' practices with parallel. The improved package of practices like viz. line sowing, nutrient management, seed treatment and whole package were used in the demonstrations. The variety of greengram IPM125 included in demonstrations methods used for the present study with respect to FLDs and farmers' practices are given in Table 1.

Under local check plots,farmer's practices were followed. Ingeneral, soils ofthe area under study were acidic soil, medium in fertility status. The spacing was 30 cm between rows and 10 cm between plants in the rows. Thinning and weeding was done; 35days after sowing maintain spacing (10 cm) within a row (30 cm) because excess population adversely affects growth and yield of crop (Chandra 2010). Seedswere sown during second week of august, 2021 with a seed rate of 18 kg/ha. The full package of practices was applied during the course of demonstration.

The data were collected and assessed about grain yield from FLD plots and farmer's fields using regional techniques used by the local farmers. The potential production was evaluated using the standard plant population of 404440 plants/ha and the average yield per plant of 22.5 gm/plant under the recommended package of procedures with a crop geometry of 30 X 10 cm (Chandra, 2010).

Different parameters as suggested by Yadav *et al.* (2004) was used for gap analysis, technology index and calculating the eco- nomics parameters of greengram. The details of different parameters and formula adopted for analysis are as under:

Extension gap = Demonstration yield - Farmers' practice yield

Technology gap = Potential yield - Demonstrationyield

Technology index = Potential yield - Demonstration yield/Potential yield x 100

Gross cost = Total cost of cultivation

Gross return= Total yield multiplied by Current market price

Net return = Gross return – cost of cultivation

Table 1. The improved and farmers practices in details of green gram

Particular	**Technological intervention**	**Existing practices**	**Gap**

Variety	IPM 125	Local or unknown variety	Full gap
Seed rate	18 kg/ha	10 kg /ha	Full gap
Seed treatment	Seed was treated	Not treated	Full gap
Sowing method	Line sowing	Broadcasting	Full gap
Spacing	30 cm x 10 cm	Not maintained	Full gap
Application of recommended dose of manure	5 kg/ meter^2	Nil/without recommendation	Partial gap
Application of Bio fertilizer	Soil application of Azospirillum & PSB @ 2 kg/ha mix with FYM	No application	Full gap
Harvesting	Manual	Manual	No Gap

Table 2. Yield attributes of green gram

Year	**area**	**No of demonstrations**	**Yield kg/ha**		**Additional yield (kg) over farmers practice**	**Yield increment (%) over farmer's practice**
			D	**F**		
2021	**30**	**75**	**640**	**503**	**137**	**20.75**

Where D denotes: demonstration plots and F denotes: farmer's practice plot

Table 3. Technology gap analysis

Potential yield (kg/ha)	**FLD Yield (kg/ha)**	**Farmer's practice yield (kg/ha)**	**% increased**	**Extension gap (kg/ha)**	**Technological gap (kg/ha)**	**Technology Index**
780	640	503	20.75	137	140	17.94

Table 4. Economics of Green gram cultivation

Year	Yield(q/ ha)		Costof Cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		BenefitCost ratio B:CRatio	
	D	F	D	F	D	F	D	F	D	F
2021	640	503	23,000	21,700	40,500	32,000	17,500	10,300	1.76	1.47

RESULTS AND DISCUSSION:

Seed yield (kg/ha): The productivity of greengram under improved production technology ranged between 620-660 kg/ha with mean yields of 640 kg/ha (Table 2). While the range of farmers practice was 485-503 kg/ha with mean yield of 503 kg/ha (Table2).

The increased grain yield with improved technologies was mainly because of line sowing use of nutrient management and weed management. The present findings confirm the findings of Singh and Meena (2011), Poonia and Pithia (2011), Meena *et al.* (2012), Math *et al.* (2012), Raj *et al.* (2013), Meena and Singh (2017) and Yadav *et al.* (2007).They found more gain yield of FLD plots than the existing practices.

Gap analysis: As per the result of gap study (Table 3); extension gap of 137 kg ha^{-1} was found between demonstrated technology and farmers' practice. Such gap might be attributed to adoption of improved technology especially high yielding variety(IPM125)sown with the help of seed cum fertilizers drill with balanced nutrition, weed management and appropriate plant protection measures in demonstrations which resulted in higher grain yield than the traditional farmers' practices. The study further exhibited a wide technology gap of 140 kg/ha. The difference in technology gap in is due to better performance of recommended varieties (Chaudhary, 2012) with different interventions and more feasibility of recommended technologies during the course of study.

The technology index in the study (17.94) was in accordance with technology gap (Table 3). Higher technology index reflected the inadequate transfer of proven technology to growers and insufficient extension services for transfer of technology (Dhaka, 2016).

As per the result of technology index, it can be assumed that the awareness and adoption of improved varieties with recommended scientific package of practices have impacted positively. These findings are in the conformity of the results of study carried out by Chandra (2010), Meena and Singh (2016), Meena and Singh(2017), Singhand Chauhan(2010),

Dayanand*et al*. (2012), Meena *et al.* (2012) and Rajni *et al.* (2014).

Economics: The Rs. 23,000/ recorded as gross cost of cultivation under Demonstration while Rs. 21,700/ was recorded under farmer's practice (Table 4). The cost of cultivation includes total expenses during the span of crop viz. ploughing cost, irrigation cost, cost of seeds, chemicals, fertilizers, labour cost etc.

