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Enhancing Farmers Income By Cultivating Summer Green Gram in Panchmahal District of Gujarat

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ABSTRACT:

Green Gram (Vigna radiata L.) is as one of the most important pulses crops of the Panchmahal district of Gujarat. However, its productivity of chickpea in the district is very low. Attempts are made to improve productivity and to increase area under chickpea by adopting HYVs (high yielding variety). In order to compare conventional chickpea with HYVs varieties, 100 front line demonstrations were carried out by the KVK during 2014 to 2017 in systematic manner on farmers' field to show the worth of a new varieties in comparison to local check and thereby convincing farmers about potentialities of improved production management practices of green gram for further adoption, involving feasible and effective scientific package of practices. Maximum average yield, net return, was obtained 9.41 q/ha, and Rs 25884/ ha respectively under demonstrated technology as compared to farmers practices 7.57 q/ha and Rs.16750/ha. The maximum average cost benefit ratio was obtained 2.1 under improved technology as compared to farmers' technology 1.9. Favorable cost benefit ratio is self explanatory of economic viability of the demonstration and convinced the farmers for adoption of imparted interventions. The technology suitable for enhancing the productivity of summer green gram crop and calls for conducting of such demonstrations under the transfer of technology by KVK.

KEYWORDS : Green Gram, Production Technology, Frontline Demonstration

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INTRODUCTION:

Pulses are important food crops for human consumption and animal feed. Being leguminous in nature, they are considered to be important components of cropping systems because of their viability to fix atmospheric nitrogen, add substantial amounts of organic matter to the soil and produce reasonable yields with low inputs under harsh climatic and soil conditions. The total production of pulses in the world was 14.76 billion tones from the area of 14.25 billion hectares in the year 2013-14 while in India total pulses production was 19.78 million tons from the area of 23.63 million hectares in the year 2013-14 of which, Gujarat contributed nearly 1.21 lakh tonnes (50.66%), owing record productivity of 526 kg/ha from 2.3 lakh ha area. Green gram is the third important pulse crop in India. It can be grown both as kharif green gram and summer green gram. With the advent of short duration, MYMV (Mung bean yellow mosaic virus) tolerant and synchronous maturing varieties of green gram (55-60 days), there is a big opportunity for successful cultivation of green gram in green gram-wheat rotation without affecting this popular cropping pattern. It ranks third in India after chickpea and pigeonpea. 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 (Jat et al. 2012). Keeping in view the present study was undertaken to analyze the performance and to promote the FLD on green gram production.

MATARIAL AND METHODS:

The study was carried out by KVK Panchmahal (Gujarat) during Summer Season from 2013-14 to 2016 -17 at selected farmers field from nine villages of (who grew green gram) were selected from three Talukas viz. Goghamba, Kalol, and Godhra for gathering the information. During study period 50 ha area was covered under front line demonstration with the 125 farmer is benefited. Before conducting FLD a list of farmer prepared by group meeting and specific skill training was imparted in the selected farmers regarding different aspects of cultivation. In the demonstration one control plot was also kept where farmer practice was carried out. The module of improved practices demonstrated included i.e. use of balance dose of fertilizers (20:40:20 N:$P_2 0_5$:S kg ha^{-1}) after adjustment with soil test values, use of disease resistant variety and seed treatment with fungicide (Carbendazime and Thiaram @ 2+1 g/kg seed) and seed inoculation with Rhizobium leguminosorum and phosphorus solubilizing bacteria (PSB)

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@ 5 g/kg seeds and one spray of Carbendazime (0.1%) and one spray of chlorpyriphos 50% and sypermethrin 5% EC @ 750 ml/ha. at pod initiation and their development stage. The performance of the crop was compared with the farmer's practice in the same location. The farmers practice included i.e. use of 50 kg DAP/ha, use of higher seed rate (25 kg/ha) with closer spacing of row to row and plant to plant (30 X 10 cm) and seed sown without seed treatment with fungicides and inoculation with Rhizobium legumenosorum and PSB. The chickpea crop where sown second to last week of October and harvest in March. The seed rate of recommended variety Meha and GAM-5 used was 20kg per ha with recommended spacing row to row and plant to plant (30 X 10 cm). Production and economic data for FLDs and local practices were collected and analyzed. The technology gap and technology index were calculated using the following formulas as given by Samui et al. (2000):

Extension gap= Demonstration yield-Farmers yield

Technology gap= Potential yield –Demonstration yield

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

RESULTS AND DISCUSSION:

Level of use and gap in adoption of summer green gram production technologies. Farmers in general cultivation in kharif and use local or old varieties instead of the recommended improved varieties as the quality seed of improved varieties are not easily available (Table-1). Very few farmers were able to arrange improved variety of seed. Farmers followed broadcast method of sowing against the recommended line sowing. Therefore they applied higher seed rate (@ 25-30 kg/ha than the recommended seed rate @ 20 kg/ha. And application of nitrogen and phosphorus is either very low or no use of same as per recommendation.

