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TECHNOLOGICAL AND EXTENSION YIELD GAPS IN SUMMER GREEN GRAM IN NAVSARI DISTRICT OF GUJARAT

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ABSTRACT

Thetechnological gap between existing and recommended technologies of summer greengram crop was studied during 2018, 2019 and 2020. In this study, total 380 frontline demonstrations in 60 ha area were conducted on farmers' fields in tenadopted villages. The findings of the study revealed that improved technology recorded a mean yield of 831 kg/ha which was 36.45 % higher than farmers' practice (611.33kg/ha). The study exhibited mean extension gap of 219.7kg/ha, technology gap of 169 kg/ha with meantechnology index of 16.9%. Anaverage additional investment of ₹ 3577/ha coupled with recommended nutrient, water management, plant protection measures, scientific monitory and non-monetary factors resulted in additional mean returns of 16653 ₹/ha. Higher mean total income of ₹ 63864/ha with aincremental Benefit: Cost ratio of 4.76 were obtained with improved technologies in comparison to farmers' practices (₹ 47211/ha).The frontline demonstrations conducted on summer greengram on farmers' field revealed that the adoption of improved technologies remarkably enhanced yield at tributing traits and yield of crop and also then etreturns to the farmers.

Keywords : *technological gap, extension gap, green gram, yield*.

INTRODUCTION

Greengram [*Vigna radiata (L.) Wilczek*] is third important pulse crop after chickpea and pigeon pea, cultivated throughout India for its multipurpose uses as vegetable, pulse, fodder and green manure crop. It is a native of India and Central Asia and commonly known as mung bean grown both *Kharif* and summer season. Its seed is more palatable, nutritive, digestible and non-flatulent than other pulses grown in world. It is a good source of protein (20-24 %), carbohydrates (60-62 %), water (10 %), fat (1.0 %), fiber (4.0 %) and ash (3.0 %). Greengram protein is deficient in methionine and cystein but rich in lysine making it an excellent compliment to rice. It is a good source of mineral, pro-vitamin A, B complex and ascorbic acid. Besides being a rich source of protein, it maintains soil fertility through biological nitrogen fixation in soil and thus plays a vital role in furthering sustainable agriculture (Kannaiyan, 1999).

In Gujarat, *Kharif* and summer greengram was cultivated in an area of 1.29 lakh ha with production 6.1 million tonnes and yield 473 kg/ha (Anonymous, 2018).Production and productivity is very low in green gram mainly due to its cultivation in resource poor lands with minimum inputs(Vinaya *et al.,*2022), non-synchronous maturity and indeterminate growth habit (Paradva*et al.,* 2021 & 2022). Therefore, it is urgent need to increase the production to satisfy the demand of ever increasing population of India. Simultaneously farmers are not adopting scientific cultivation practices in crops particularly in green gram. Keeping in view the present study was undertaken to analyze the performance and to promote the FLD on green gram production.

OBJECTIVE

To determine the extent of technological and extention gap in recommended summer greengram production technology

METHODOLOGY

A total of 380 frontline demonstrations in area of 60 ha were conducted on farmers' field in villages of Vansada, Chikhali, Khergam, Jalalpor and Navsari block of Navsari district of Gujarat, during summer season 2018, 2019 and 2020 in irrigated condition. The package of improved technologies included line sowing, nutrient management, seed treatment with fungicide and biofertilizers, pest management and whole package were used in the demonstrations. The variety of greengram was Gujarat Mungbean-6 included in demonstrations methods used for the present study with respect to FLDs and farmers' practices are given in Table-1. In case of local check plots, existing practices being used by farmers were followed. In general, soils of the area under study were sandy clay loam and medium to low in fertility status. The spacing was 30 cm between rows and 10 cm between plants in the rows. The thinning and weeding was done invariably 15-20 days after sowing to ensure recommended plant spacing within a row because excess population adversely affects growth and yield of crop. Seed sowing was done in the first fortnight of February with a seed rate of 20-25 kg/ha. Other management practices were applied as per the package of practices for summer crops. Data with respect to yield attributes and grain yield from FLD plots and from fields cultivated following local practices adopted by the farmers of the area were collected and evaluated. Different parameters as suggested by Yadav *et al.* (2004) was used for gap analysis, and calculating the economic. The details of different parameters and formula adopted for analysis were as under:

Extension gap = Demonstration yield - Farmers' practice yield

Technology gap = Potential yield - Demonstration yield

$$\text{Technology index} = \frac{\text{Potential yield - Demonstration yield}}{\text{Potential Yield}} \times 100$$

