

RESEARCH ARTICLE

Effect of Biofertilizer on the growth of Mungbean *Vigna radiata* (L, Wilczek)

Fernandes Peter and Bhalerao Satish A*

Environmental Sciences Research Laboratory, Department of Botany, Wilson College, University of Mumbai, Mumbai-400007, M.S., India.

*Corresponding Author Email ID: drsatisbhhalerao@yahoo.com

Manuscript Details	ABSTRACT
<p>Received : 21.02.2015 Revised : 11.03.2015 Revised Received :21.03.2015 Accepted: 02.04.2015 Published: 25.04.2015</p> <p>ISSN: 2322-0015</p> <p>Editor : Dr. Arind Chavhan</p> <p>Cite this article as: Fernandes Peter and Bhalerao Satish A. Effect of Biofertilizer on the growth of Mungbean <i>Vigna radiata</i> (L, Wilczek) , <i>Int. Res. J. of Science & Engineering</i>, 2015; Vol. 3 (2): 51-54.</p> <p>Acknowledgements The authors are thankful to Principal Dr. V. J. Sarwaiya for their administrative support, cooperation and help. Thanks to Viva College for the help.</p> <p>Copyright: © Author(s), This is an open access article under the terms of the Creative Commons Attribution Non-Commercial No Derivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>Biofertilizers are living cells that enrich the soil quality. They are eco-friendly and play an important role in the production of crop. Biofertilizer are cost effective as compared to chemical fertilizers and are also renewable source of energy. They maintain the long term fertility of the soil. Hence to increase the productivity of the soil the use of biofertilizer is a must. The comparative effect of biofertilizer <i>azotobacter spp</i> on the growth and yield of Mungbean <i>vigna radiata</i> (L, Wilczek) was studied. The seeds of mungbean were treated with biofertilizer and their result was recorded after 45 days. The results proved that plant grown with biofertilizer <i>Azotobacter spp</i> showed excellent results in the morphological and biochemical parameters. Hence the use of biofertilizers should be encouraged.</p> <p>Keywords: Biofertilizer, Mungbean <i>vigna radiata</i> (L, Wilczek), <i>Azotobacter spp.</i>, Biochemical parameters, Morphological parameters.</p>
	<p>INTRODUCTION</p> <p>Currently, a real challenge for the workers in the field of agricultural research is to stop the use of expensive agrochemicals/chemical fertilizers. Which negatively affect the environment as well as human health. Chemical fertilizers are used to replenish soil N, in Large quantities, they are highly costly and contaminate environment severely (Dai <i>et al</i>, 2004). Biofertilizers fix the atmospheric nitrogen in the available form for plants (Chen 2006). Biofertilizers are low cost, renewable sources of plant nutrients which supplement chemical fertilizers. Biofertilizer is one of the best and modern tools for agriculture. Use of Biofertilizer is of great importance because they are components of integrated nutrient management, and they are also cost effective and renewable source of energy for plants and to help in reducing the use of chemical fertilizers for sustainable agriculture</p>

(Rana *et al*, 2013). Biofertilizer or microbial inoculants can be generally defined as latent cells of efficient strains of a phosphate solubilizing and nitrogen fixing microorganism used for treatment of soil. Biofertilizer are organic products of living cells containing different types of microorganisms, which have the ability to convert important elements from unavailable sources to available sources through ecological processes (Vessey, 2003). They are composting the area with the objective of increasing the number of such microorganisms and accelerate microbial process to augment to extent of the availability of the nutrient in a form which can easily assimilated by plant (Subba-Rao, 1986).

