



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; 6(4): 1064-1066
Received: 09-05-2017
Accepted: 10-06-2017

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Effect of sources of nutrient on growth and yield of blackgram (*Vigna mungo* L.) Varieties in NEPZ of India

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Abstract

A field experiment was conducted during *Zaid* season of 2015-16 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad. The experiment consisted of two different variety of blackgram (Type-9 and Sekhar-2) and five sources of nutrient (100% Organic, 100% Inorganic, 75% Organic + 25% Inorganic, 50% Organic + 50% Inorganic and 25% Organic + 75% Inorganic on the basis of N & K), which was laid out in randomized block design (RBD) with three replications. The result revealed that blackgram variety Sekhar-2 with 75% Organic (22.5 q/ha FYM + 125.03 kg/ha BM) + 25% Inorganic (27.75 kg/ha DAP + 6.25 kg/ha MOP) on the basis of N & K, recorded maximum dry weight (12.49 g), highest number of pods/plant (24.55), number of seeds/pod (7.07) and test weight (42.19 g) which attributed in obtaining highest grain yield (872.96 kg/ha), stover yield (2511.11 kg/ha) and harvest index (33.60%).

Keywords: Summer blackgram, variety, Integrated sources of nutrient, Organic, Farm Yard Manure and Bone Meal

Introduction

Pulses are commonly known as food legumes with are secondary to cereals in production and consumption in India. The United Nations, declared 2016 as "International Year of Pulses" (IYP) to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed at food security and nutrition. Pulses are an integrated part to many diets across the globe and they have great potential to improve human health, conserve our soil, protect the environment and contribute to global food security. Blackgram is scientifically known as *Vigna mungo* (L.) and commonly known as urd in India. It is a tropical leguminous plant. Organic manures act not only as a source of nutrients and organic matter, but also increase size, biodiversity and activity of the microbial population in soil, influence structure, nutrients get turnover and many other changes related to physical, chemical and biological parameters of the soil (Albiach *et al.*, 2000) ^[1]. The basic concept of integrated nutrient management is the supply of the required plant nutrients for sustaining the desired crop productivity with minimum deleterious effect on soil health environment. INM, which entails the maintenance/adjustment of soil fertility to an optimum level for crop productivity to obtain the maximum benefit from all possible sources of plant nutrients organic as well as inorganic in an integrated manner (Aulakh and Grant 2008) ^[2].

The wide variations in yield attributing parameters persisted among the varieties obtained from the different parental origin. Attainments of particularly higher or lower yield attributing character among varieties are the genetically controlled phenomenon. Such variations in yield attributes among the blackgram genotypes have also been observed by several research workers, (Bhowaland and Bhowmik 2014) ^[3]. Therefore, keeping the above facts in view, the present investigation was undertaken to examine the impact of sources of nutrient on productivity and sustainability of blackgram varieties.

Materials and Methods

The experiment was carried out during *Zaid* season of 2015-16 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.), which is located at 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city.

The soil was sandy loam with pH 7.4, organic carbon 0.43%, available phosphorus 15.60 kg/ha, potassium 345.22 kg/ha and Zn status of 0.84 ppm. The treatments comprised of two different varieties (Type 9 and Shekhar- 2) and five sources of nutrient (100% Organic, 100% Inorganic, 75% Organic + 25% Inorganic, 50% Organic + 50% Inorganic and 25% Organic

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+ 75% Inorganic on the basis of N & K) which was laid out in Randomised Block Design (RBD) consisting of ten treatment combinations with three replications; plot size was 3 x 3 m for crop seed rate is 25 kg ha⁻¹ (*Vigna mungo* L.). Blackgram was sown on 12th April 2016 and the recommended dose was 20 kg N + 50 kg P₂O₅ + 15 kg K₂O/ha. Full dose of Nitrogen, phosphorus and potassium applied as diammonium phosphate and muriate of potash for inorganic sources of nutrient and FYM + Bone Meal for organic sources of nutrient on the basis of N & K was applied at the time of sowing of blackgram. The other usual common packages of practices were followed time to time and periodical growth observations were recorded at an interval of 15 days. The crop was harvested on 9th June. At harvest, grain and straw yield of crop were recorded.

Results and Discussion

Growth Parameter

Data presented in (Table- 1) indicated that treatment T₈ (Var. Sekhar-2 + 75% Organic + 25% Inorganic) was significantly influenced on dry weight (12.49g) and it was 21.13% higher compared to lowest dry weight (9.85g) was observed in treatment 5 (Var. Type 9 + 25% Organic + 75% Inorganic) sources. Favorable effect on dry weight is mainly due to the fact that balanced and combined use of various plant nutrient sources *viz.*, 75% Organic + 25% Inorganic results in proper absorption, translocation and assimilation of those nutrients, ultimately increasing the dry-matter accumulation and nutrient contents of plant and thus showing more uptake of elemental nutrients. Beneficial effects of integration of chemical fertilizers along with organic manures were also noticed by Maruthi *et al.* (2014) [6] in soyabean crop.

Table 1: Effect of sources of nutrient on growth parameter, yield attributes, yields and harvest index of blackgram varieties at harvest stage.

