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ROLE OF BIOFERTILIZERS IN OKRA

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Abstract:

Azotobacter is a free living bacteria which grows well on a nitrogen free medium. There are four species of the bacteria found in our soil. Some strains have higher nitrogen fixing abilities than others. It is used in a large number of crops like rice, sugarcane, cotton, mustard, wheat, sorghum, turmeric, tobacco and all types of vegetables, fruits and horticulture crops. Azotobacter and Azospirillum are ecofriendly, non-toxic to both plants and animals, improve and germination, fix 20-30% nitrogen, thrive best even in alkaline soil and fix nitrogen by producing growth promoting substances. The study established the importance of biofertilizres which are eco-friendly and cost effective in comparison to pollution creating and costly chemical fertilizers. Out of the four varieties tested in Experiment-1, cv. selection-151 gave the maximum yield and proved the most suitable for growing under local climatic conditions. Azotobacter is a free living diazotroph that was isolated from the rhizosphere and from the roots of grasses. Some strains have higher nitrogen fixing ability than others. It is used in a large number of crops like rice, sugarcane, cotton, sunflower, mustard, maize, wheat, turmeric, tobacco and all types of vegetables, fruits, horticulture crops. This paper deals with the roles of Biofertilizers in the Okra plant in particular.

Keywords: Azotobacter, Bacteria, Biofertilizers, Okra, Soil.

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Introduction:

Azotobacter is free living bacteria which grow well on a nitrogen free medium. It is gram negative, polymorphic i.e. it is of different sizes and shapes. Its size ranges from 2-10 x 1-2.5 µm. The cyst germinates under favorable conditions to give vegetative cells. Is also produces poly-saccharides. ***Azotobacter*** species are sensitive to acidic pH, high salts and temperature above 35^0C. There are four species of ***Azotobacter*** namely ***A. chroococcum***, ***A. agilis***, ***A. paspali*** and ***A. vinelandii*** of which ***A. chroococcum*** is most commonly found in our soils.

Azotobacter fixes atmospheric nitrogen in the rhizosphere. Some strains have higher nitrogen fixing ability than others. It uses carbon for it metabolism from simple or compound carbonaceous substances in nature. Besides carbon, ***Azotobacter*** also requires calcium for nitrogen fixation. Similarly a medium used for growth of ***Azotobacter*** is required to have presence of organic nitrogen, micro- nutrients and salts in order to enhance the nitrogen fixing ability of ***Azotobacter*** (Anonymous, 2008). The species of ***Azotobacter*** are known to fix atmospheric nitrogen on an average 10 mg of N/g of sugar in pure culture on a nitrogen free medium. A maximum of 30 mg N fixed per gram of sugar was reported by lopatina. However, ***Azotobacter*** is a poor competitor for nutrients in soil. Most efficient strains of ***Azotobacter*** would need to oxidize about 1000 kg of organic matter for fixing 30 Kg of N/ha.***Azotobacter*** also produces some substances which check the plant pathogens such as ***Alternaria, Fusarium*** and ***Helminthosporium***. Hence, ***Azotobacter*** also acts as biological control agent. It is used in a large number of crops like rice, sugarcane, cotton, sunflower, mustard, maize, wheat, sorghum, turmeric, tobacco and all types of vegetables, fruits, horticulture crops etc.

Azospirillum is a free living diazotroph that was isolated from the rhizosphere and from the roots of grasses. ***Azospirillum*** species are ubiquitous and are found in many parts of the world consisting of tropical, subtropical and temperate climatic conditions. These bacteriaare gram negative, aerobes, curved rod shaped with a polar flagellum and contaglobules of poly–betahyodroxy butyrate. They have a DNA base composition of 66-71 mole G+C.(Elmerich, ***et. al.,*** 1987).

Five species of ***Azospirillum*** have been reported which are ***A. lipoferum***, ***A. brasilense***, ***A. amazonemse***, ***A. halopraeferens***, ***A. irakense***. Organic acids, such as malate

and succinate are the preferred carbon sources for ***Azospirillum*** (Govindrajan and Thangaraju, 2001).

