



## Biofertilizer and its role in sustainable crop production

Shiv Singh Meena<sup>1</sup> and Praveen Solanki<sup>2</sup>

<sup>1</sup>Department of Soil Science, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA

<sup>2</sup>Department of Environmental Science, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA

In recent decades crop production per unit area was decreased due to decline in soil fertility through the excess use of chemical fertilizer, insecticide, and pesticide for agricultural production. As a reason of population growth and their increasing food demand, consumption of chemical fertilizer and pesticide raise to increase crop production per unit area. It causes a lot of inappropriate results, including degradation of water and soil quality. There for, now day's use of biofertilizer has become paramount importance in the agriculture sector for their potential role in food safety and sustainable crop production.

Biofertilizer is micro-organisms that enrich the nutrient quality of the soil. The main sources of biofertilizer are bacteria, fungi, actinomycetes, yeast and cyanobacteria (blue green algae). Biofertilizer is used as a seed or root treatment and soil inoculation.

**Methods of biofertilizer application :** The most common method of inoculation is 'seed inoculation' in which the inoculant (bacterial culture) is mixed with water to make slurry form and then mixed with seed. In this case, the carrier must be a form of fine powder. To achieve the tight coating of inoculation on seed surface, use of adhesive material such as gum sucrose solution, vegetable oil and jaggary or sugar. In seed inoculation method 200 g of culture, 200 g of sugar are suspended in 300-400 ml of water and mixed properly. Ten kg seed are treated with this pest, treated seed should be dried in shade before sowing. The second most common method is 'soil inoculation' will be adopted where a large population of a bacterial strain can be introduced into the soil. For soil inoculation in general, granular inoculant is placed into the furrow under or along the seed. In soil inoculation, 4 kg biofertilizer is mixed in 200 kg of compost and kept for overnight. This mixture is incorporated into the soil at the time of sowing or planting. Biofertilizer can be used along

with chemical fertilizer but the care should be undertaken to avoid direct contact of chemical based input with biofertilizer which is likely to reduce the microbial population of biofertilizer.

**Potential role of biofertilizer in agriculture :** Biofertilizer fixed atmosphere nitrogen in plant roots and increase the solubility of soil phosphorus and so on. The incorporation of biofertilizer plays a major role in improving soil fertility, through increase nitrogen and phosphorus



content in soil and yield attributing characters, thereby final yield of the crop has been increasing. Application of biofertilizer in the soil improves soil biota and minimizes the sole use of chemical fertilizers. Under temperate conditions, inoculation of Rhizobium increase number of pods plant<sup>-1</sup>, the number of seed pod<sup>-1</sup> and test weight (g). Biofertilizer acts as antagonistic and

reduced the incidence of soil-borne disease and thus, help in crop production in a sustainable manner. Biofertilizer plays an important role in the recycling of plant nutrients such as nitrogen, phosphorus and sulphur and improves soil fertility and soil productivity. They also release growth promoting substance like vitamin-B complex, Indole acetic acid and Gibberellic acids etc. and thus, help in increase nutrient and water uptake by plants and also improve the soil health.

**Significance of biofertilizer :** Applications of biofertilizer help to minimize the use of chemical fertilizer such as nitrogen and phosphorus by approximately 25 per cent. It stimulates the plant growth and increases crop yield upto 20-30 per cent. Biofertilizer restores natural soil fertility through fixation of atmospheric nitrogen and increase a solubility of soil phosphorus and improve soil biodiversity. They provide protection against drought and some soil-borne disease. Reduces the cost towards fertilizer use, especially regarding nitrogen and phosphorus

*Contd..... p. 123*