PERFORMANCE OF IMPROVED VARIETIES OF PULSES AT FARMERS' FIELD OF SEMI-ARID CONDITION OF GUJARAT

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ABSTRACT

Pulses are as one of the most important crops of the Panchmahal district of Gujarat. However, pulses are the major crop of this area in Gujarat state though the productivity is very low as compared to its yield potential due to cultivating local or old varieties along with higher seed rate and also paying more input cost of production. Attempts were made to improve the productivity HYV pulses for better economic return. In order to compare conventional varieties with HYVs, 430 front line demonstrations were carried out in systematic manner on farmers' field to show the worth of a HYVs in comparison to local varieties and thereby convincing farmers about potentialities of improved production management practices of pulses for further adoption, involving feasible and effective scientific package of practices. The result of study revealed that the improved varieties, of chickpea, pigeonpea and Green gram, increased the average yield upto 23.98, 39.98 and 24.93 percent and technology gap (q/ha) 2.23, 4.89 and 2.60 over local check varieties of the pulse crops, respectively.

Keywords : *chickpea, pigeonpea and green gram, production technology, frontline demonstration*

INTRODUCTION

Pulses are the main source of protein to vegetarian people of India. It is second important constituent of Indian diet after cereals. Pulses being legumes fix atmospheric nitrogen into the soil thus, improve the soil fertility. India is producing 14.76 million tons of pulses from an area of 23.63 million hectare which is one of the largest pulses producing countries in the world. However, about 2-3 million tons of pulses are imported annually to meet the domestic need. Thus, there is need to increase production and productivity of pulses in the country by more intensive interventions. To achieve target of additional production of pulses, it is necessary to make efforts on important pulse crops depending upon their contribution in national productivity. The national and state (Gujarat) productivity of chickpea (*Cicer arietinum L.*), pigeonpea (*Cajanus cajan L.*) and green gram (*Vigna radiata L.*) was 799, 760, 451 kg/ha, where as it was 1128, 986, 516 kg/ha in chickpea, pigeonpea and green respectively during 2011-12 (Anonymous 2011). The productivity of pulses *viz.* chickpea, pigeonpea and green gram was 890, 1413 and 506 kg/ha, respectively in Panchmahal district during 2010-11, which is quite low than their yield potential. Keeping in view these factors in background the present study was undertaken to exhibit the comparison between traditional and HYV through FLD at farmers field.

OBJECTIVE

To know the performance of improved varieties of pulses at farmers field of semi-arid condition of Gujarat.

METHODOLOGY

The performance of improved varieties of chickpea, pigeonpea and green gram were conducted in three blocks of Panchmahal district *viz.* Ghoghamba, Kalol and Godhra during *Kharif* and *Rabi* during 2012-13 to 2015-16. An extensive survey was made before conducting the front line demonstrations (FLDs) to select the farmers. The demonstration was consisted of improved varieties, recommended seed rate, line sowing with seed-cum-ferti drill. Seed treatment was done with fungicide (carboxin + thiram @ 2 g/kg seed) followed by seed inoculation with PSB cultures @ 5 g per kg seeds. The performance of the crop under module was compared with the farmers' practice in the same location. The farmers practice included sowing of traditional varieties, high seed rate, broadcasting method of sowing without seed treatment. The following improved varieties of pulse crops viz. Chickpea (GG-1,GG-2, and GG-3), Pigeonpea (Vaisali, BBN-2, GT-1 and AGT-2) and Green gram (GM-4, Meha and GAM-5) were undertaken for the study. The trials were regularly monitored and data on crop yield were collected after harvesting the crop. In order to estimate the technology gap, extension gap and technology index the following formula was used as per described by Samui *et al.* (2000).

Extension gap = Demonstration yield-Farmers yield
Technology gap = Potential yield –Demonstration yield
Technology index = $\frac{\text{(Potential yield –Demonstration yield)} \times 100}{\text{Potential yield}}$

RESULTS AND DISCUSSION

Performance of FLD

Yield of frontline demonstration trials and potential yield of respective varieties of pulse crops were compared to estimate the yields gap, which were further categorized into technology and extension gaps. The adoption of technology in frontline demonstration trials was studied through technology index, which shows the feasibility of the evolved varieties at the farmer's field.

(A) Chickpea

Three demonstrated varieties of chickpea (GG-1, GG-2, and GG-3) and local check have been shown in table 1. During the period under study, it was observed that in front line demonstrations, the improved chickpea variety recorded the average higher grain yield (16.8 q $ha^{-1)}$ compared to local check (12.97 q ha^{-1}). The results showed that the maximum extension gap was recorded with GG-2 followed by GG-3 and GG-1 cultivars, while the highest technology gap was recorded with GG-3 followed by GG-2 and GG-1. It is clearly evident from the results that the minimum technology index was recorded with GG-2 cultivar followed by GG-1 and GG-3 (Table 1). The difference in the yield among the varieties may be due to variation in soil fertility, irrigation facility, non-congenial weather and location specific management problems as described by Dudhade *etal*. (2009). However, the result clearly shows an increase in chickpea yield up to 23.98 per cent over control. The technology index was lowest with GG-2 cultivar, which indicates that GG-2 is performing batter at the farmer's field. The technology index of all three demonstrated varieties ranges between 7.89 to 17.89 per cent indicating the high level of adoption under farmer's field conditions. Similar findings were also reported by Thakral and Bhatnagar (2002).

