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Effect of *Rhizobium* seed inoculation, nitrogen and phosphorus on growth, nodulation, flowering and seed yield of cowpea cv. PUSA PHALGUNI (*Vigna unguiculata* Walp)

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ABSTRACT

An experiment was condcted in randomized block design at Agricultural Experiment Station, N.A.U, Paria, Dist-Valsad (Gujarat) during summer season of 2005 to find out suitable dose of nitrogen, phosphorus with and without *Rhizobium* inoculation in cowpea cv. PUSA PHALGUNI. On the basis of results it can be concluded that 20 kg N + 40kg P_2O_5 / ha along with *Rhizobium* seed inoculation gave significantly higher growth, maximum nodulation and seed yield of cowpea cv. PUSA PHALGUNI. Earliness in flowering was observed with *Rhizobium* inoculation with 10 kg/ha N and higher level of phosphorus (40 kg/ha).

Key words : Cowpea, *Rhizobium* inoculation, Nodulation, Seed yield.

INTRODUCTION

Cowpea (*Vigna unguiculata* Walp) is one of the most important legume vegetable crop grown extensively for its long tender pods as well as seeds as a pulse throughout India. The productivity and production of seed crop is low, due to lack of proper management practices. Among which proper nutrient management (INM) is one of the major factor. Nitrogen fixing bacteria in legumes belonging genus *Rhizobium* not only aids in nitrogen fixation but also produces growth substances like auxins and as such reduces the requirement of nitrogenous and phosphoric fertilizers (Mehta *et al.*,1973). Owing to the energy and as cost intensive manufacture of chemical fertilizers, use of microbial inoculants to supplement a part of nitrogen requirement has attained immerse importance. Keeping in view the above, a field experiment was conducted to find out the effect of *Rhizobium* seed inoculation, nitrogen and phosphorus on growth, nodulation and seed yield of cowpea.

MATERIALS AND METHODS

A field experiment was carried out in summer 2005 at Agricultural Experiment Station, N.A.U, Paria, Dist-Valsad (Gujarat) to find out effect of *Rhizobium* seed inoculation, nitrogen and phosphorus on growth, flowering, nodulation and seed yield of cowpea cv. PUSA PHALGUNI. The soil of experimental site was medium black and clayey in nature having pH 8.15,E.C. 0.17 dSm^{-1}, available nitrogen 235.2kg/ha and available P_2O_5 41.65 kg/ha. The treatments consisted of three levels of nitrogen *i.e.*0,10 and 20 kg/ha, three levels of phosphorus *i.e.* 0,20 and 40 kg/ha and with and without *Rhizobium* seed inoculation. Thus eighteen treatment combinations were replicated thrice in randomized block design with factorial concept in 4.0 x 3.6 m^2 plots with spacing of 45cm x 15cm. Whole quantity of phosphorus and half dose of nitrogen were applied according to treatment before sowing. While, remaining half quantity of nitrogen was applied 30 days after sowing. *Rhizobium* culture was applied to seed by slurry method before sowing and seeds were dried in shade. At maturity, the crop was harvested, threshed in backyard and seeds were collected. The data on growth, nodulation at 45 DAS, flowering and seed yield were recorded for statistical interpretation.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarised under following heads:

Growth parameters :

Plant height and number of branches were not affected significantly due to *Rhizobium* seed inoculation treatment (Table 1). However, maximum plant height was recorded in treated seed. On the contrary number of nodules per plant significantly differed by *Rhizobium* treatment and higher number was noted in treated seed plot. It may be due to the fact that *Rhizobium* inoculation increased nitrogenese activity and synthesis of growth promoting substance like IAA which takes active part in nodulation process. These findings are in conformity with Mishra (1999) and Swaroop *et al.* (2001).

Nitrogen levels significantly affected plant height, number of branches and number of nodules per plant (Table 1). Higher level of nitrogen (20 kg/ha) had higher value of all growth parameters than lower level of nitrogen (10 kg/ha). It might be due to that the nitrogen is the

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