Additional cost = Demonstration Cost

Effective gain = Additional Returns- Additional cost

Additional returns = Demonstration returns -Farmers' practice returns

Incremental B: C ratio = AdditionalReturns /AdditionalCost

Table 1: Demonstration package and farmer practice under FLDs of green gram in Navsari district of Gujarat

Technology component	Demonstration plot (Improved technology)	Farmer's practice (Control)
Variety	GM-6	Local
Seed rate	20-25 kg/ha	30-35 kg/ha
Sowing method	Line sowing	Broad casting
Seed treatment	Seed treatment with Thiaum 3gm/kg seed	No seed treatment
Seed treatment	Seed treatment with each bio-fertilizers *Rhizobium* and PSB 10ml/kg seed	No seed treatment with biofertilizers
Weed management	Weeds control by using herbicide *Pendimethalin* 1.0 kg a.i./ha in 500 liter of water as pre-emergence treatment for effective control of weeds within two days after sowing and hand weeding at 15-20 DAS	Only hand weeding at 15-20 DAS
Nutrient management	20: 40:00 kg N P K/ha through DAP and Urea	No FYN and only apply imbalance chemical fertilizers application
Plant protection	Pod borer major insect in green gram to control with Quinalphos 25 EC 1liter/ha	No use of any pesticides for control of pod borer

RESULTS AND DISCUSSION

Yield attributing traits

The number of pods per plant of green gram under improved technology were 38.7, 37.2 and 37.0 as against local check (farmers' practices) 33.7, 32.3 and 32.9 (Table- 2) during the year 2018, 2019 and 2020, respectively. Number of pods under demonstration of improved technology was increase up to the tune of 14.84, 15.17 and 12.46 % over farmers' practice during the year 2018, 2019 and 2020, respectively. The average number of pods per plant in improved technology and farmers' practice were 37.63 and 32.97, respectively, thus there was 14.16% more pods per plant found under demonstrations plots. Similar types of results were observed in case of seeds/pod and test weight of green gram. Number of seeds per pods and test weight of green gram were noticed 10.5 and 54.43 g, 10.3 and 53.81g as well as 10.2 and 54.40 g under the improved technology during the year 2018, 2019 and 2020, respectively. The per cent increasing in the number of seeds per pods and test weight up to the tune of 34.62 and 43.99, 39.19 and 46.94 and 36.0 and 46.24 during the year 2018, 2019 and 2020, respectively. The average number of seed per pods and test weight in improved technology and farmers' practice were found 10.3 and 54.21g and 7.57 and 37.21g, respectively, thus there was 36.60 and 45.72 % more seeds per pods and test weight found under demonstrations plots over farmers practices, respectively. The findings confirm with the findings of Rajni *et al.* (2014) and Meena and Singh (2017).

Table 2: Yield attributing traits of green gram under demonstration plot *vis a vis* farmer's practice (n=380)

Year	Number of pods/plant			Number of seeds/pods			Test weight (gm)		
	IP	FP	% increase	IP	FP	% increase	IP	FP	% increase
2018	38.7	33.7	14.84	10.5	7.8	34.62	54.43	37.80	43.99
2019	37.2	32.3	15.17	10.3	7.4	39.19	53.81	36.62	46.94
2020	37.0	32.9	12.46	10.2	7.5	36.00	54.40	37.20	46.24
Average	**37.63**	**32.97**	**14.16**	**10.3**	**7.57**	**36.60**	**54.21**	**37.21**	**45.72**

Yield

A comparison of productivity levels between demonstrated practices and local checks of green gram increased successively over the years in demonstration plots Table-3. During the study year 2018 to 2020, it was observed that in front line demonstrations of improved green gram variety GM-6 along with package of practices recorded the average higher grain yield (831 kg/ha) compared to famer practices (611.33 kg/ha), which was 36.45 % higher average yield of demo practices over farmer's practices. The increase in percentage of yield of green gram was ranging between 23.67 to 47.12 during three years of study. The results clearly speak the positive effects of FLDs over the exiting practices towards enhancing the yield of green gram in Navsari districts (Gujarat) with its positive effect on yield attributes. Yield enhancement in different crops in Front Line Demonstration has been documented by Dayanand *et al.* (2012), Mena *et al.* (2012), Pal *et al.* (2014), Rajni *et al.* (2014) and Meena and Singh (2017).

