RESEARCH ARTICLE

Response of Black gram *Vigna mungo* (L.Hepper) to Biofertilizer

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ABSTRACT

Biofertilizers are commonly called microbial inoculants which are capable of stoping important nutritional elements in the soil from non-usable to usable form by the crop plants through their biological processes. For the last one-decade, biofertilizers are used in large quantity as an eco-friendly approach to reduce the use of chemical fertilizers, improve soil fertility status and for improvement of crop production by their biological activity in the rhizosphere. The seeds of Vigna mungo were treated with bio-fertilizers for 45 days as compared to untreated. It was observed that the plants treated with experimental bio-fertilizer *Rhizobium* showed excellent result in the morphological and bio-chemical parameters.

Key Words- Biofertilizer, *Rhizobium japonicum, Vigna mungo* (L.hepper).

INTRODUCTION

Biofertilizer like *Rhizobium, Azotobacter, Azospirillum and blue green algae (BGA)* are in use since long time ago. *Rhizobium* inoculants is used for leguminous crops.azotobactor is used on crops like wheat, maize, mustard, cotton, potato and other vegetable crops. Azospirillum inoculants are recommended mainly for sorghum, millets, maize, sugarcane and wheat. Nostoc genera represents blue green algae, while the atmospheric nitrogen are fixed by *Anabaena, Tolypothrix and Aulosira* and these are used for the growth of paddy crop of both upland and lowland condition. Water fern azolla is associated with anabaena, it helps in contributing 60kg/ha/season ans its usefull in enriching soil with organic matter and bacteria which are usefull so-called phosphate solubilizing bacteria like Pantoea agglomerans strain P5 and Pseudomonas putida strain P13. These bacteria solubalize the insoluble phosphate source. Some phosphates are not mobile due to mineral ions such as Fe, Al and Ca or organic acids, the rate of available phosphate (Pi) in soil is well below plant needs.

Biofertilizers are mostly named as microbial inoculants which are capable of controlling some of the nutritional element in the soil from useless to usefull by the crop plant from their biological processes. Since many years biofertilizers are used as in large amount as an eco-friendly process which has reduced the use of chemical fertilizer. This improve soil fertility status and for enhancement of crop production by their biological activity in the rhizosphere.Vast researches were carried out on the use of bacteria, (*Azotobacter, Azospirillum, Rhizobium, phosphobacteria*) vam fungi as biofertilizers supply nitrogen and phosphorous improves the growth of several crop plants was observed (Marwaha, 1995). Dual inoculation of VAM and bacteria biofertilizers proved more effective in increasing the growth of different crop plants (Panwar, 1993). In recent years, biofertilizers have started on large scale as a promising component of integrating nutrient supply system in agriculture. Our whole system of agriculture depends in many important ways, on microbial activities and there appears to be a tremendous potential for making use of microorganisms in increasing crop production. Some of the small or microbe fertilizers or biofertilizers are important part of our environment for sustainable agricultures practices (Bloemberg 2000). Main biofertilizers are nitrogen fixing bacteria, phosphate solubalizing and plant growth promoting microorganism (Goel 1999). Most of the biofertilizers benefiting the crop production such as *azotobactor , azospirillum blue green algae (BGA)* and *Rhizhobium*(Hegde1999). Many experiments were conducted to study the effect of biofertilizers alone or in combination with other chemical fertilizers (Patel et al. ,1992).Pulses play a vital role in Indian agriculture. Pulses are important sources of food. They are very rich in protein, particularly to the vegetarian who constitute the bulk of population in India. Blackgram is an annual food legume. It is very nutritious and is recommended for diabetics. Biofertilizers are small microbes which can be created which contain living cells of nitrogen fixing and phosphate solubalizing microorganism for treatment of seed or soil. They are organic product which contain living cells of various types of microorganism, which are capable of converting important elements fro unavailable to available from through biological processes (Vessey et al., 2003). They are converting te area with the objective of increasing such microorganisms and accelerate microbial process to augment to extend of the availability of the nutrient in a form which can easily assimilated by plant (Subba-Rao, et al, 1986The findings of previous studies in the field show that the biofertilizers are widely used in several countries with proven results in all kinds of plants and trees. (Victor and(Ruben, 2002). Nitrogen is an essential nutrient for the growth of different crops; its application is beset with economic burdens and environmental risks. Biological nitrogen fixation not only improves plant growth but also helps to minimize the use of chemical nitrogen fertilizers, so that the cost of production and environmental risks are reduced.

