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RESEARCH PAPER

Evaluation of chickpea varieties under frontline demonstration at farmer's field in Bhind district of M.P.

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Abstract : The study was carried out to know the gap between improved packages of practices in gram crop. Frontline demonstration on gram varieties J.G.16, JAKI 92-18 and J.G. 130 were conducted at farmer's field in the adopted village of Krishi Vigyan Kendra, Lahar Bhind (M.P.) during the years 2010-11 to 2014-15. The average yield of J.G. 16 variety was 18.07 q/ha. J.G. 16 has given 20.4 q/ha. Highest yield during the year under frontline demonstration while local varieties gave 16.61 q/ha average yield during the year. The variety JAKI -9218 was demonstrated during 2011-12 and 2012-13 gave average yield at the farmers field 17.32 q/ha and 15.99 q/ ha, respectively. While variety conducted farmers practice gave average yield 13.62 q/ha and 13.52 during the years, respectively. The variety was given 18.50 q/ha. Highest yield under FLD, while farmers practice given highest yield 13.90 q/ha. The variety conducted under front line demonstrated was gave 27.16 per cent and 18.26 per cent higher yield over farmers practices during 2011-2012 and 2012-13, respectively. The average B.C. ratio of demonstrated technology was 1:180. J.G. 130 variety of gram tested at farmers field during 2012-13 and gave average yield 17.56 q/ha. While it was 13.1q/ha. in farmers practice. 34.04 per cent increased yield was recorded over farmer's practices. The variety JG 130 also demonstrated in farmers field under frontline demonstration during 2013-14 and 2014 -15 in 10.40 ha land on 26 farmers field, this variety during the years could not sown its performance due to rainfall and hailstorm during flowering to maturity. The average yield during the years (2013-14 and 2014 -15) was 6.13 and 2.53 q / while it had been seen in case of farmers practice 3.93 q/ha and 2.50 q/ha, respectively. Sixty four demonstration have been conducted during 2010-11 to 2014-15 in 25.80 ha of land. It could be said the yield performance of variety under improved package of practices not only in favour of increased yield but also economic condition of the farmers of the district

Key Words : Frontline demonstration, Gram, Varietal performance, Economic analysis, Farmers practices, Technology gap, Extension gap, Technology index

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INTRODUCTION

Historically India is the largest producer, consumer and importer of pulses. Pulses are a good and chief source of protein for a majority of the population in India. Protein malnutrition is prevalent among men, women and children in India. Pulses contribute 11 per cent of total intake of

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proteins in India (Reddy, 2010). Production of pulse s in the country is far below the requirement to meet even the minimum requirement level per capita consumption. Per capita availability of pulses in India has been continuously decreasing which is 32.5 g/day against the minimum requirement of 80 g/ day per capita prescribed by Indian Council of Medical Research (ICMR). So, it is necessary to popularized latest technologies in the field of agriculture at farmer's to increase production of pulses to meet the protein requirement of increasing population of the country.

The Bhind district has about 19903 ha area of gram, while it has average productivity about 12.31 q/ha. The productivity of gram could be increased upto near 17.0 to 18 q/ha. The productivity of gram could be increased by adoption of small interventions such as proper seed rate, balance dose of nutrients, seed treatment, use of bird percher; *Neem* based insecticide and need based recommended insecticides at pod formation. The study was conducted during 2010-11 to 2014-15 at farmer's field along with improved varieties and improved package of practices. In addition to improved varieties the extension activities have been incorporated in organizing the front line demonstration and on farm trials at farmer's fields. The extension activities had motivated the farmers for increasing the adoption of improved varieties by adjoining farmers in the village as well as nearby the villages. Each demonstration has been furnished with two training programmes *i.e.* at sowing and integrated nutrient management and plant protection measures along with one field day at maturity stage. The demonstration has been proved very effective tool for demonstration of major characteristics of the technology before the farmers so the technology could be adopted by the large number of farmers in the district. The gram is rich source of protein and has many uses in daily life not only farmers but also all the categories of people such as *Pakodi, Namkeen, Besan, Besan laddoo* etc. Gram is one of the important crops of pulses not only in Madhya Pradesh but also India. It provided numbers of farmers / person's employment in the village as well as adjoining areas of cities where gram based industries located. Yet, adoption levels for several components of the improved technology were very low, emphasizing the need for better dissemination (Kiresur *et al.*, 2001). The gram crop would be more remunerative in limited irrigation than the cereals crops if few small interventions could be adopted.

