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Performance of summer green gram [*Vigna radiata* (L.) Wilczek] in northern hill zone of Chhattisgarh, M.P

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Abstract
Green gram is an important pulse crop of summer season in northern hill zone of Chhattisgarh which is tribal belt of M.P. But the average productivity of crop is quite low due to various limiting factors including lack of awareness about improved production technology, use of Yellow Vein Mosaic Virus (YMV) susceptible varieties etc. The present study was conducted to assess the possibility of improvement in yield potential through use of YMV resistant high yielding varieties of green gram namely PDM - 139 and SML-668.

The varietal assessment trials were conducted by KVK, Umaria at 60 farmers field 0.25 ha each in different locations of Villages Tali, Sallaiya, Kherwa and Chandiya. The result of study showed average highest yield of variety SML- 668 (14.05 q/ha) followed by PDM 139 (12.99 q/ha) and HUM-1 (8.31 q/ha) in check plot. The highest average net profit of Rs. 47100 /ha was found under SML -668 where as it was only 41800 /ha under PDM- 139 and Rs 19483/ha from check plot of variety HUM -1. The cost benefit ratio was found 3.03, 2.80 and 1.87 respectively under varieties SML 668, PDM 139 and HUM - 1.

Keywords: Green gram, YMV, improved variety

Introduction
Green gram [*Vigna radiata* (L.) Wilczek] is also known as mung, golden gram, moong and is one of the most important pulse crop grown in almost all part of country over a wide range of agro-climatic conditions. Its seed contains high protein (28%) and is more palatable, nutritive, digestible and non flatulent than other pulses grown in world (Sahoo *et al*. 2003) [8], with 3.83 million ha cultivated area and 1.60 million tones production. India is the largest producer of green gram in world. The average productivity of green gram is very less (461 kg/ha) as compared to its genetic potential up to 1500 kg /ha. In Umaria district, approximately 1200 ha area is covered under summer green gram but the average productivity is very low (395kg/ha) due to use of YMV susceptible varieties along with poor agronomic practices i.e no seed treatment, poor plant population, late sowing, imbalance use of nutrient etc.

Legumes crop having unique interesting aspects of ability in building up their own nitrogen supply, having quick maturity, versatile nature in different agro climatic and soil situation and capable of providing crop cover for soil conservation. It is also helpful in improving soil fertility status of soil where paddy- wheat crop rotation is followed (Kumar and Pandey, 2018) [10].

Recently, many high yielding, early maturing and disease resistant varieties suitable for summer condition have been evolved which have to be evaluated for their suitability in different agro climatic regions.

Looking to the problem of the district a varietal assessment trail (OFT) has been conducted in different location during 2016-17 to 2018-19.

Methodology
Varietal assessment trials (OFT's) were conducted in Umaria district of MP in northern hill zone of Chhattisgarh under close supervision of KVK scientists. Total 60 trials were conducted under real farming situation in summer season during 2016 -17 to 2018-19 (consecutive year) at different villages Tali, Sallaiya, Chandiya and Kherwa under KVK operational area. The area under each trial was 0.25 ha, the soil was sandy loam texture with low water holing capacity, low to medium in organic content (0.03 to 0.052), low in available nitrogen (110.2 – 206.7), phosphorus (11.9-17.4), low to medium available potash (211.4 – 292 kg/ ha) and soil pH acidic to neutral 6.5 – 7.0.

The improved variety of green gram was used in trials (SML - 668, PDM -139) and compared with variety HUM -1as check plot. The seed treatment was done with *Tricoderma viridae* @10 gm/kg seed then it was inoculated by Rhizobium and PSB @10 gm/kg seed each before sowing. Balance dose of NPK 20:50:20 kg/ha has been applied through DAP as basal. Summer green gram was sown after paddy-wheat crop rotation, in summer (last week of March) and harvested in last week of June.

Harvesting and threshing operations were done manually. A 5m x 5m plot harvested in two locations in each assessment plot with other essential observation recorded. Average grain weight was taken at 10% moisture level. Similar procedure was adopted on farmers check plot and after that average plot yield was converted in to q/ ha yield. Before conducting assessment trial, training to farmers of respective villages was imparted with respective of technological interventions as per recommendation of agriculture university related with problem of farmers.

All other steps like site and farmer selection in problematic area, layout of trials, farmers participation were followed as per technical guidelines given by Vishwa Vidyalaya. Visit of farmers and extension functionaries were also organized at site to create awareness about assessed technology and obtaining farmers view about possible suggested problem solving technology which has been conducted. Yield data of all components has been collected and analyzed with vegetative and reproductive attributes, cost of cultivation, gross return, net return, harvest index and BC ratio etc.

