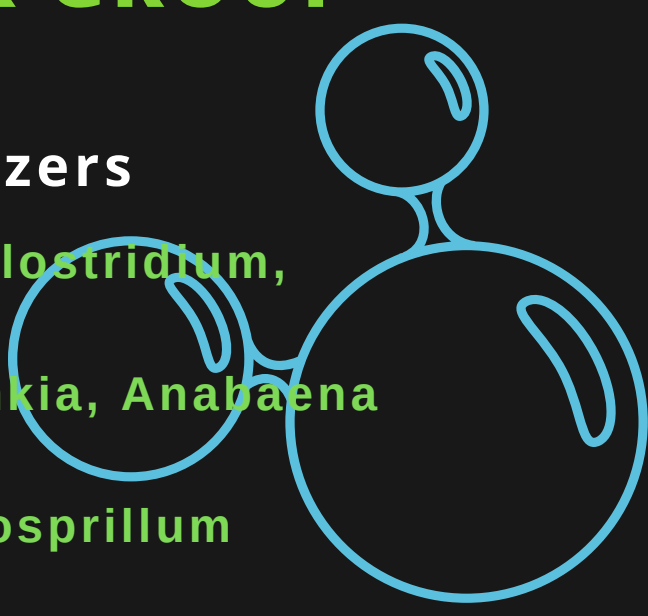
BIOFERTILIZERS

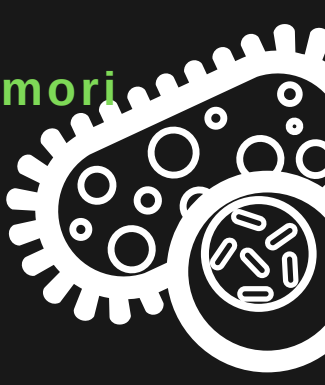
Biofertilisers are good a source of enhancing the nutrient availability in soil and plants. These are categorized on basis of the specific nutrient availability concern. Nitrogenous Biofertilisers are capable of fixing atmospheric nitrogen when suitable crops are inoculated with them. Biofertilisers are low cost, effective,environmental friendly and renewable source of plant nutrients to supplement fertilisers. Integration of chemical, organic and biological sources of plant nutrients and their management is necessary for maintaining soil health for sustainable agriculture. The bacterial organisms present in the biofertiliser either fix atmospheric nitrogen or solubilise insoluble forms of soil nutrients.United Agricare India Pvt. Ltd. is producing nitrogen fixing biofertilisers (Rhizobium, Azotobacter, Acetobacter),Phosphate Solubilising Bacteria (PSB) for phosphorus, Potassium Mobilizing Biofertiliser (KMB) for potassium, Zinc Solubilizing Biofertiliser (ZSB) for zinc and NPK liquid consortia for nitrogen, phosphorus & potassium. To cater the growing demand of liquid biofertilisers, United Agricare India Pvt. Ltd. has focused to produce liquid and powder biofertilisers instead of solid carrier based. The main advantages of liquid biofertiliser are higher efficiency, easier application & handling, and better shelf life.

BIO-FERTILIZER GROUP



- **Nitrogen fixing Biofertilizers**
  1. **Free Living- Azotobacter, Clostridium, Anabaena, Nostoc**
  2. **Symbiotic- Rhizobium, Frankia, Anabaena azollae**
  3. **Associative Symbiotic- Azosprillum**

- **P Solubilizing Biofertilizers**
  1. **Bacteria- Bacillus megaterium var phosphaticum**
  2. **Fungi- Penicillium sp, Aspergillus awamori**



- **P Mobilizing Biofertilizers**
  1. **Arbuscular mycorrhiza: Glomus sp., Gigasopra sp., Acaulospora sp., Scutellospora sp.**
  2. **Ectomycorriza: Laccaria sp., Pisolithus sp., Boletus sp., Amanita sp.**
  3. **Orchid mycorrhiza: Rhizoctonia solani**

- **Biofertilizers for Micro nutrients**
  1. **Silicate and ZInc solubilizers- Bacillus sp.**

- **Plant Growth Promoting Rhizobacteria**

1. **Pseudomonas- Pseudomonas fluorescens**

DIFFERENT TYPES OF BIO-FERTILIZER

1. *Rhizobium*

Rhizobium infects the roots of leguminous plants. They are usually found in the soil and produce nodules after infecting the roots of the leguminous plants. As a result, nitrogen gas is fixed from the atmosphere. This nitrogen is made available to the plants that help in their growth and development. When the legume dies there will be a breakdown of nodules. As a result, Rhizobium is released back to the cell where it can infect a new host.

