International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

Response of Greengram Varieties to Different Fertilizer Grades

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Abstract: ***The greengram crop was sown with nine treatment combinations of three different varieties and three levels of fertilizers. Application of 30:60:00 kg NPK ha^{-1} (F3) recorded significantly higher growth and yield contributing characters followed by application of 25:50:00 (F2) and 20:40:00 (F1). BM-2003-02 (V2) recorded significantly higher growth contributing characters followed by BPMR-145 (V3) and BM-2002-01 (V1). The variety BM-2003-02 (V2) recorded significantly higher yield contributing characters followed by BM-2002-01 (V1).***

Keywords: greengram varieties, fertilizer grades, growth and yield response

1. Introduction

Pulses are the major sources of dietary protein in the vegetarian diet in our country. Besides being a rich source of protein, they maintain soil fertility through biological nitrogen fixation in soil and thus play a vital role in sustainable agriculture. Greengram (*Vigna radiata*) is one of the most important pulse crops. According to Vavilov (1926) greengram is a native of India and central Asia. It is grown in these areas since pre-historic period. It is grown in almost all parts of the country. Greengram is primarily a crop of rainy season. Second forthnight June to Middle of August is the most suitable growing period where tere is good sunshine with adequate moisture. It is consumed in different ways as dal, halwa, snack and so many other preparations. Ascorbic acid (Vitamin C) is synthesized in sprouted seeds of greengram with increment in riboflavin and thiamine. It is also used as green manure crop. Being a short duration crop it also provides an excellent green fodder to the animals. It fits well in various multiple and intercropping systems. After picking of pods, greengram plants may be used as green fodder or can be incorporated as green manure.

Greengram (*Vigna radiata*) gives low seed yield and poor growth performance mainly due to poor management and low soil fertility. Nitrogen due to leaching and volatization and phosphorus due to fixation may not be available adequately at flowering and pod formation stages of crop and result in shading of flowers and pods. The crop needs more nitrogen at the reproductive phase, and the nutrient uptake after flowering either becomes slow or stops due to inactivation of roots. The optimum supply of nitrogen and phosphorus significantly influenced the growth and yield of greengram.

2. Materials and Methods

The field investigation was conducted at department of Agronomy, college of Agriculture, Latur during 2011-12. The experimental field was leveled and fairly drained. The experiments soil was low in Nitrogen, medium in available phosporous and high in available potash. The soil was clay in texture with moderate moisture holding capacity which was good for normal crop growth. The experiment was laid out in Factorial Randomized Block design with three replications. The green gram crop was sown with nine treatment combinations of three different varieties and three graded levels of fertilizers. the varieties wereV_1-BM-2002-01, V_2- BM-2003-02 and BPMR-145 and graded levels were F_1-20:40:00, F_2-25:50:00 and F_3-30:60:00 kg NPK ha^{-1}. The gross and net plot size of each experimental unit was 5.4 m x 4.2 m and 4.8 m x 3.6 m respectively. The crop was sown on 7th july 2011 by dibbling and seeds at 30 cm x 10 cm distance. The recommended cultural practices and plant protection measures were taken.

3. Result and Discussion

3.1 Effect of fertilizers grades

3.1.1 Growth and development

It was observed from the data that the height was found to be increased progressively at every stage of crop growth. The increase in height was rapid during 15-45 DAS and thereafter it increases marginally till maturity. The effect of different grades of fertilizers on plant height was found to be significant and the higher plant height was observed by the application of 30:60:00 kg NPK ha^{-1} (53.96 cm) as compared to other grades of fertilizers. Similar result was obtained by Uddin *et al.* (2009) and Chowdhury (2000).

From the data on mean number of branches per plant revealed that the number of branches increased gradually up to harvest. The rate of increase was high up to 45 days, moderate from 45 DAS to at harvest. Mean number of branches were not influenced significantly by various treatments under study. The application of 30:60:00 kg NPK ha^{-1} (3.54) was found higher values of mean number of branches followed by 25:50:00 kg NPK ha^{-1} (3.27) and lowest value of mean number of branches was observed by fertilizer grade 20:40:00 kg NPK ha^{-1} (3.11).

It was observed from the data on mean number of nodules per plant that the rate of increasing in number of nodules per plant was fast up to 30 days, slowed between 30-45 days and reduced from 45 days to maturity. The application of 30:60:00 kg NPK ha^{-1} recorded higher mean number of nodules per plant (31.12) followed by the application of 25:50:00 kg NPK ha^{-1} (29.89) and 20:40:00 kg NPK ha^{-1}

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(27.83). Similar result was reported by Ganeshamurthy *et al.*, (2005) and Singh *et al.* (2005).

It was observed from the data on mean number of pods per plant were increased progressively from 45 days onwards till maturity. The application of 30:60:00 kg NPK ha^{-1} was recorded higher mean number of pods per plant (10.08) followed by the application of 25:50:00 kg NPK ha^{-1} (9.48) and 20:40:00 kg NPK ha^{-1} (8.19). Same result was reported by Sadeghipour *et al.*, (2010), Uddin *et al*,. (2009), Dixit *et al.* (2008) and Karwara *et al.* (2006).

3.1.2 Yield and yield attributes

The mean pod yield (g) per plant was significantly influenced by the various treatments. The application of 30:60:00 kg NPK ha^{-1} recorded significantly higher dry pod yield per plant (7.60 g) followed by the application of 25:50:00 kg NPK ha^{-1} (7.12 g) and 20:40:00 kg NPK ha^{-1} (5.81).

The effect of different grades of fertilizers on mean seed yield (g plant^{-1}) was found to be significant. The application of 30:60:00 kg NPK ha^{-1} recorded significantly higher mean seed yield (4.61 g plant^{-1}) followed by the application of 30:60:00 kg NPK ha^{-1} (4.27 g plant^{-1}) and 30:60:00 kg NPK ha^{-1} (3.45 g plant^{-1}).