MATERIALS AND METHODS

Seeds of *Vigna mungo (L.Hepper)* were treated with experimental *Rhizobium japonicam* as follows.

Seed treatment with *Rhizobium japonicum:*

Rhizobium japonicum was mixed with rice starch in a container to form a slurry. *Vigna mungo* seeds were soaked in the slurry and kept overnight for germination.

Inoculation of seeds treated with biofertilizers

Nearly 100 undamaged healthy seeds of were selected for experiment . After selection, the seeds were sowed at equal depth in 10 pots with soil. 10 control pots were also maintained by sowing untreated seeds. The plants were watered at regular interval and the growth parameters were recorded after 45 days of sowing. The morphological parameters such as number of leaves, length of leaves, breath of leaves, length of plant, shoot and root length were measured. The bio chemical parameters such as the total chlorophyll , total protein content and total carbohydrate content were analysed.

RESULTS AND DISCUSSION

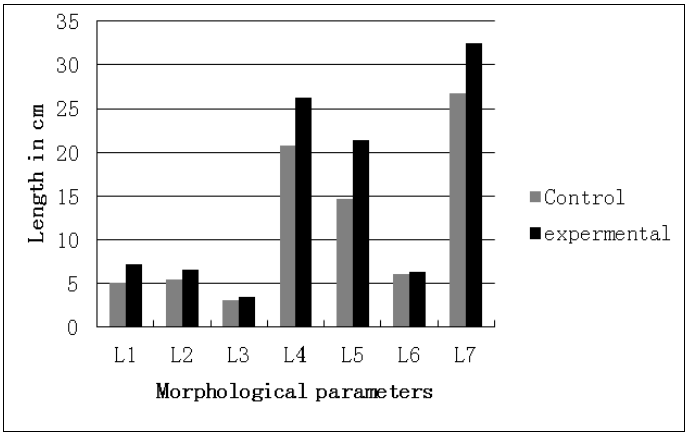
It was observed that when the biofertilizer *Rhizobium japonicum* was applied to *Vigna mungo (L.hepper),* the plant showed excellent growth as compared to control. In general all plants treated with bio fertilizers showed significant improvement in the parameters like, number of leaves, length of leaves, breadth of leaves, length of plant, shoot length and root length (Table 1).

Table 1: Effect on morphological parameters of black gram plants treated with Biofertilizer

TREATMENT	(A) Number of leaves/plant (cm)	(B) Length of leaves (cm)	(C) Breadth of leaves (cm)	(D) Length of plant (cm) (above ground)	(E) Shoot length (cm)	(F) Root length' (cm) (below ground)	(D+F) Total length of plant (cm)
CONTROL	5.0	5.4	3.0	20.7	14.7	6.0	26.7
EXPERIMENTAL	7.2	6.5	3.4	26.2	21.4	6.3	32.5

Table.2 Effect on biochemical parameters of *Vigna mungo (L.hepper) treated* with *bacterial Biofertilizer*

Sample	Total Carbohydrate Content	Total Chlorophyll Content	Total Protein Content
Control	2.25	0.821	2.8
Experimental	2.35	0.885	3.0



L1-Number of leaves/plant, L2-Length of leaves, L3-Breadth of leaves, L4-Length ofplantL5- Shoot length, L6-Root length, L7-Total length of plant.