Table 1: Level of use and gap in adoption of summe green gram production technologies in Panchmahal.

Crop Operations	Recommended technologies	Existing technologies	Gap*
Variety	GAM-5(YVMV resistant)	Local (GM-4)	Full gap
Land preparation	One cultivator ploughing and 1 ploughing	One cultivator ploughing and 2 ploughings	Nil
Seed rate	@ 20 Kg/ha (GAM-5 with line sowing)	@ 25-30 Kg/ha (broadcasting)	higher seed rate
Seed treated	@ 2 g Carbendazim with @1 g Thaiaram/kg seed	No use of fungicides for seed treatment	Full gap
Fertilizer	DAP @ 85 Kg/ha with dual inoculation of Rhizobium and PSB@ 10 g/ Kg seed	No fertilizer and without inoculation of culture	Full gap
Weeding	One mechanical weeding or Pendimethelin @ 3.3 litre/ha	One mechanical weeding Chemical weeding is not done	Full gap
Irrigation	Three or four irrigation	Three or four irrigation	-
Plant protection	one spray of Carbendazime (0.1%) and one spray of chlorpyriphos 50% and sypermethrin 5% EC @ 750 ml/ha	Nil	Full gap

YIELD AND YIELD ATTRIBUTES:

Result indicated that the yield of green gram increased successively over the years in demonstration plots. During 2014 to 2017 the average demonstration yield was recorded to be 9.41 q/ha, it was noted highest yield 10.37 q/ha during 2015-16. The increase in percentage of yield was ranging between 6.94 to 36.97 during four years of study. The results clearly speak the positive effects of FLDs over the exiting practices towards enhancing the yield of green gram in Panchmahal districts (Gujarat) with its positive impact on yield attributes (table-3). The significantly highest average number of pods /plant (54.7), number of seed/pod (13.4),Test weight (51.87g) and grain yield (10.37 q/ha), was observed under balance dose of fertilizers with the dual inoculation of Rhizobium and PSB @ 5 g/ kg as seed treatment as compared to conventional practices number of pod /plant (29.7), number of grain/pod (10.2),Test weight (40.31g) and grain yield (7.98 q/ha). Positively response of inorganic and bio-fertilizers which

improves the physical and biological property of soil. And improvement of water holding capacity and the aeration with the incorporation of bio-fertilizer was corroborated with the earlier findings of (Aulakh and Malhi 2005 and De et.al.. 2006). The year-to-year fluctuations in yield and cost of cultivation can be explained on the basis of variations in prevailing social, economical and prevailing microclimatic condition of that particular village. Mukherjee (2003) has also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing systems productivity. Yield enhancement in different crops in Front Line Demonstration has been documented by (Padmaiah et al 2009, Rai et. al. 2012, Tiwari et al, 2003 and Tomer et al, 2003 Singh et al, 2019)

Table 2: Impact of demonstration on yield of summer Green Gram.

Year	No .of demo	Area ha.	Variety	Potentional Yield q/ha	Yield		Increase yield %
					RP	FP	
2013-14	25	10	Meha	12.5	8.47	7.92	6.94
2014-15	25	10	Meha	12.5	9.20	7.60	21.05
2015-16	25	10	GAM-5	12.5	10.37	7.98	29.94
2016-17	50	20	GAM-5	12.5	9.6	6.87	36.97
Average	-	-	-	12.5	9.41	7.59	23.97

Table 3: Impact of package on yield parameters of summer Green Gram.