Table 1: An extract of relevant information showing effect of different treatments on growth and yield attributes

Sr. No.	*Particulars*	*Treatments*					
		F_1	*F_2*	*F_3*	*V_1*	*V_2*	*V_3*
1.	Mean plant height at harvest (cm)	44.71	49.67	53.96	48.24	47.22	52.87
2.	Leaf area plant^{-1} at harvest(dm^2)	2.50	2.23	4.71	3.59	3.61	3.23
3.	Number of branches plant^{-1} at harvest	3.11	3.27	3.54	3.09	3.02	3.98
4.	Number of nodules plant^{-1} at 45 DAS	27.83	29.89	31.12	29.34	29.97	29.53
5.	Number of pods plant^{-1} at harvest	8.19	9.48	10.08	8.81	9.42	7.89
6.	Weight of pods plant^{-1} (g)	5.81	7.12	7.60	6.96	7.41	6.16
7.	Weight of seeds plant^{-1} (g)	3.45	4.27	4.61	4.20	4.43	3.72
8.	Test weight (g)	39.92	40.00	40.12	39.46	40.25	40.33
9.	Seed yield (kg ha^{-1})	806	933	1008	893	995	858
10.	Harvest index	27.11	28.08	27.98	26.80	27.47	28.43

The effect of different grades of fertilizers on mean number of seeds per plant was found to be significant. The application of 30:60:00 kg NPK ha^{-1} recorded significantly higher mean number of seed per plant (130.67). Similar observations were recorded by Ahmad *et al.* (2003).

The effect of different grades of fertilizers was not significant on mean test weight (1000 seeds). But the highest test weight was observed by the application of 30:60:00 kg NPK ha^{-1} (40.12 g) which was followed by the application of 25:50:00 kg NPK ha^{-1} (40) and 20460:00 kg NPK ha^{-1} (39.92 g). Similar result was reported by Sadeghipour *et al.* (2010), Mitra *et al.* (2006), Karwasra *et al.* (2006), Singh and Tripathi (2005) and Choudhary and Singh (2004).

Data on mean seed yield kg ha^{-1} was significantly influenced by different grades of fertilizers. The application of 30:60:00 kg NPK ha^{-1} recorded significantly higher mean seed yield kg ha^{-1} (1008 kg ha^{-1}) followed by the application of 25:50:00 kg NPK ha^{-1} (933 kg ha^{-1}) and 20:40:00 kg NPK ha^{-1} (806 kg ha^{-1}). Same result was reported by Sadeghipour *et al.* (2010), Singh (2008), Chesti *et al.* (2007), Siag and Prakash (2007), Mitra *et al.* (2006) and Ganeshamurthy *et al.* (2005).

Data on biological yield (kg ha^{-1}) was significantly influenced by different grades of fertilizers. The application of 30:60:00 kg NPK ha^{-1} was recorded significantly higher mean biological yield kg ha^{-1} (3674 kg ha^{-1}). Same result was reported by Patel *et al.* (2008), Tickoo *et al.* (2006) and Khan *et al.* (2002).

Data on harvest index showed that there was no any significant effect by the application of different grades of fertilizers on harvest index. The highest harvest index was observed (28.08) by the application of 25:50:00 kg NPK ha^{-1} but mere differences between the harvest index was nearly same at all the treatments. Same result was reported by Singh *et al.* (2000).

3.2 Varieties

3.2.1 Growth and development

The higher plant height was observed by the variety BM-2003-02 at all the growth stages which were followed by BPMR-145 and BM-2002-01. Similar result was reported by Uddin *et al.*, (2009), Dost Muhammad *et al.* (2004). The variety BM-2003-02 recorded highest mean number of pods per plant (9.42) followed by the variety BM-2002-01 (9.24) and variety BPMR-145 (9.04). Similar result was reported by Uddin *et al.* (2009), Reddy (1986), Singh *et al.* (2004) and Dost Muhammad *et al.* (2004).

3.2.2 Yield and yield attributes

The mean pod yield (g) per plant was significantly influenced by the various treatments and it was revealed that the variety BM-2003-02 recorded highest mean pod yield (g) per plant (7.41 g) followed by the variety BM-2002-01 (6.96 g) and variety BPMR-145 (6.16 g). The effect of varieties on mean seed yield (g plant^{-1}) was found to be significant. The variety BM-2003-02 recorded highest mean seed yield (4.43 g) followed by the variety BM-2002-01 (4.20 g) and variety BPMR-145 (3.72 g).

The mean test weight was not significantly affected by different varieties of green gram. The highest test weight was obtained by the variety BPMR-145 (40.33 g) followed by the variety BM-2003-02 (40.25) and the variety BM-2002-01 (39.46). Similar result was reported by Uddin *et al.* (2009) and Yadav *et al.* (2007).

The data on mean seed yield kg ha^{-1}, straw yield kg ha^{-1} and biological yield kg ha^{-1} it was showed that the variety BM-2003-02 recorded significantly higher mean seed yield (995 kg ha^{-1}), straw yield (2590 kg ha^{-1}) and biological yield (3622 kg ha^{-1}) followed by the variety BM-2002-01 (893,

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2436 and 3332 kg ha^{-1} respectively) and variety BPMR-145 (858, 2184 and 3017 kg ha^{-1} respectively). Similar result was reported by Singh *et al.* (2009) and Khan *et al.* (2006).

Data on harvest index showed that there was no any significant effect by the application of different grades of fertilizers on harvest index. The highest harvest index was observed (28.43) by the variety BPMR-145 but differences between the harvest index was nearly more and less same at all the treatments.

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