

Original Research Article

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Assessment of Green Gram Varieties for Better Yield in Palamu District of Jharkhand

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ABSTRACT

Pulses have been traditionally recognized as an indispensable constituent of Indian diet and an important source of protein for the poor as well as for the vegetarians who constitute major population of the country. The major pulses grown in Kharif season are Arhar (Pigeon Pea) and Moong (Green Gram) Urd (Black gram) and Kulthi (Horse Gram) and in rabi season include chickpea, lentil, mungbean (Summer), urd bean. India is the largest producer as well as consumer of pulses, and is the largest importer in the world. The situation in India is very alarming due to high demand and low supply of the pulses. To cope this situation the government of India initiated efforts to boost the pulse production through cluster front line demonstration through Krishi Vigyan Kendra which already doing Front Line Demonstration of improved varieties of green gram namely IPM 02-03, SML 668 and HUM 16 and boosting production. The data like average number of branches, pods/plant, grain/pod, disease incidence (%) and grain yield (q/ha) were recorded during investigation. Among all the varieties assessed, variety IPM 02-03 proved to be the best with highest number of pods/plant (38.1) and minimum incidence of yellow mosaic disease of 6.6 per cent resulting in the highest yield of 15.7 q/ha followed by SML668 with disease incidence of 7.9 per cent, 34.6 pods/plant and yield of 14.2 q/ha. Hence, it was inferred that IPM 02-03 variety of green gram proved better followed by SML668.

Keywords

Green gram,
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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. India is the largest producer, consumer and importer of pulses in the world. It accounts for 33 per cent of world area and 22 per cent of the total world production of pulses (Sandhu and Dhaliwal, 2016).

Pulses are good and cheaper source of protein, which indicate the great importance of pulses in their daily food habits. Green

gram (*Vigna radiate* L. Wilczek.) is the third important pulse crop in India. It can be grown both as *Kharif* green gram and summer green gram. Green gram 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 (Meena *et al.*, 2012). However, the production and productivity is very low in green gram mainly due to its cultivation in resource poor lands with minimum inputs, non synchronous maturity and indeterminate growth habit. Green gram yield is also affected by insect-pests and diseases, especially by green gram yellow mosaic virus (MYMV) and *Cercospora* leaf spot (CLS) (Table 1).

The front line demonstration (FLD) is an important method of transferring the latest package of practices in totality to farmers. Further, these demonstrations are designed carefully where provisions are made for speedy dissemination of demonstrated technology among farming community through organization of other supportive extension activities, such as field days and farmers convention. The main objective of the FLD 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. Keeping in view, the present study was undertaken to increase the green gram productivity by conducting the FLDs.

Materials and Methods

The present on farm study was conducted during *Kharif* & Summer 2016-17 and 2017-18 in Palamu district of Jharkhand under raised conditions. Twenty farmers' field were randomly selected and sown three high yielding improved varieties of green gram namely IPA 02-03, SML668 and HUM16 in

five replication with one check variety already grown by the farmers.. The package of improved technologies like line sowing, nutrient management, seed treatment and whole package were used in the demonstrations. The variety of green gram IPM-02- 3 was included in demonstrations methods used for the present study with respect to CFLDs and farmers' practices are given in Table 2. In case of local check plots, existing practices being used by farmers were followed. In general, soils of the area under study were 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 30-35 d after sowing to ensure recommended plant spacing within a row because excess population adversely affects growth and yield of crop. Other management practices were applied as per the package of practices. The data with respect to grain yield from CFLD plots and from fields cultivated following local practices adopted by the farmers of the area were collected and evaluated. Potential yield was taken in to consideration on the basis of standard plant population (404440 plants/ ha) and average yield per plant 22.5 g/plant under recommended package of practices with 30 X 10 cm crop geometry (Chandra, 2010). Various field data like average number of nodules/plant, plant height, number of branches, number of pods/plant and yield were recorded at harvest. Different parameters as suggested by Yadav *et al* (2004) was used for gap analysis, and calculating the economic. To estimate the technology gap, extension gap and technology index formula given by Samui *et al.*, (2000) was used i.e.

$$\text{Extension gap} = \text{Demonstration yield} - \text{Farmers' practice yield}$$

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield}$$

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

Results and Discussion

Yield attributing traits

The data (Table 3) indicated that maximum number of modules found in IPM 02-03 which were significantly superior over other varieties and farmers’ practice. This might be due to decrease in adsorption/fixation and enhanced phosphorus availability with application of organic manures resulting in better growth and consequently exploitation of greater soil volume for modulation as reported by Choudhary *et al.*, (2011). The tallest plant height was recorded in variety

HUM16 (47.3 cm) followed by SML668 (46.8 cm) and IPM 02-03 (45.2cm). The varieties SML668 produced maximum number of branches per plant (9.7) followed by IPM 02-03 (9.6). The reason may be attributed to the genetic variability and varietal difference and environmental adaptability. Similar results were reported by Samant (2014) in green gram.

The variety IPM 02-03 recorded maximum number of pods/plant which was significantly higher with variety SML668 (34.6). The positive effect of phosphorus application on number of pods/plant might be due to better enzymatic activities which control flowering and pod formation (Kumar and Singh, 2014).