Fig. 1: Effects on morphological parameters of black gram plants treated with biofertilizer

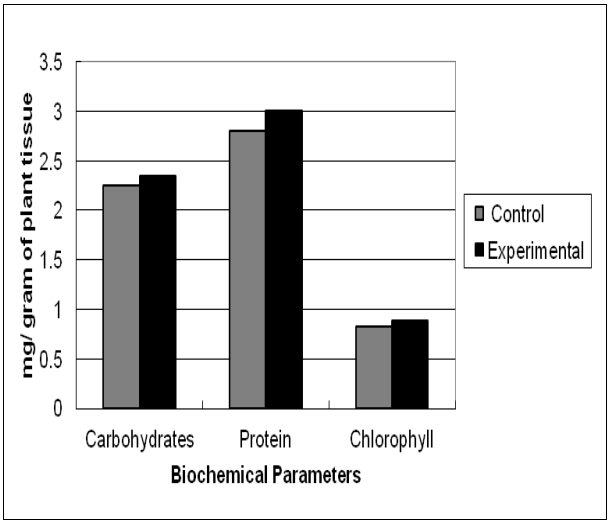


Fig. 2: Effect on biochemical parameters of *Vigna mungo (L.hepper),* plants treated with Biofertilizer

The total chlorophyll content levels of inoculated plants were significantly higher than the un-inoculated plants. The same results were observed in carbohydrate and protein content (Table 2).

CONCLUSION

The seeds treated with bacterial biofertilizer *Rhizobium japonicum* showed significant increase in growth of the plant- *Vigna mungo (L.hepper).* The morphological parameters such as number. of leaves, length of leaves, breadth of leaves, length of plant, shoot length, root length, and total length of plant showed significant increase. The effect was also seen in the bio chemical parameter such as carbohydrate content, protein content, and chlorophyll content. The results prove that plants treated with *Rhizobium japonicum* showed excellent performance in both morphological as well as biochemical parameters. Hence the use of biofertilizers should be encouraged by the Agricultural Institutions of Government of Maharashtra India because it is cost effective and helps in keeping the environment pollution free.

REFERENCES

Bloomberg GV, WijfjesAHM, LamersGEM, Stuurmam N and Lugtenberg BJJ (2000). Simultaneous imaging of luorescent proteins in the rhizosphere: newperspective for studying microbial communities. *Mol. Plant Mic. Int*., 13: 1170-1176

Geol. AK, Laura RD, Pathak DV, Anuradhaand G, Goel A (1999) Use of biofertilizers: potential, constraints and future strategies review. *Int. J. Trop Agric.*, 17: 1-18

Hegde DMDwivedi BS and Babu SNS (1999) Biofertilizers for cereal production in India – Areview. *Ind. J. Aric. Sci*., 69: 73-83

Marwaha BC (1995) Biofertilizer – A supplementary source of plant nutrient. *Fert. News*, 40: 39-50.

Panwar JDS (1993) Response of VAM and Azospirillum inoculation to water status and grain yield in wheat under stress condition. *Ind. J. Plant Physiol*., 36: 41-43.

Patel PC, Patel JR and Sadhu AC (1992) Response of forage sorghum (*Sorghum bicolor*) tobiofertilizers and nitrogPseudomonas fluoresensWCS 3655 populations expressing three different auto fen levels. *Ind. J. Agron.,* 37:466-469.

Subba-Rao NS (1986) Phospate Solubalization by soil , microorganism in:advance in agricultural Microbiology , Subba-Rao NS(Ed) Oxford and IBH, New Delhi, pp:295-303

Vessey JK (2003) Plant growth promoting rhizobacteria as biofertilizer. *Plantsoi*, 255:571586.

Victor TJ and Ruben R (2002) Effects of organic and inorganic fertilizers on mosquito populations in rice fields of southern, *Ind. Medi Veteri. Entomo*, 14: 61-68.