Organic farming has emerged as an important priority area globally as well in our country India. Due to this there is a growing demand for safe and healthy food. Hence, there are concerns for the long term sustainability as well as environmental pollution associated due to use of agrochemicals indiscriminately. Biofertilizers has an important role to play in improving soil fertility by fixing atmospheric nitrogen. Hence, the use of biofertilizers for harvesting of the naturally available, biological system of nutrient mobilization (Venkateshwarlu, 2008). The importance and role of bio-fertilizers in sustainable crop production has been studied by several authors. But their progress in the field of technology production always remained below satisfaction in Asia and Europe due to various constraints, either economically or politically and in some cases even ecologically (Mishra *et al*, 2013)

Need of Bio-Fertilizers

Indiscriminate use of synthetic fertilizers has led to the pollution of air, water and soil. The contaminated soil and water basins, destroys micro-organisms and eco-friendly insects, making the crop more prone to diseases which in turn reduces the soil fertility. Biofertilizers are economical viable and eco-friendly over a longer period, they are efficiently productive and economical viable to smaller and average farmers over chemical fertilizers. (Mishra *et al* 2013) Bio-fertilizers are microorganisms. The microorganism are like bacteria, fungi, algal strains. They differ from chemical fertilizer in their mode of action differs. Biofertilizers has an important role to play in improving soil fertility by fixing atmospheric nitrogen and improving the quality of nutrient available in the soil. Thus, enhancing crop yield by natural method. Chemical fertilizers also plays a similar role but they cause a great harm to the environment by significantly disturbing the soil. Agriculture is the most important sector of Indian economy. It contributes to growth,

employment and overall economy of India. The Government of India has been trying to promote the use of Biofertilizer by providing incentives/subsidies to the farmer. These inputs have a multiple beneficial impacts on the soil. Biofertilizers increases the soil fertility naturally and does not affect the soil like chemical fertilizers. Hence to increase the productivity of the soil the use of biofertilizer is a must. (Dixit, 2013). Microorganisms play an important role in soil processes that determine the plant productivity. There are many soil microorganisms like Rhizobium, Azotobacter, Azospirillum, Phosphatesolubilizers (Phosphobacteria), Blue green algae, Azolla and Mycorrhiza which can be used to increase the productivity of the plants. It includes mainly nitrogen fixing and, phosphate solubilizing microorganisms (Goel *et al*, 1999). In the present study, used microorganisms as biofertilizer was azotobacter and plant used was Mungbean *Vigna radiata* (L, Wilczek) Mungbean is also called moong or green gram in India. It belong to Fabaceae. Its seeds are rich in protein. mungbean is a short season crop, which is adaptive to a warmer and drier climate. Temperature of 20 -30 degree Celsius is optimum for plant germination. They are mostly grown in all over India. They are not expensive and rich source of protein. Thus, the aim of the experiment was to increase the productive of the crop with the help of Biofertilizers, which is eco-friendly.

METHODS AND MATERIAL

Seeds of Mungbean *vigna radiata* (L, Wilczek) were treated with Biofertilizer as follows

Seed treatment with biofertilizer

Rice starch was used for making the biofertilizer as slurry. The seeds were treated with the *Azotobacter spp* slurry and were kept overnight for germination. 100 undamaged healthy seeds were selected. After selection, the seeds were sown in 10 plastic pots with soil. Ten control pots were also maintained by showing untreated seeds. The plants were watered daily at regular intervals and the growth parameters were studied. After 45 days of sowing, the morphological and biochemical parameter of green gram were analyzed. The morphological parameters such as number of leaves, length of leaves, breadth of leaves, length of plant, shoot length and root length were analyzed. The biochemical parameters such as total chlorophyll content, protein content and carbohydrates content were also analyzed.

RESULT AND DISCUSSION

When seeds with biofertilizer treated the plants showed better growth performance when compared compared to control. In general, all plants treated with biofertilizers showed significance improvement in the results like the number of leaves, length of leaves,

breadth of leaves, length of plant, root length ,shoot length and leaf length;(Table1) The total chlorophyll contents level of inoculated plants were significantly higher than the uninoculated plants. The same results were observed in carbohydrates and protein content (Table2).

Table1:Effect on morphological parameters of Mungbean plant treated with Biofertilizers.

