



## FACULTY OF AGRICULTURE SCIENCES AND ALLIED INDUSTRIES

**Biofertilizers:-** In nature, there are a number of useful soil micro organisms which can help plants to absorb nutrients. Their utility can be enhanced with human intervention by selecting efficient organisms, culturing them and adding them to soils directly or through seeds. The cultured micro organisms packed in some carrier material for easy application in the field are called bio-fertilisers. Thus, the critical input in Biofertilisers is the micro organisms.

## Benefits of biofertilizers

Bio-fertilisers are living microorganisms of bacterial, fungal and algal origin. Their mode of action differs and can be applied alone or in combination.

1. Biofertilizers fix atmospheric nitrogen in the soil and root nodules of legume crops and make it available to the plant.
2. They solubilise the insoluble forms of phosphates like tricalcium, iron and aluminium phosphates into available forms.
3. They scavenge phosphate from soil layers.
4. They produce hormones and anti metabolites which promote root growth.
5. They decompose organic matter and help in mineralization in soil.
6. When applied to seed or soil, biofertilizers increase the availability of nutrients and improve the yield by 10 to 25% without adversely affecting the soil and environment.

## Types and features of biofertilizers

Based on type of microorganism, the bio-fertilizer can also be classified as follows:

- **Bacterial Biofertilizers:** e.g. Rhizobium, Azospirillum, Azotobacter, Phosphobacteria.
- **Fungal Biofertilizers:** e.g. Mycorrhiza
- **Algal Biofertilizers:** e.g. Blue Green Algae (BGA) and Azolla.
- **Actinimycetes Biofertilizer:** e.g. Frankia.

## Characteristics Features of common Biofertilizers

1. **Rhizobium** : Rhizobium is relatively more effective and widely used biofertilizer. Rhizobium, in association with legumes, fixes atmospheric N. The legumes and their symbiotic association with the rhizobium bacterium result in the formation of root nodules that fix atmospheric N. Successful nodulation of leguminous crop by rhizobium largely depends on the availability of a compatible strain for a particular legume. Rhizobium population in the soil is dependent on the presence of legumes crops in field. In the absence of legumes the population of rhizobium in the soil diminishes.
2. **Azospirillum** : Azospirillum is known to have a close associative symbiosis with the higher plant system. These bacteria have association with cereals like; sorghum, maize, pearl millet, finger millet, foxtail millet and other minor millets and also fodder grasses.
3. **Azotobacter** : It is a common soil bacterium. *A. chroococcum* is present widely in Indian soil. Soil organic matter is the important factor that decides the growth of this bacteria.
4. **Blue Green Algae (BGA)** : Blue green algae are referred to as rice organisms because of their abundance in the rice field. Many species belonging to the genera, Tolypothrix, Nostic, Schizothrix, Calothrix, Anoboenosois and Plectonema are abundant in tropical conditions. Most of the nitrogen fixation BGA are filamenters, consisting of chain of vegetative cell including specialized cells called heterocyst which function as a micronodule for synthesis and N fixing machinery.

## Application of biofertilizers to crops

- 1. Seed treatment:-** Each packet (200g) of inoculants is mixed with 200 ml of rice gruel or jaggery solution. The seeds required for one hectare are mixed in the slurry so as to have uniform coating of the inoculants over the seeds and then shade dried for 30 minutes. The treated seeds should be used within 24 hours. One packet of inoculant is sufficient to treat 10 kg seeds. Rhizobium, Azospirillum, Azotobacter and Phosphobacteria are applied as seed treatment.
- 2. Seedling root dip:-** This method is used for transplanted crops. Five packets (1.0 kg) of the inoculants are required for one ha and mixed with 40 litres of water. The root portion of the seedlings is dipped in the solutions for 5 to 10 minutes and then transplanted. Azospirillum is used for seedling root dip particularly for rice.
- 3. Soil treatment:-** 4 kg each of the recommended biofertilizers are mixed in 200 kg of compost and kept overnight. This mixture is incorporated in the soil at the time of sowing or planting.