Internat. J. agric. Sci. Vol.3 No.1 January 2007 : 179-180

Effect of nitrogen levels and rhizobium application methods on yield attributes, yield and economics of black gram (*Vigna mungo* L.)

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ABSTRACT
A field experiment was conducted during kharif season of 2005, at crop research form, Department of Agronomy, Allahabad Agricultural Institute – Deemed University, Allahabad, with Blackgram (*Vigna mungo L.*) var. PU-19. The treatments comprised of four levels of nitrogen (10, 20, 30 and 40 kg ha^{-1}) and three methods of application of Rhizobium (Uninoculated, soil application and seed treatment) in factorial randomized block design (4x3), with 12 treatment combinations, each replicated three times. Among the treatments, application of nitrogen @ 20 kg ha^{-1} and seed treatment with Rhizobium significantly increased the plant height, number of leaves, dry weight of plant, number of nodules, number of pods, number of grains per pod, test weight, grain yield and stover yield. This treatment combination was found superior to all other treatments in respect of growth, nodulation, yield, economic returns and benefit cost ratio.

Key words : Nitrogen, Rhizobium, Blackgram, Yield.

INTRODUCTION

Contribution of pulses to Indian agriculture and daily life has been tremendous besides being one of the important constituents of our diet, Black gram is the third important pulses crop in India. Covering on area of 2.56 million hectares. With the share of 12 per cent for the total acreage, but constitutes only 8 per cent of the total pulse production of the country. This is due to the fact that average productivity of Blackgram is as low as 467 kg/ha in India while the average productivity of other legumes were 778/ ha. The cause for such low yield are due to some of physiological, biochemical as well as certain inherent factors associated with the crop apart from the genetic constitution. The physiological factors such as inefficient partitioning of assimilates, poor pod setting, excessive flower abscission and lack of nutrients during the critical stages of crop growth were found to be some of the yield barriers of Black gram (Alberta and Bower, 1983).

Nutrients plays a privotal role in increasing the seed yield in pulses. Nitrogen and Rhizobium application was found to be as good as soil application (Subramanian and Palaniappan, 1981). Mitra *et al*. (1988). Opioned that nitrogen is the major limiting factor for yield in Blackgram. Keeping on the above points in view, the study was conducted to develop a suitable combination of Nitrogen and rhizobium for improving the yield of the black gram.

MATERIALS AND METHODS

A field experiment was carried during Kharif 2005 season, in the department of Agronomy, Allahabad Agricultural Institute –Deemed University, Allahabad using variety PU-19. The treatments comprised of T_1 Nitrogen 10 kgha^{-1} +uninoculated, T_2-Nitrogen 10 kgha^{-1} + rhizobium soil application, T_3-Nitrogen 10 kgha^{-1} + Rhizobium seed treatment, T_4-Nitrogen 20 kgha^{-1} + uninoculated, T_5-Nitrogen 20 kgha^{-1} +Rhizobium soil application, T_6-Nitrogen 20 kgha^{-1} + Rhizobium seed treatment , T_7-Nitrogen 30 kgha^{-1} + uninoculated, T_8-Nitrogen 30 kgha^{-1} + Rhizobium soil application T_9-Nitrogen 30 kgha^{-1} + Rhizobium seed treatment, T_{10}-Nitrogen 40 kgha^{-1} +Uninoculated, T_{11}-Nitrogen 40 kgha^{-1} +Rhizobium soil application, T_{12}-Nitrogen 40 kgha^{-1}+Rhizobium seed treatment. The soil of experimental site was sandy loam with a pH. 7.8, organic carbon 0.4, low in available nitrogen (212 kg/ha) medium in available phosphoures (16 kg/ha) and potassium (246.2 kg/ha) The experiment was laid out in factorial randomized block design with 3 replication. PU-19 Blackgram was sown at a spacing of 30 cmx 10cm. The treatments were imposed as per schedule. The recommended inorganic fertilizer of 50 kg/ha P and 20 kg/ha. K were applied to all the plots. Plant height, number of braches/plant, number of nodules/ plant and dry weight/plant, were recorded at different interval. The number of pod per plant was counted from five plants and mean arrived.

RESULTS AND DISCUSSION

Yield attributes and yield:

The maximum number of pods (32.33) were recorded with T_6 (Nitrogen 20 kgha^{-1} + Rhizobium seed treatment) followed by T_5 (Nitrogen 20 kgha^{-1} + Rhizobium soil application). T_6 recorded significant increase in pods/plant, which was significantly superior to other treatments and statistically at par with T_5 and T_4, respectively. The maximum number of seeds/pod was recorded with T_6 followed by T_5. Which is significantly superior to all the treatments. The higher value of test weight was found in T_6 followed by T_5. Similar results were recorded by Singh and Shriwastava (1991).

Plant dry weight and no of nodules /plant:

T_6 produced more number of nodules/plant followed by T_5, However higher plant dry weight was observed in T_6 followed by T_5 and T_4, respectively. Nitrogen and Rhizobium application increased the no. of nodules/plant and dry matter production. This result corroborated with Raju and Verma (1993) and Mand and Chahal (1987).

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