Treatment	(A)	(B)	(C)	(D)	(E)	(F)	(D+F)
	Number of leaves/plant (cm)	Length of leaves (cm)	Breadth of leaves (cm)	Length of plant (cm) (above ground)	Shoot length (cm)	Root length' (cm) (below ground)	Total length of plant (cm)
Control	5.5	5.1	2.5	20.9	14.9	5.0	25.9
Experimental	6.7	6.2	3.1	25.7	20.4	5.3	31

Table.2 Effect on Bio-chemical parameters of Mungbean plants treated with Biofertilizer.

Treatment	Total Carbohydrate Content	Total Chlorophyll Content	Total Protein Content
Control	1.75	1.039	2.4
Experimental	3.4	1.341	5.66

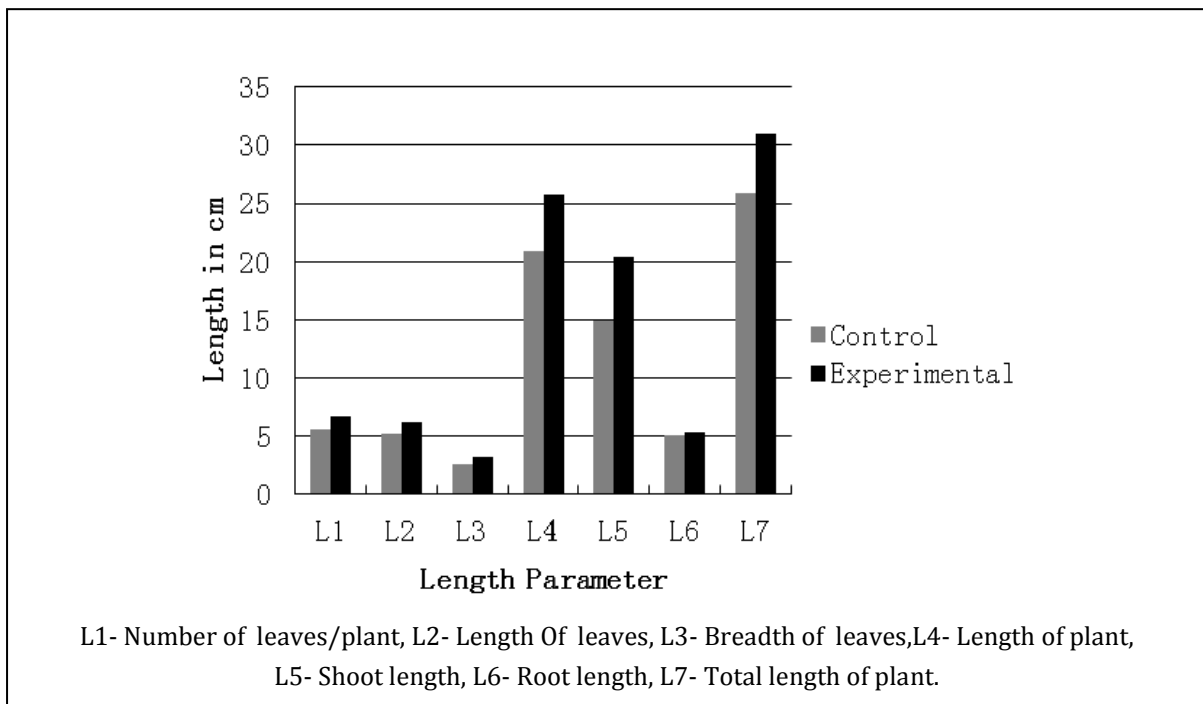


Fig.1: Effect on morphological parameters of Mungbean plant treated with Biofertilizer.