Yield gaps

The data presented in Table- 3 stated that an extension gap was highest (273 kg/ha) during 2018 and lowest (160 kg/ ha) during 2020. An average extension gap of three years was found 219.7 kg/ha. Such gap might be attributed to adoption of improved technology especially high yielding varieties sown 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 during different years. It was lowest (155 kg/ha) during 2018 and highest (188 kg/ ha) during 2019. The average technology gap of all the years was 169 kg/ha. The difference in technology gap in different years is due to better performance of recommended varieties with different interventions and more feasibility of recommended technologies during the course of study. Similarly, the technology index for all demonstrations in the study was in accordance with technology gap. Higher technology index reflected the inadequate transfer of proven technology to growers and insufficient extension services for transfer of technology. On the basis of three years study, overall 16.9 % technical index was recorded, which was observed 15.5 %, 18.8 % and 16.4 % during 2018, 2019 and 2020, respectively. Hence, it can be inferred that the awareness and adoption of improved varieties with recommended scientific package of practices have increased during the advancement of study period. These findings are in the conformity of the results of study carried out by Singh and Chauhan (2010), Poonia and Pithia (2011), Dayanand *et al.* (2012), Mena *et al.* (2012), Meena and Singh (2017) and Bhoraniya *et al*. (2017).

Table 3: Yield, technology gap, extension gap and technology index in green gram in Navsari district of Gujarat

(n=380)

Years	Area (ha)	Number of FLDs	Potential yield (kg/ha)	FLD yield (kg/ha)	Farmers Practice yield (kg/ha)	% increase	E G (kg/ha)	T G (kg/ha)	TI (%)
2018	30	200	1000	845	572	47.12	273	155	15.5
2019	10	80	1000	812	586	38.56	226	188	18.8
2020	20	100	1000	836	676	23.67	160	164	16.4
Average	**20.0**	**-**	**-**	**831.0**	**611.33**	**36.45**	**219.7**	**169.0**	**16.9**

EG= Extension gap; TG= Technology gap; TI= Technology index; FP= Farmers practices

Economic analysis

Different variables like seed, fertilizers, bio-fertilizers and pesticides were considered as cash input for the demonstrations as well as farmers practice and on an average of three year additional investment of ₹ 3577/ha was made under demonstrations plots. Economic returns as a function of gain yield and MPS sale price varied during different years. The maximum additional returns (₹ 18776/ha) during the year 2019 were obtained due to higher grain yield and higher MPS sale rates as declared by GOI coupled with lower yield in farmers practices. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit cost ratio (IBCR) were 5.56 and 3.29 in the year 2018 and 2020, respectively (Table-4) depends on produced grain yield and MPS sale rates. Overall average IBCR was found 4.76. The results confirm with the findings of front line demonstrations on pulses by Dayanand *et al.* (2012), Raj *et al.* (2013) and Pal *et al.* (2014) and Bhoraniya *et al.* (2017).

Table 4: Economic analysis of FLD's in green gram in Navsari district of Gujarat (n=380)

Year	Cost of cash input (Rs./ha)		Additional cost (₹/ha)	Sale price in demo. (MSP) grain (₹/q.)	Total returns (Rs./ha)		Additional returns in demo. (₹/ha)	Effective gain (₹/ha)	IBCR
	IP	FP			IP	FP			
2018	6830	3500	3330	6975	61995	43477	18518	15188	5.56
2019	7550	4000	3550	7050	63312	44536	18776	15326	5.44
2020	7950	4100	3850	7196	66286	53620	12666	8816	3.29
Average	**7443.3**	**3900.0**	**3577**	**7074**	**63864**	**47211**	**16653**	**13110**	**4.76**

CONCLUSION

From the foregoing results of 380 frontline demonstrations conducted in 60 ha area on summer green gram on farmers' field revealed that the yield and economics of green gram production increased through adoption of newly released high yield variety along with fertilizer, biofertilizer, weed management and pest and dieses management. The results further, revealed that lack of knowledge of suitable HYV, soil fertility and low technological knowledge were the three most important factors, which inhibited the adoption of HYV of green gram in Navsari. The average yield of green gram in demonstration was 831 kg/ha, which was 36.45 % higher as compared local check (611.33 kg/ha). The average return of Rs. 63864/ha for demonstration plots, which was having average higher additional return of Rs. 16653/ha with average incremental benefit cost ratio of Rs. 4.76 as compared to local check. The impact of FLD was also analyzed which showed that there was significant improvement in knowledge level and satisfaction on the yield production of improved technologies. Therefore, there is a need to disseminate the improved technologies among the farming community with effective extension approaches *viz*., training and demonstrations.

POLICY IMPLICATION

Based on the findings of the study it can be recommended that there is immense yield gap of greengram. Hences there is grate scope to improve yield and knowledge of farmers about improved practicesof summer green gram. Therefore, Government should focused on training programmes, demonstrations, field days, exhibitions, camps, radio/TV talks, message through ICT tools at grass root level.

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CONFLICT OF INTEREST

There is no conflict between author.

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