Table.1 Production of pulses in India

Pulses/Year	2014-15	% Share in Total production	2015-16 % Share in	Total production	2016-17*	% Share in Total production
Urd	1960.00	11.42	1950.00	11.92	2890.00	13.05
Moong	1500.00	8.74	1590.00	9.72	2130.00	9.62
Tur	2810.00	16.38	2560.00	15.65	4230.00	49.11
Gram	7330.00	42.74	7060.00	43.18	9120.00	41.20
Other Pulses	3550.00	26.69	3190.00	19.52	3770.00	17.03
Total Pulses	17150.00		16350.00		22140.00	

Source: Directorate of Economics and Statistics (DES)*: Based on 2nd Advance Estimates for 2016-17

Table.2 Particulars showing the details of green gram grown under CFLD and farmers’ practice

Sr. No.	Cultural operation	Existing practice	Improved cultivation practice
1.	Variety	Local seed	IPA 02-03, SML 668 and HUM16
2.	Seed rate	25-30 kg/ha	30 kg/ha.
3.	Seed quality	Ungraded seed	Graded seed
4.	Seed treatment	No seed treatment	Treated with bavistin followed by Rhizobium
5.	Method of sowing	Broadcasting	Line sowing by seed drill
6.	Fertilizer application	-	110kg DAP + 40 kg MOP + 12 Kg Urea per ha.
7.	Plant protection measures	-	Chlorpyrifos 20% EC

Table.3 Performance of varieties on growth parameters, yield attributes and yields of green gram. (Pooled data over two years)

Treatment	Nodules		Plant height (cm)		No. of Branches		No. of pods/ plant		No. of grain/ pod		Disease incidence (%)		Yield (q/ha.)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Famers' practice	6.6	6.5	41.2	40.2	7.5	7.8	29.3	29.5	11.3	11.6	17.2	15.4	11.5	11.80
IPM 02-03	12.6	12.4	45.2	46.2	9.6	9.9	38.1	38.3	12.8	12.9	6.6	6.2	15.7	16.72
SML668	11.4	11.5	46.8	48.3	9.7	10.1	34.6	34.8	12.9	13.0	7.9	7.6	14.2	14.90
HUM16	9.8	10.1	47.3	48.5	8.8	8.7	32.1	31.5	12.3	12.5	8.6	8.1	13.5	13.77
CD P< (0.05)	2.02	2.05	1.28	1.32	NS	NS	4.34	4.37	0.92*	0.93*	1.94	1.89	1.17	1.27

* Significant at 5% level of probability

Table.4 Yield, technology gap, extension gap and technology index of green gram

Year	Name of Variety	Yield (q/ha.)			Per cent increase	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
		Potential yield (q/ha)	Improved practices	Farmers' Practice				
			Average	Average				
2016	IPM 02-03	20	15.7	11.6	35.34	4.30	4.10	21.50
	SML668	18	14.6	11.6	25.86	3.40	3.00	18.89
	HUM16	18	13.4	11.6	15.51	4.60	1.80	25.55
2017	TMB37	20	16.78	11.8	42.20	3.22	4.98	16.10
	SML668	18	14.92	11.8	26.44	3.08	3.12	17.11
	HUM16	18	13.60	11.8	15.25	4.40	1.80	24.44

The variety SML668 recorded maximum number of grain/ pod (12.9) and significantly superior to IPM 02-03 (12.8). The reason may be attributed towards the genetic variability and grain size. Farmers' check variety had minimum grain/ pods (11.3, 11.6). The data (Table 3) showed that disease incidence (%) ranged between 6.2 to 8.6 per cent in three varieties whereas; the farmers' practice recorded 15.4 to 17.2 per cent during both years. Almost same trend was recorded in the subsequent years.

Seed yield

The productivity of green gram under improved production technology ranged between 13.5 -16.72 q/ha with mean yields of 15.11 q/ha (Table 4). In comparison to farmer's practice, there was an increase in productivity of green gram under improved technologies. The increased grain yield with improved technologies was mainly because of line sowing use of nutrient management and weed management. The findings were in line with Singh and Meena (2011), Poonia and Pithia (2011), Meena *et al.*, (2012).

The maximum yield of green gram was recorded in IPM 02-03 which was significantly superior to SML668 in both the years. However, HUM16 recorded highest yield in comparison to farmers' practice. Thus, the local variety/farmers' practice may be replaced with high yielding varieties because of higher productivity.

Gap analysis

The technology gap ranged between 3.40 to 4.60 and 3.22 to 4.40 q/ha in 2016 and 2017, respectively. The observed technology gap was due to various constraints such as soil fertility, availability of low moisture content and climatic hazards etc. Hence, to reduce the yield gap location specific recommendations

for varieties, soil testing and timely sowing appears to be necessary. A value of 1.80 to 4.10 q/ha of extension gap was found in 2016 whereas it was 1.80 to 4.98 q/ha during 2017. There is a need to decrease this wider extension gap through latest techniques. These findings were similar to the findings of Jain (2016) and Kushwah *et al.*, (2016). The technology index showed the suitability of varieties at farmer's field. Lower technology values indicated that feasibility of variety among the farmers is more. The technology index ranged from 18.89 to 25.55 per cent. The finding was in accordance to finding of Sandhu and Dhaliwal (2016).

In conclusion the CFLD produces a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. This could be circumventing some of the constraints in the existing transfer of technology system in the district. The productivity gain under CFLD over existing practices of Green Gram cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of Green Gram in the district. This technology is suitable and acceptability to all the farmers group during *Kharif* and summer season. The findings of the study concluded that the yield of IPM 02-03 was significantly higher than other varieties with recommended package and practices of green gram. Thus, the farmer's practice variety may be replaced with high yielding varieties like IPM 02-03 and SML668 in Palamu district of Jharkhand.

It may be concluded that the frontline demonstrations conducted on greengram at the farmers' field revealed that the adoption of improved technologies significantly increased the yield as well as yield attributing

traits of the crop and also the net returns to the farmers. Hence, there is a need to disseminate the improved technologies among the farmers with effective extension methods like training and demonstrations. The farmers' should be encouraged to adopt the recommended package of practices for realizing higher returns.

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