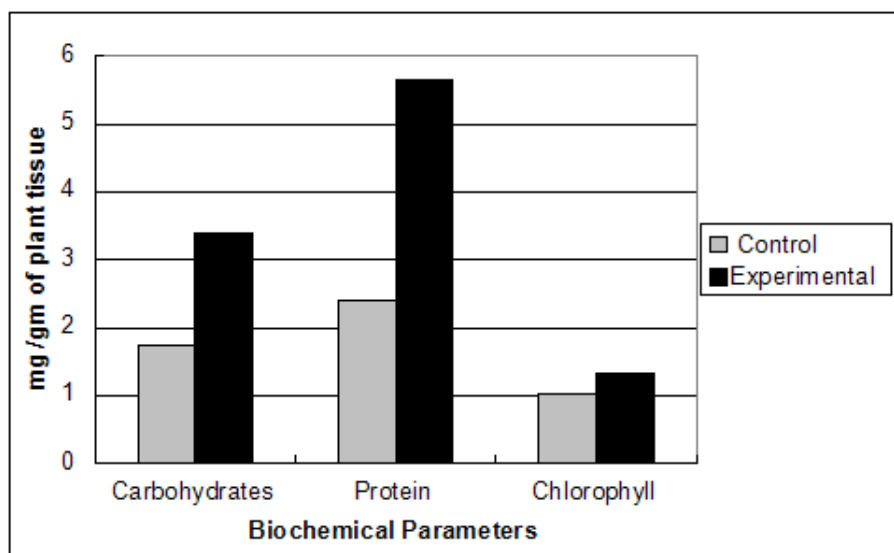


Fig. 2: Effect on Bio-chemical parameters of Mungbean plants treated with Biofertilizer.

CONCLUSION

When seeds treated with biofertilizer (*Azotobacter spp*) showed significant increase in growth parameter of plant Mungbean (*Vigna radiata*). Their morphological parameters such as Number of leaves, length of leaves, breath of leaves, length of plants, shoot length, root length and Total length of plant showed significant increase. The effect was also seen on the bio-chemical parameter such as carbohydrate content, protein content and chlorophyll content, the results prove that plants treated with experimental *Azotobacter spp* showed excellent growth in both the morphological as well as biochemical parameters. Hence, the use of biofertilizer should be encouraged by the government of Maharashtra & India because it is cost effective and Eco-friendly.

REFERENCES

- Chen J. The combined use of chemical and organic fertilizers for crop growth and soil fertility. Int. Workshop on Sustained Management of the Soil Rhizosphere System for Efficient Crop Production and Fertilizer Use., (2006) pp: 16-20.
- Dai J, Becquer T, Rouiller JH, Reversat G, Bernhard-Reversat F, Lavelle P. Influence of heavy metals on C and N mineralization and microbial biomass in

Zn-, Pb-, Cu-, and Cdcontaminated soils. *Applied Soil Ecology*, 2004; 25: 99-109.

- Dixit Supriya. Impact of Bio-fertilization on morphological parameters of *Vigna mungo* (L.) Hepper: *International Journal of Research in Plant Science*, 2013; 3(1): 10-13.
- Goel AK, Laura RD, Pathak DV, Anuradha G and Goel A. Use of biofertilizers: potential, constraints and future strategies review. *Inter. J. Trop. Agric.*, 1999; 17: 1-18.
- Mishra DJ, Singh Rajvir, Mishra UK and Shahi Sudhir Kumar. Role of Bio-Fertilizer in Organic Agriculture: A Review; *Research Journal of Recent Sciences*, 2013; 2:239-41.
- Rana Rachna Ramesh and Kapoor Pooja Biofertilizers and Their Role in Agriculture; *Popular Kheti*, 2013; 1(1):56-61.
- Subba-Rao NS, Phosphate Solubilization by soil Micro organisms. In: *Advances in Agricultural Microbiology*, Subba-Rao, N.S. (Ed.). Oxford and IBH, New Delhi, (1986); pp: 295-303.
- Venkatashwarlu B. Role of bio-fertilizers in organic farming: Organic farming in rainfed agriculture: Central institute for dry land agriculture, Hyderabad, (2008); pp: 85-95.
- Vessey JK. Plant growth promoting rhizobacteria as biofertilizers. *Plant Soil.*, 2003; 255: 571-586.