Treatments	Dry weight (g)	Number of pods plant ⁻¹	Number of seeds pod ⁻¹	Test weight (g)	Grain yield (kg ha ⁻¹)	Stover yield (kg ha ⁻¹)	Harvest Index (%)
1. var. Type 9 + 100% Organic (FYM + BM)	10.66	18.33	5.60	37.28	726.30	1497.78	32.65
2. var. Type 9 + 100% Inorganic (DAP + MOP)	11.78	20.55	5.87	38.52	751.48	1724.81	30.36
3. var. Type 9 + 75% Organic + 25% Inorganic	12.23	21.56	6.33	41.05	794.44	1911.11	29.38
4. var. Type 9 + 50% Organic + 50% Inorganic	11.89	20.33	6.07	40.05	773.70	1802.22	30.04
5. var. Type 9 + 25% Organic + 75% Inorganic	9.85	18.89	5.40	36.20	722.59	1428.15	33.60
6. var. Sekhar-2 + 100% Organic (FYM + BM)	11.28	22.11	6.67	39.22	801.11	2174.81	26.92
7. var. Sekhar-2 + 100% Inorganic (DAP + MOP)	12.07	21.78	6.73	39.68	848.52	2410.74	26.03
8. var. Sekhar-2 + 75% Organic + 25% Inorganic	12.49	24.55	7.07	42.19	872.96	2511.11	25.82
9. var. Sekhar-2 + 50% Organic + 50% Inorganic	12.30	22.11	6.87	40.92	852.22	2482.96	25.56
10. var. Sekhar-2 + 25% Organic + 75% Inorganic	10.08	21.56	6.53	38.24	799.63	2119.26	27.39
F test	S	NS	S	S	S	S	S
SEm (±)	0.06	1.16	0.24	0.39	10.54	34.51	0.38
CD (P = 0.05)	0.18	-	0.71	1.16	31.31	102.54	1.12

Yield attributes

The data revealed that maximum number of pods plant⁻¹ (24.55) was recorded in treatment T₈ (Shekhar-2 + 75% Organic + 25% Inorganic) though non-significant. Significantly higher seeds pods⁻¹ (7.07) was recorded in treatment T₈ (Shekhar-2+75% Organic+25% Inorganic), however treatment T₆ (Shekhar-2 + 100% Organic), T₇ (Shekhar-2 + 100% Inorganic), T₉ (Shekhar-2 + 50% Organic and Inorganic), T₁₀ (Shekhar-2 + 25% Organic + 75% Inorganic) was found to be statistically at par with treatment T₈ (Shekhar-2+75%Organic+25% Inorganic) and (table- 1) show same treatment was also higher in test weight (42.19 g) however, treatment T₃ (Type 9 + 75%Organic + 25% Inorganic) was found to be statistically at par with T₈ (Shekhar-2 + 75%Organic + 25% Inorganic).

This may be attributed to availability of sufficient amount of nutrients throughout growth period resulting in better uptake and superior yield attributes. These results are similar to those reported by Shivakumar and Ahlawat (2008) [8]. According to Kumar *et al.* (2009) [5] organic manures along with inorganic fertilizers attribute to higher availability and adsorption of nutrients in french bean.

Number of pods plant⁻¹ of crop was increased significantly and progressively with the increasing percentage of organic manure in a combination of inorganic source of nutrient. This result is similar to those reported by Meena *et al.* (2016) [7] in greengram.

The wide variations in yield attributing parameters persisted among the both varieties obtained from the different parental origin. Attainments of particularly higher or lower yield

attributing character among both varieties are the genetically controlled phenomenon. Bhowaland and Bhowmik (2014) [3] reported similar manifestation in summer mungbean, among the blackgram genotypes have also been observed by several research workers.

Yields and Harvest Index

Highest grain yield (872.96 kg/ha) was recorded in treatment T₈ (Shekhar-2 + 75%Organic + 25% Inorganic) however, treatment T₉ (Shekhar-2 + 50% Organic and Inorganic) and T₇ (Shekhar-2 + 100% Inorganic) was found to be statistically at par with treatment T₈ (Shekhar-2+75%Organic + 25% Inorganic). Highest stover yield (2511.11 kg/ha) was recorded in treatment T₈ (Shekhar-2 + 75% Organic + 25% Inorganic) However, treatment T₉ (Shekhar-2 + 50% Organic and 50% Inorganic) and T₇ (Shekhar-2 + 100% Inorganic) was found to be statistically at par with treatment T₈ (Shekhar-2 + 75%Organic+25% Inorganic). Highest harvest index (33.60%) was recorded in treatment T₅ (TYPE 9 + 25% Organic + 75% Inorganic) However, treatment T₁ (TYPE 9 + 100% organic) was found statistically at par with treatment T₅ (TYPE 9 + 25% Organic + 75% Inorganic).

Integrated nutrient management significantly influenced on yield parameters like number of pods per plant, number of seeds per pod. Integrated nutrient management system involving organics like FYM, and chemical fertilizers is a better way to achieve higher seed yield and yield attributes. The growth and yield of crop plants are inter dependent and are determined by the presence of sufficient quantities of available form of nutrients in soil for plant uptake is reported

by Gable *et al.* (2008) ^[4] in maize-chickpea cropping system. Organic matter is a source of energy for soil micro-flora which brings transformation of inorganic nutrients held in soil in a form that is readily utilized by growing plants. The additional beneficial effects of FYM for improvement in soil physical properties.

Shekhar-2 variety is more resistant to YMV compare to Type-9. It gives better dry matter accumulation in vegetative growth phase and superior yield attributing characters which ultimately responded in higher seed and stover production compare to Type-9. The increased harvest index in type-9 might be owing to production of higher grain over its straw. Different blackgram genotypes exhibited great variations in the productivity parameters.

It is concluded that for obtaining higher yield, blackgram variety Sekhar- 2 is to be grown during *zaid* season with an integrated source of nutrients (on basis of N & K) where applied 75% through organic (22.5 q/ha FYM + 125.03 kg/ha BM) and 25% through inorganic (27.77 kg/ha DAP + 6.25 kg/ha MOP).

Acknowledgements

The authors are grateful to the Department of Agronomy, Naini Agricultural Institute for taking their keep interest and encouragement to carry out the research work at Sam Higginbottom University of Agriculture, Technology and Sciences.

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