Table 1 : Yield performance of demonstrated varieties of chickpea

Year	Varieties	Area (ha)	Potential	Demo Yield q/ha	Check	Yield increase (%)	Technology gap (q/ha)	Extension gap (q/ ha)	Technology index (%)
2012-13	GG-1	10	19	17.07	13.52	26.25	1.93	3.5	10.15
2013-14	GG-2	10	19	16.9	12.8	24.26	2.1	4.1	11.05
2014-15	GG-2	05	19	17.5	13.7	21.71	1.5	3.8	7.89
2015-16	GG-3	08	19	15.6	11.9	23.71	3.4	3.7	17.89
Total		**33**	**Average**	**16.8**	**12.97**	**23.98**	**2.23**	**3.77**	**11.74**

(B) Pigeon pea

Three varieties of pigeonpea (Vaishali, GT-100 and AGT-2) were demonstrated at 100 hectares area of farmer's field in different villages of the Panchmahal district during 2012-13 to 2015-16. The average yield of demonstrated varieties at farmers field was 14.12 q/ha as compared to 10.02 q/ha with local cultivars (Table 2). The cultivar Vaishali recorded the highest average yield (17.3 q/ha) over existing local varieties. The yield obtained from AGT-2 (51.8%) and GT-100 (44.94) was higher over the local check varieties expressing better adoption at farmer's field condition. The maximum technology gap was recorded with GT-1 followed by AGT-2 and Vaishali. The technology index of GT-100, AGT-2 and Vaishali was 39.68, 28.95 and 25.26 per cent, respectively during 2012-13 and 2015-16 as compared to check indicating high adoption at farmer's field conditions. 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 Rai, *et. al.,* 2010 and Roy Burman *et. al.,* 2010.

Table 2. Yield performance of demonstrated varieties of Pigeonpea

Year	Varieties	Area (ha)	Potential	Demo. Yield q/ha	Check	Yield in-crease (%)	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
2012-13	Vaisali	20	19	17.30	12.30	40.6	1.70	5.00	08.90
2013-14	Vaisali	20	19	14.20	10.96	22.56	4.80	3.24	25.26
2014-15	GT-100	10	19	11.46	7.90	44.94	7.59	3.56	39.68
2015-16	AGT-2	50	19	13.50	8.90	51.80	5.50	4.60	28.95
	Total	**100**	**Average**	**14.12**	**10.02**	**39.98**	**4.89**	**4.10**	**25.69**

(C) Green gram:

The improved different varieties of green gram (GM-4, Meha, SML-668 and GAM-5) were demonstrated at 50 hectare area of farmer's field in different villages of the Panchmahal district during 2012-13 and 2015-16. The

improved varieties of green gram (GAM-5) remarkably increased (41.17 per cent) yield over local varieties during the 2015-16. Technology gap, extension gap and technology index of GAM-5 were recorded as 1.9, 2.8 q/ha and 16.52 per cent, respectively. Irrespective of variety and seasonal variations, the average yield achieved under improved variety was 9.6 q/ ha as compared to that of 6.8 q/ha under farmers practice however, lesser than the potential yield of the variety (Table 4). These results are in consonance with the finding as respected by Cassman (1999) and Ninama et al. (2017) and observed that even cereals under best production systems can perform to the maximum extent of potential productivity (83%) under real field conditions. The results of study revealed that the use of healthy seeds of improved variety along with seed treatment produce vigorous plant as it promote greater absorption of water and nutrients which might play a vital role to enhance the yield of green gram which also support the findings of Provorov *et al.,* 1998, Tiwari *et al*., 2003 and Mehboob *et al.,* 2003.

Table 4 : Yield performance of demonstrated variety of Green gram

Years	Varieties	Area (ha)	Potential	Demo Yield q/ha	Check	Yield increase (%)	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
2012-13	GM-4	05	11.5	9.6	7.8	28.1	1.9	1.8	12.17
2013-14	Meha	05	11.5	8.47	7.6	11.45	3.03	0.87	22.00
2014-15	SML-668	20	11.5	7.9	6.4	18.98	3.6	1.5	31.30
2015-16	GAM-5	20	11.5	9.6	6.8	41.17	1.9	2.8	16.52
	Total	**50**	**Average**	**8.89**	**7.15**	**24.93**	**2.60**	**1.74**	**20.49**

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