The occurrence of nitrogen fixing ***Azospirillum*** from the roots of rice, sorghum, maize, cotton, ragi, guinea grass, hariyali has been reported by (Purushothaman ***et. al.,*** 1980).Subba Rao (1983) have also reported occurrence of fixing ***Azospirillum*** from roots of the plantation crops and orchard crops.

It is evident from the above that both ***Azotobacter*** and ***Azospirillum*** are ecofriendly, non-toxic to both plants and animals, improve and germination, fix 20-30 % nitrogen, thrive best even in alkaline soil and fix nitrogen by producing growth promoting substances. Therefore, in the present study an attempt has been made to study the effect of ***Azotobacter*** and ***Azospirillum*** on the growth and nitrogen economy in four varieties of okra.

Results and Discussion:

1. The main purpose of the present study is to minimize the use of chemical fertilizer in order to reduce the cost of production.
2. To enhance and popularize the use of biofertilizers which are eco-friendly in place of chemical fertilizers, in order to curtail the pollution.
3. To obtain the fruits with minimum residues and therefore, to popularize theorganic farming which is export oriented and is becoming popular in Europe and America.
4. To obtain the maximum yield to improve the cost benefit ratio for the farmers.

Conclusions:

On the basis of results of Experiments performed in this study, the following conclusions have been drawn:

(1) Out of the four varieties tested in Experiment-1, cv. *selection-151* gave the maximum yield and proved to be the most suitable for growing under local climatic conditions.

(2) Both the biofertilizers i.e. ***Azotobacter*** and ***Azospirillum*** proved beneficial and increased the yield by 651.97, 790.24 percent, respectively in comparison to control.

(3) The treatment $N_{22.5}$ + Biofertilizers (in case of both ***Azotobacter*** and ***Azospirillum***) proved optimum for almost all the growth, biochemical and yield parameters.

(4) The inoculation with ***Azotobacter*** and ***Azospirillum*** decreased the chemical fertilizer requirement of the crop by approximately 80 percent, therefore, the cost of production of the crop decreased tremendously.

(5) The study established the importance of biofertilizres which are eco-friendly and cost effective in comparison to pollution creating and costly chemical fertilizers.

Future Prospects:

(1) The similar studies should be carried out under field conditions at a large scale to work out the exact role of biofertilizers in enhancing the yield and saving of nitrogen fertilizers.

(2) The effect of other microbes especially the phosphate solubilizing bacteria and fungi should also be worked out on okra.

(3) The pods of okra (edible part) should be tested for residues of chemical fertilizers in the presence of biofertilizer.

(4) The use of biofertilizers be popularized among farmers to let them aware of the use of ecofriendly microbes that not only fetches better price but also contribute towards sustainable agriculture.

(5) This may be used as an alternative of inorganic nitrogen by saving cost of production and sustaining productivity.

References:

Anonymous, (2008). ***Azotobacter*** http://www.indiaagronet.com/indiaagronet/ manures_fertilizers/azotob.

Elmerich, C.; Bozouklian, H.; Vieille, C.; Fogher, C.; Perround, B.; Perrin, A. and Anderleyden, J.V. (1987). ***Azospirillum*** : genetics of nitrogen fixation and interaction with plants**. Phil. Trans. R. Soc. Lond. B. 317** : 183-192.

Govindarajan, K. and Thangaraju, M. (2001). ***Azospirillum*** a potential inoculant for horticultural crops. **South Indian Hort. 49** : 233-235.

Purushothaman, D.S.; Gunasekaran, and oblisami, G. (1980). Nitrogen fixation by ***Azospirillum*** in some tropical plants. **Proc. Ind. Natl. Sci. Acad. 46** : 713-717.

Subbarao, N. S. (1983). Nitrogen fixing bacteria associated with plantation and orchard plants. **Can. J. Microbiol. 29** : 863-866.