MATERIAL AND METHODS

Krishi Vigyan Kendra, Lahar (Bhind) has conducted 64 front line demonstration during 2010-11 to 2014-15 in the adopted villages of Bhind district. The villages namely Chiruli, Bespura, Dewarikala, Hirapura, Gohad, Gorai, Birkhidi in Lahar, Raun and Gohad blocks of district. The area under each front line demonstration was 0.4 ha. Total 64 farmers were selected who have been earlier selected and had actually undertaken the demonstration on their fields and data were collected with the help of personal contact and observations. Yield data was also recorded at the time of threshing. The yield of each demonstration was recorded in a systemic manner and the yield of farmers' practices was also recorded at the same time. The data regarding yield and other parameters were collected personally from farmers after every crop harvest through structured interview schedule. The grain yield of demonstration crop was recorded and analyzed. The necessary steps for selection of the site and farmers, layout of demonstration etc. were followed as suggested by Choudhary (1999). The extension gap, technology gap and technology index were work out (Samui *et al*., 2001**)** as given below:

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration Yield – Farmer's yield

Technology index= Potential yield-Demonstration yield x100/Potential yield

RESULTS AND DISCUSSION

In demonstrated technology use of quality seeds of improved varieties, line sowing, balance dose of fertilizers (Using micronutrient zink) were emphasized and comparisons has been made with the existing practices (Table 1). The necessary steps for selection of site, farmers and layout of demonstration ete were followed as suggested by Choudhary (1999). The traditional practices were maintained in case of local checks area and productivity of gram in Bhind district.

Table 2 cleary showed that average yield of improved varieties at farmers field was 12.08 q/ha, while it was only 10.03 q/ ha in case of farmer's practice. Overall average 20.40 per cent increased yield has been recorded in demonstrated technology as compared to farmers practice. It could be concluded that production of district would be increased by adoption of improved varieties of gram. Table 2 also clearly showed that the highest yield in demonstration was 20.0 q/ha in the year 2010-11 of the variety JG 16 followed by JAKI 92-18

(18.50/ha) in the same year. The lowest yield was recorded in year 2014-15 (2.0q/ha) in demonstrated technology it was due to more numbers rainy days as well as hail storm during flowering to maturity. During these years variety of gram JG 130 has been demonstrated, while, the same variety (JG 130) has been tested during the year 2012-13 it gave average yield 17.56 q/ha as compared to farmers practice (13.10 q/ha). The improved variety of gram JG 130 preferred by the farmers due to bold seed.

Table 1 : Comparision between demonstrated technology and existing farmers practice in gram

Particulars	Demonstrated practices	Farmers practice
Farming situation	Semi- irrigated and light black to black soils	Semi- irrigated and light black to black soils
Varieties	Improved varieties- JG 16, JG 130 and JAKI 92-18	Local old seeded varieties
Time of sowing	15-25 October	15-25 October
Method of sowing	Line sowing	Line sowing
Seed rate	75 kg / ha	80-100 kg / ha
Fertilizers	20:60:20-NPK kg/ ha +5 kg Zn/ha	50-100 kg DAP/ha
Irrigation	Ist irrigation at pre-flowering IInd need based at pod formation	Only one irrigation at pre-flowering
Plant protection	Seed treatment with Trichoderma viridae and PSB@ 5 g/kg seed each	No seed treatment
	50 bird percher / ha +*Neem* based insecticide @ 5 ml / litre of water and need based spray of chemical insecticides to manage of pod borer	No pod borer control measures adopted

Table 2 : Evaluation of improved varieties at farmer's field under front line demonstration

Years	No. of demo.	Variety	Area (ha)	Yield demo.			Check Av. yield	% increased
				Mini /max	Av.	Mini / max		
2010-11	13	JG-16	5.2	15.18	20.0	18.07	16.61	8.85
2011-12	12	JAKI 92-18	5.0	15.60	18.50	17.32	13.62	27.16
2012-13	13	JAKI 92-18	5.2	14.50	17.50	15.99	13.52	18.25
2013-14	13	JG130	5.2	5.60	6.50	6.13	3.93	46.56
2014-15	13	JG 130	5.2	2.0	3.0	2.53	2.50	1.2
Total/Av.	64		25.8	10.57	13.10	12.08	10.03	20.40

Table 3 : Compare of technology gap, extension gap and technology index of varieties

Varieties	Av. farmer's practices yield (qtl/ha)	Av. demo. yield (qtl/ha)	Potential yield (qtl/ha)	Technology gap (qtl/ha)	Extension gap (qtl/ha)	Technology index (%)
JG 16	16.61	18.07	20	1.93	1.46	9.65
JAKI 92-18	13.57	16.65	20	3.35	3.08	16.75
JG130	3.21	4.43	21	16.57	1.22	78.90
Average	11.13	13.05	20	7.28	1.92	35.10