Year	Plant hight		No. of pods/plant		No. of seed/pod		Test wt(gm)	
	RP	FP	RP	FP	RP	FP	RP	FP
2013-14	39.2	28.9	48.7	26.1	11.9	9.5	41.22	33.57
2014-15	42.8	34.6	46.8	32.5	12.3	8.4	40.17	34.98
2015-16	43.5	31.0	54.7	29.7	13.4	10.2	51.87	40.31
2016-17	48.2	29.1	52.1	24.8	12.7	9.5	49.61	38.97
Average	43.4	30.9	50.5	28.3	12.6	9.4	45.73	36.95

RP-Recommended practices, FP-Farmers practices

ECONOMICS OF FRONTLINE DEMONSTRATIONS:

The economics of summer green gram production under front line demonstrations were estimated and the results have been presented in table 4. Economic analysis of the yield performance revealed that front line demonstrations recorded higher gross returns (Rs.57035 ha^{-1} in 2015-16) and net return (Rs. 33335 ha^{-1} in 2015-16) with higher benefit ratio (2.4 in 2015-16) compared tofarmer practices (table 5).

These results are in line with the findings of Rai et.al. (2015), Kumar et.al. (2015), Hiremath and Nagaraju (2009) in case of pigeonpea, okra, potato and onion crop. The data clearly revealed that the maximum increase in yield and cost benefit ratio was observed under recommended practices as compared to farmer's practices. The variation in cost benefit ratio during different years may mainly be on account of yield performance and input output cost in that particular year.

Table 4: Economics of frontline demonstrations on summer Green Gram

Year	Cost of cultivation (Rs ha-1)		Gross return (Rs ha-1)		Net return (Rs ha-1)		Benefit cast ratio	
	RP	FP	RP	FP	RP	FP	RP	FP
2013-14	23500	22400	41503	37240	18003	14840	1.8	1.7
2014-15	22400	21800	50600	41800	28200	20000	2.3	1.9
2015-16	23700	22400	57035	43560	33335	21160	2.4	1.9
2016-17	24000	23000	48000	34000	24000	11000	2.0	2.0
Average	23400	22400	49284.5	39150	25884.5	16750	2.1	1.9

RP-Recommended practices, FP-Farmers practices

TECHNOLOGY GAP:

The trend of technology gap ranging between 0.55 to 2.73 q/ha respected the farmers cooperation in carrying out such demonstration with encouraging results in subsequent year. The technology gap observed may be attributed to the dissimilarity in soil fertility status and weather condition.

EXTENSION GAP:

The extension gap showed on increasing trend. the extension gap ranging between 2.9 to 4.03 q/ha during the period of study emphasize the need to educate the farmers through various means for the adaptation of improved agricultural production technique to reverse the trend of wide extension gap.

TECHNOLOGY INDEX:

The technology index showed the feasibility of the evolved technology at the farmers fields. The lower the value of technology index more is the feasibility of the technology. As such reduction in technology index from 17.04 to 32.24 percent during 2014 to 2017 exhibitated the feasibility of the demonstrated technology in this region. The finding of the present study is in consonance with the findings of Hiremath and Nagaraju (2009) and Kushwaha (2007). in case of onion crop.

Table 5: Extension Gap, Technology Gap and Technology Index of FLD on summer green gram

Year	Technology gap- (qha^{-1})	Extension Gap (qha^{-1})	Technology index (%)
2013-14	0.55	4.03	32.24
2014-15	1.6	3.3	26.40
2015-16	2.39	2.13	17.04
2016-17	2.73	2.9	23.2
Average	1.69	3.09	24.72

IMPACT OF TECHNOLOGY:

The achievements and outcomes of the organized FLDs programmers' rewarding. summer green gram has registered significant increase productivity and B: C ratio. The mean yield of 125 FLDs conducted has exhibited 6.94 to 36.97 per cent increased yield at different location against to farmer practice. Which is primarily due to release of high yielding and disease resistant varieties and improved technology against farmer practices. This technology adopted additional 1500 ha area and obtained 14000 quintals additional yield and in terms of money Rs. 450,00,000 from this area. These can possible by quickly spreading of this technology in Practicing farmers & farm women and RAEOs through training and provide literature related to package and practices of Green Gram.

CONCLUSION:

From the above findings its can concluded that use of scientific method of green gram cultivation can reduce the technology gap to considerable extent thus leading to increased productivity of summer green gram in the Districts. The results of FLDs convincingly brought out that the yield of Green gram could be increased by 6.94 to 36.97 per cent with the intervention on balanced nutrition coupled with the insect pest management in Panchmahal. Favorable cost benefit ratio is self explanatory of economic viability of the demonstration and convinced the farmers for adoption of intervention imparted. The technology suitable for enhancing the productivity of summer green gram crop and calls for conduct of such demonstrations under the transfer of technology programmed by KVKs.

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