2.Azotobacter

It is non symbiotic nitrogen fixing bacteria recommended for non leguminous crops like Paddy, Wheat, Millets, Cotton, Tomato, Cabbage, Mustard, Safflower and Sunflower. The Azotobacter performs well if the soil organic matter content is high.

3.Acetobacter

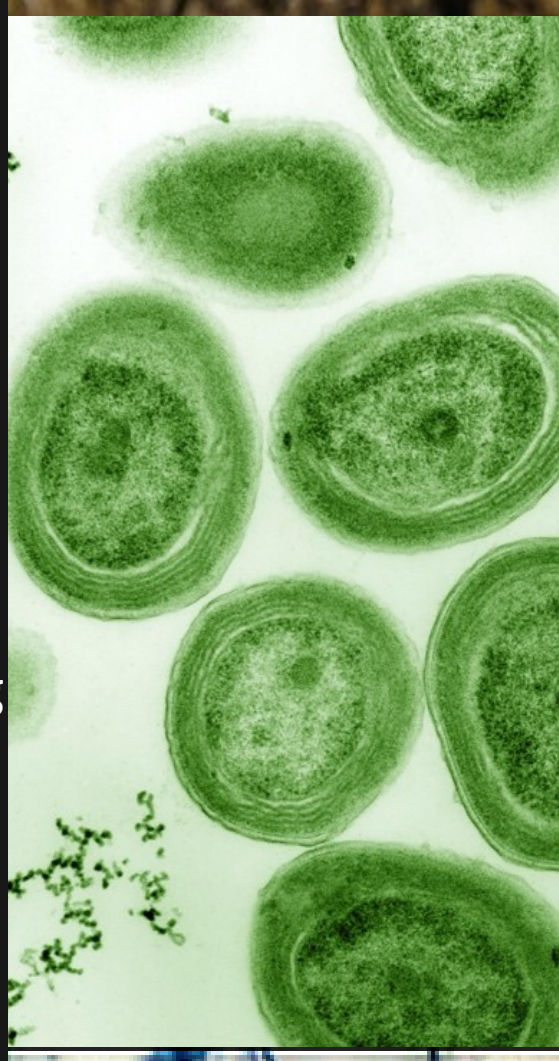
Acetobacter is a genus of acetic acid bacteria. Acetic acid bacteria are characterized by the ability to convert ethanol to acetic acid in the presence of oxygen. Of these, the genus Acetobacter is distinguished by the ability to oxidize lactate and acetate into carbon dioxide and water. Bacteria of the genus Acetobacter have been isolated from industrial vinegar fermentation processes and are frequently used as fermentation starter cultures.

4.Potassium Mobilizing Biofertiliser (KMB)

Potassium (K) availability in soil is also influenced by by microbial activities in the rhizosphere which releases K from the non-exchangeable reserve. These microorganisms are commonly known as potassium solubilizing bacteria or potassium dissolving bacteria. The most important potassium solubilising bacteria are silicate bacteria such as Bacillus mucilaginous, B. edaphicus, B. glucanolyticus and B. circulans.

5.Cyanobacteria

Cyanobacteria, or blue-green algae, is one such example of a bio-fertilizer, a type of organic fertilizer which contains living organisms and harnesses naturally occurring inputs like solar energy, nitrogen, and water to ensure soil fertility and plant growth. Small-scale farmers using bio-fertilizers have the potential to provide larger and more sustainable yields and healthier soils for themselves and their communities.



6.A.M Fungi

An arbuscular mycorrhiza(AM) is a type of mycorrhiza in which the symbiont fungus penetrates the cortical cells of the roots of a vascular plant forming arbuscules.

7.Silicate Solubilizing Bacteria

Silicate solubilizing bacteria not only increase the availability of silicates, P and K in the soil, but also provide a biological control system to the plants against pathogenic fungi. These bacteria release Si in soil which acts as a physical barrier to pathogens.

8.Azospirillum

The genus Azospirillum belongs in the alpha-Proteobacteria class of bacteria. Azospirillum are gram-negative, do not form spores, and have a slightly-twisted oblong-rod shape. Azospirillum have at least one flagellum and sometimes multiple flagella, which they use to move rapidly. Azospirillum are aerobic, but many can also function as microaerobic diazotrophs, meaning, under low oxygen conditions, they can change inert nitrogen from the air into biologically useable forms

9.Azolla

Azolla is a floating pteridophyte, which contains as endosymbiont the nitrogen-fixing cyanobacterium Anabaena azollae (Nostocaceae family). Widely cultivated in the Asian regions, Azolla is either incorporated into the soil before rice transplanting or grown as a dual crop along with rice.

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