Result and Discussion

Growth attributes

The data in Table -1 revealed about average growth parameters of green gram varieties. Plant height (cm) and no. of branches / plants was found maximum in assessed variety SML -668 (50.53 cm and 4.5 / plant) followed by PDM -139 (48.40 cm and 4.2 / plant) and under check plot HUM -1(44.8 cm and 3.6 / plant). The difference in plant height and no. of branches / plant was obtained due to their genetic differences in growth habits. Similar findings were also reported by Kartik, *et al*. (2020) [4] and Patel *et al*. (2016 b) [6].

Yield attributes and yield

It is evident from the result indicated in Table -1 that there were differences in no. of pods / plant and yield of green gram in all the varieties. The average highest no. of pods / plants was recorded under variety SML-668 (60.50) followed by PDM -139 (56.60) and HUM- 1 (39.1). The difference in yield attribute character among variety might be due to different genetic constitution of the variety. The present findings are supported by Gangwar *et al*. (2013) [1], Gorade *et al*. (2014) [2], Jadhav *et al*. (2014) [3], Patel *et al*. (2016 b) [6].

A difference in seed yield of various green gram varieties was also recorded. The variety SML - 668 showed highest average seed yield of 14.05 q/ha when compared to PDM-139 (12.99) and HUM -1 (8.31 q/ha). Magnitude of average increase in green gram seed yield recorded by SML - 668 (69.38%) followed by PDM 139(56%) over HUM -1. This might be due to difference in its genetic built up. Above finding are in accordance with Rathod and Gawande (2012) [7], Patel *et al*. (2013 b) [5] and Kartik *et al*. (2020) [4].

Economics

Economic indicators including gross expenditure, gross return, net return and BC ratio of assessment trials were also calculated and presented in Table -2. Data clearly revealed a wide variation in gross return, net profit, BC ratio with the use of different varieties. Among different varieties, SML-668 gave maximum gross return (Rs. 70283 / ha), net profit (Rs. 47100/ ha) and BC ratio (3.03), where as lowest gross return (Rs. 41566/ ha), net return (Rs.19483/ha) and BC ratio (1.83) with variety HUM-1 was recorded. This might be due to highest grain yield recorded with SML -668 variety when compared to rest. The result confirmed the findings of Shelke *et al*. (2012) [8], Patel *et al*. (2013 b) [5] and Jadhav *et al*. (2014) [3].

Table 1: Effect of Green gram varieties on growth and yield parameter

Year	No of OFT	Area(Ha)	No. of pods / plant			Plant height (cm.)			No. of branches /plant			Biological yield (q/ha)			Harvest index (%)		
			HUM 1 (V 1)	PDM 139 (V2)	SML 668 (V 3)	V 1	V 2	V 3	V 1	V 2	V 3	V 1	V 2	V 3	V 1	V 2	V 3
2016-17	25	0.25	41.16	56.3	62.2	44.6	48.5	52.1	3.5	4	4.6	24.29	37.18	39.94	36.64	36.9	37.18
2017-18	25	0.25	39.2	51.5	59.3	46.2	49.2	50.3	3.7	4.2	4.4	23.4	35.7	38.53	36.8	37.1	37.32
2018-19	10	0.25	37.0	52.3	60.0	43.8	47.5	49.2	3.6	4.4	4.5	20.5	32.6	34.60	36.1	36.8	37.39
	60	0.75	39.12	53.36	60.5	44.86	48.4	50.53	3.6	4.2	4.5	22.73	35.16	37.69	36.51	36.93	37.29

Table 2: Effect of green gram varieties on yield and economics

Year	Yield (q/ha)			% increase overV1		Goss Expenditure (Rs/ha.)			Gross Return(Rs/ha.)			Net Return (Rs/ha.)			BC Ratio		
	HUM- 1 (V1)	PDM 139 (V2)	SML 668 (V 3)	V 2	V 3	V 1	V 2	V 3	V 1	V 2	V 3	V 1	V 2	V 3	V 1	V 2	V 3
2016-17	8.9	13.72	14.85	54.1	66.8	21750	22750	22750	44500	68600	74250	22750	45850	51500	2.04	3.01	3.26
2017-18	8.63	13.25	14.38	53.5	66.62	22000	23000	23000	43150	66250	71900	21150	43250	48900	1.95	2.88	3.12
2018-19	7.41	12.02	12.94	62.2	74.6	22500	23800	23800	37050	60100	64700	14550	36300	40900	1.64	2.52	2.71
	8.31	12.99	14.05	56.6	69.38	22083	23183	23183	41566	64983	70283	19483	41800	47100	1.87	2.8	3.03

Conclusion

On the basis of results obtained it can be concluded that variety SML - 668 is a suitable variety of summer green gram for the Umaria district in northern hill of Chhattisgarh M.P over PDM -139 and HUM-1 for getting more profitable yield.

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