The gross return was recorded under demonstration was Rs. 40,500/ as compared of Rs. 32,000/ under farmer's practices. The gross return was Rs. 8500/ha was higher as compared farmer's practices. The Net return under demonstration was Rs.17,500/ as compared Rs. 10,300/under farmer's practices; which was also higher as Rs. 7200/ha. Similarly, the Benefit cost ration was higher under demonstration plots (1.76) as compared to farmer's practices (1.47). The higher economic parameters indicates that the scientific package of practices was implemented very nicely at farmer's field (Yadav *et al*. 2004).

Conclusion

On the basis of results of demonstrations; it is clear that Front Line Demonstrations (FLD) was an effective tool for increasing the productivity of green gram. The frontline demonstrations conducted on green gram at the farmers' field revealed that the adoption of improved technologies significantly increased the yield as well as the net returns to the farmers.

The demonstrations and farmers training, field visits, advisories etc. were the pivotal factors for enhancing the yield of green gram. Thus, the need of moments to disseminate improved technologies at farmers field effectively for economic prosperity of farming community.

REFERENCES

AICRP on MULLaRP. In *Annual Report (Mungbean and Urdbean) Annual Group Meet on All India Coordinated Research Project on MULLaRP 2017-18'p*; ICAR-Indian Institute of Pulses Research: Kanpur, UP, India, 2018.

Chandra,G.(2010).Evaluation of front line demonstrations of greengram in Sunderban, West Bengal. *Journal of Indian Society of Costal Agricultural Research*,28:12-15

Chaudhary,S. (2012).Impact of front line demonstration on adoption of improved green gram production technology in Nagaur district of Rajasthan. M.Sc. Thesis, SKRAU, Bikaner.

Chauhan, J.S.; Rajendra Prasad, S.; Satinder, P.; Choudhury, P.R.; Udaya Bhaskar, K. Seed production of field crops in India: Quality assurance, status, impact and way forward. *IndianJ.Agric.Sci.***2016**,*86*,563–579.

Day Anand, Verma, R.K. and Mahta, S.M. (2012). Boosting the mustard production through front line demonstrations. *Indian Research Journal of Extension Education,* 12(3):121-123.

Dhaka, B.L., Bairwa, R.K. and Ram, B. (2016). Productivity and profitability analysis of greengram (Cv. RMG 344) at farmer's field in humid southern plain of Rajasthan. *Journal of food legume* 29(1):71-73.

Gauttam, U.S., Paliwal, D.K. and Singh, S.R.K. (2011). Impact of frontline demonstrations on productivity enhancement of chickpea. *Indian Journal of Extension.* 47 (3 & 4) pp 10-13

Louwaars, N.P.; Manicad,G. Seed Systems Resilience—An Overview.*Seeds***2022**,*1*,340–356.

Meena, M.L. and Dudi, A. (2012). On farm testing of chick- pea cultivars for site specific assessment under rainfed condition of western Rajasthan. *Indian Journal of Extension Education,* 48 (3&4): 93-97.

Meena, M.L. and Singh, D. (2016). Productivity enhancement and gap analysis of moth bean (*Vignaaccontifolia* (Jacq.)) through improved production technologies on farmer's participatory mode. *Indiana Journal of Dry- land Agricultural Research and Development,* 31(1):68-71

Meena, M.L. and Singh,D.(2017).Technological and extension yield gaps in green gram in Pali district of Rajasthan, *India. Legume Research,* 40(1):187-190.

Meena, O.P., Sharma K.C., Meena, R.H. and Mitharwal, B.S. (2012). Technology transfer through FLDs on mungbean in semi-arid region of Rajasthan. *Rajasthan Journal of extension Education,* 20:182-186.

Ofuya, Z.M. and Akhidue, V. (2005). The role of pulses in human nutrition: A review. *Journal Applied Sciences and Environmental Management*, 9:99-104.

Project Coordinator's Report 2023, All India Coordinated Research Project on Kharif Pulses; Indian Council of Agricultural Research-Indian Institute of Pulses Research: Kanpu, India, 2023; p. 208024.

Raj, A.D., Yadav, V. and Rathod, J.H. (2013). Impact of frontline demonstrations (FLD) on the yield of pulses. *International Journal of Scientific and Research,*3(9):1-4

Rajni, Singh, N.P. and Singh, P. (2014). Evaluation of frontline Demonstrations on yield and economic analysis of summer mungbean in Amritsar district of Punjab. *In- dian Journal of Extension Education.* 50 (1&2):87-89.

Rakhode, P.N., Koche, M.D. and Harne, A.D. (2011). Management of powdery mildew of greengram. *Journal of Food Legume,* 24(2):120-122.

Singh, B.S. and Chauhan, T.R. (2010). Adoption of mung bean production technology in arid zone of Rajasthan. *Indian Research Journal of Extension,*10(2):73-77.

Tomar, R.K.S., Sahu, B.L., Singh, R.K. and Prajapati, R.K. (2012). Productivity enhancement of blackgram (Vigna mungo L.) through improved production technologiesinfarmer'sfield.*JournalofFoodLegumes*, 22(3):202-204.

Yadav, D.B, Kambhoj, B.K. and Garg, R.B. (2004). Increasing the productivity and profitability of sunflowers through frontline demonstrations in irrigated agro- ecosystem of eastern Haryana. *Haryana Journal of Agronomy,*20(1):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 demonstration. *Indian Journal of Extension Education,* 7(2):12-14.