Table 4 : Economic analysis of demonstrated technology and farmers practices

Years	Av. cost of cultivation		Av. additional cost demo (Rs./ha)	Gross return (Rs./ha)		Net return (Rs./ha)		Additional net return demo (Rs./ha)	BC ratio	
	Demo.	Check	Demo.	Demo.	Check	Demo.	Check	Demo.	Demo.	Check
2010-11	21200	20000	1200	49350	45150	28150	25150	3000	2.33	2.25
2011-12	16000	14000	2000	57156	44946	41156	30946	10210	3.57	3.21
2012-13	23996	22973	1023	48369	40897	24373	17924	6449	2.01	1.78
2013-14	24000	22500	1500	26704	21397	2704	-1103	3807	1.11	0.95
2014-15	20000	19000	1000	8096	7590	-11904	-11410	-494	0.40	0.39
Average	21039.20	19694.60	1344.60	37935	31996	16895.8	12301	4594.40	1.80	1.62

The average yield was fluctuated from 20.0 q/ha to 2.53 q/ha during the years (2010-11 to 2014-15), while it was 16.61 to 2.50q/ha in case of farmers practice. The findings is an agreement with those of Kumar *et al*. (2010), who has found on overall basis increased yield 13.0 per cent (pearl millet) and Singh *et al*. (2013) found 25.33 per cent (soybean) increased yield. This findings also supported by Singh (2002); Mishra and Khare (2017) and Poornia and Pithia (2011). The incremental in yield might be due to varietal performance in the demonstrated plots along with other factors *i.e.* improved seed of crop, seed inoculation with carbendazim, Thiram, Rhizobium culture and timely management of pod borer through use of bird percher @ 50 per ha. *Neem* based insecticides and need based recommended insecticides. It could be said that the adoption of improved varieties with small but important interventions not only increase the production but also improve the social status of farmers by more economic return. The extension activities have played vital role in the dissemination of technology not only village but also adjoining villages through diffusion effect.

The technological gap were 1.93 3.35 and 16.57 in case of varieties JG 16, JAKI 92-18 and JG 130, respectively during the years. The overall technological gap has been seen 7.28 q/ha (Table 3). This technology gap might be due to dissimilarity of of soil fertility in the district, agricultural practices and climatic condition (Mukhergee, 2003 and Mishra and Khare, 2017). Extension gap of 1.46, 3.08 and 1.22 q/ha were observed in case of gram varities *i.e.* JG 16, JAKI 92-18 and JG-130 during the years (2010-11 to 2014-15), respectively. The overall average extension gap were observed 1.92 q/ha, which emphasized the need to educate the farmers through various means. This findings is in corroboration with the findings of Hiremath and Nagaraju (2010) and Jyothiswaroopa *et al*. (2016). The technology index varied from 9.65 to 78.90 per cent. On an average technology index was observed 35.10 per cent. Lower the value of technology index more is the feasibility of the technology (Jeenger *et al.,* 2006). During the years (2010-11 to 2012-13) the technology index is shows the efficacy of good performance of technological interventions, while, during the years of 2013-14 and 2014-15 the index was higher due to rains and hails at the time of flowering to maturity.

The economic viability of improved technologies over farmers' practices have been calculated depending on prevailing market prices of inputs and outputs costs (Table 4). It has been observed that cost of cultivation of chickpea varied from Rs. 16000 to 24000/ha with an average of Rs. 21039.20/ha of demonstration as against the variation in the cost of cultivation from Rs. 14000 to 22973/ha with an average of Rs. 19694.60 in case of the farmers practices. Cultivation of chickpea under frontline demonstration gave average higher gross return (37935/ ha) as well as net return (16895.80) as compared to farmers practices with Rs. 31996/ and Rs. 12301/ha, while, net return in the years of 2010-11 and 2011-12 were Rs. 28150 and Rs. 41156/ha, respectively as compared to farmers practices Rs. 25150 and Rs. 30946 / ha, respectively. The negative net return also have been found in the year of 2014-15 in frontline demonstration (Rs.-11904/ ha), while in case of farmers practices it have been observed in the years of 2013-14 and 2014-15 (Rs.-1103 and Rs. -11410/ha) due to adverse weather condition at flowering to maturity stages. In case of B:C ratio it varies from 0.4 to 3.57 in frontline demonstration, while it varies in farmers practices 0.39 to 3.21. The highest B:C ratio has been seen in the year of 2011-12 (3.57), it was 3.21 in farmers practice same year. The overall average BC ratio has been seen in frontline demonstration *i.e*. 1.80, while in case of farmer's practices it was 1.67.

Conclusion:

It could be concluded from the above findings that all the three improved varieties *i.e*. JG. 16, JAKI 92-18 and JG 130 had been preferred by the district farmers. The need to popularize these varieties in the district so whole district should be covered by these improved varieties. The adoption on large scale could be ensured by the motivating the whole district farmers through mass campaign, *Kisan mela* and farmers *Sangosthi* along with large scale demonstration should be conducted in whole district.

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