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RESEARCH ARTICLE

EFFECT OF MICROBIAL INOCULANTS ON BIOMETRICAL TRAITS OF BLACK GRAM (*VIGNA MUNGO* L. HEPPER)

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ABSTRACT

Agriculture is the most important sector of economy and employment in India. Today an increasing number of farmers and agriculturists are turning to the use of bio fertilizers to enhance the crop production as these are gentler on the soil as compared with the chemical fertilizers. Soil microorganisms play an important role in soil processes that determine plant productivity. In the present study, used microorganisms as bio fertilizer were Rhizobium and Phosphobacteria in which rhizobium fix atmospheric nitrogen whereas phosphobacteria solubilizes the insoluble phosphorous and converts it in soluble form to crop plants. Therefore, both activities are important for the growth and development of crop plants to enhance the crop yield. In this experiment used crop plant material was Black gram (*Vignamungo* L.Hepper) to observe certain morphological parameters such as germination percentage, plant height, fresh and dry weight of plants, number of pods per plant and seed yield per plant. The maximum values of all experimental parameters were reported with combination treatment of Rhizobium and Phosphobacteria. Therefore, it was concluded that the combination of beneficial microorganisms such as Rhizobium and Phosphobacteria might be an important factor to enhance the crop yield and also for achieving a sustainable agriculture in the future.

Key words: Bio-fertilizers, Black gram, morphological traits.

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INTRODUCTION

Bio-fertilizers help the plants indirectly through better nitrogen fixation or improving the nutrient availability in the soil thereby enhancing crop yield by natural method. Today an increasing number of farmers and agriculturists are turning to the use of biofertilizers as these are gentler on the soil as compared with the chemical fertilizers. As the sustainable crop production depends on good soil health that is the optimum combination of organic and inorganic components of soil, biofertilizers help to restore the natural habitat of the soil, transform complicated organic matter into basic compounds and thus helping the plants to grow and nurture in a natural way. Soil microorganisms play an important role in soil processes that. determine plant productivity. There are many useful soil microorganisms which can used as bio fertilizer for many crop plants like Rhizobium, Azotobacter, Azospirillum, Phosphatesolubilizers (Phosphobacteria), Blue green algae, Azolla and Mycorrhiza. It includes mainly nitrogen fixing, phosphate solubilizing and plant growth promoting microorganisms (Goel *et al*., 1999).

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In the present study, used microorganisms as biofertilizer were Rhizobium and Phosphobacteria in which rhizobium fix atmospheric nitrogen symbiotically and forms root nodules with legumes whereas, phosphobacteria solubilizes the insoluble phosphorous and converts it in soluble form to crop plants. Therefore, both activities are important for the growth and development of crop plants to enhance the crop yield. In this experiment used crop plant material was Black gram (*Vigna mango*L. Hepper).

MATERIALS AND METHODS

For the present study, black gram seeds and biofertilizers were obtained from pulse research station, vamban and this experiment was carried out at plant breeding farm, faculty of agriculture, Annamalai University during 2017. Black gram seeds were sown in the experimental plot with spacing of 10 x 30 cm between plants and rows. Bio fertilizers used alone as Rhizobium and Phosphobacteria separately as well as in combination as Rhizobium + Phosphobacteria to inoculate the different experimental treatments such as Control (T0= without biofertilization inoculation), Treatment1 (T1= with Rhizobium inoculation), Treatment2 (T2= with Phosphobacteria inoculation) and Treatment3 (T3= Rizobium+Phosphobacteria).

Table 1. Effect of bio-fertilizer inoculation on seed germination and morphological parameters of *Vignamungo* (L.)

Treatment	Germination percentage (%)	Plant Height (cm)	Fresh Weight (mg/g)	Dry weight (mg/g)	No. Of pods per plant	Seed yield per plant
T0	84.3	46.3	35.9	20.1	27.8	6.1
T1	86.5	49.7	49.8	25.8	29.7	7.2
T2	87.2	51.3	48.7	24.9	28.9	6.9
T3	88.3	54.1	52.9	27.8	31.2	7.8

T0 = Control
T1 = Treatment inoculation with Rhizobium only.
T2 = Treatment inoculation with Phobacteria only.
T3= Treatment inoculation with combination of Rhizobium + Phosphobacteria.

This experiment was laid out in RBD with three replications. Several agronomical and plant protection measures were carried out during the crop stand. From each entry, 10 plants were randomly selected for observation of important characters like germination percentage, plant height, fresh and dry weight of plants, number of pods per plans and seed yield per plant.

RESULTS AND DISCUSSION

In the present study, growth parameters of *Vigna mungo* L.(Hepper) such as germination percentage, plant height, fresh and dry weight, number of pods per plant and seed yield per plant were significantly increased by application of biofertilizers in all experimental treatments when compared to Control treatment (without inoculation of microorganism) (Table1). The highest value of experimental morphological parameters were observed with T3 combination of Rhizobium and Phosphobacteria (Table 1). It was reported that the availability of Phosphorus to legumes play an important role in its production. The soil microbes are responsible for transfer of the immobilized soil phosphorus becomes easily available to these crop plants (Ahmad *et al*. 2001). From the results it was observed that other nutrients make it for available from the soil or protecting plants from pathogenic microbes hence the T3 recorded maximum values for all the parameters studied. This was in accordance with the findings of Bhattacharya *et al*. 2000. The parameters like germination percentage, plant height, fresh and dry weight of plants, number of pods per plant and seed yield per plant recorded maximum value in T3 when compared to other treatments same results were obtained by Selvakumar *et al.* (2012).

Conclusion

Biofertilization can play a Vital role in substituting commercially available chemical fertilizers therefore reducing the environmental problem to some extent. Bio fertilizerseco friendly activate the growth promotion of associated plants. The highest stimulatory effect of root associated beneficial soil bacteria, especially Rhizobium and Phosphobacteria have potential to be used as biofertilizer increase the productivity of black gram crop and also other plants. Therefore, Nitrogen fixation and plant growth enhancement by microorganism might be an important factor for achieving a sustainable agriculture in the future.

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