Biofertilizers

Biofertilizers: Definition, type of biofertilizer; nitrogen biofertilizers, Compost biofertilizers, & Phosphorous biofertilizers, Importance of biofertilizers, Advantages and disadvantages of biofertilizer

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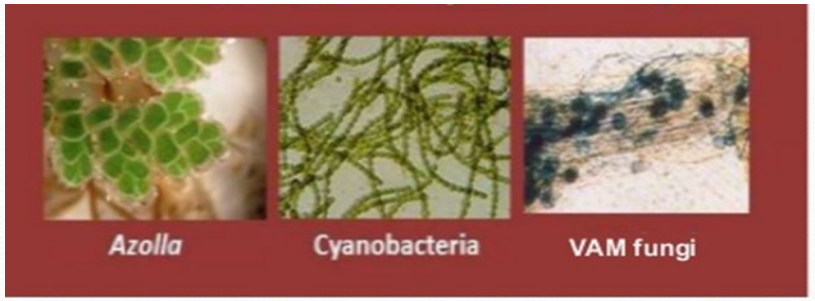
What is Biofertilizer?

- Biofertilizers are substance that contains microbes, which helps in promoting the growth of plants and trees by increasing the supply of essential nutrients to the plants.
- It comprises living organisms which include bacteria, fungi, mycorrhizal and blue-green algae.
- Biofertilizer also include organic fertilizers(manure, etc.)
- Use of bio-fertilizer is recommended for improving the soil fertility in organic farming.

- Bio-fertilizers add nutrients through the natural processes of nitrogen fixation, solubilizing phosphorus, and stimulating plant growth through the synthesis of growth-promoting substances.

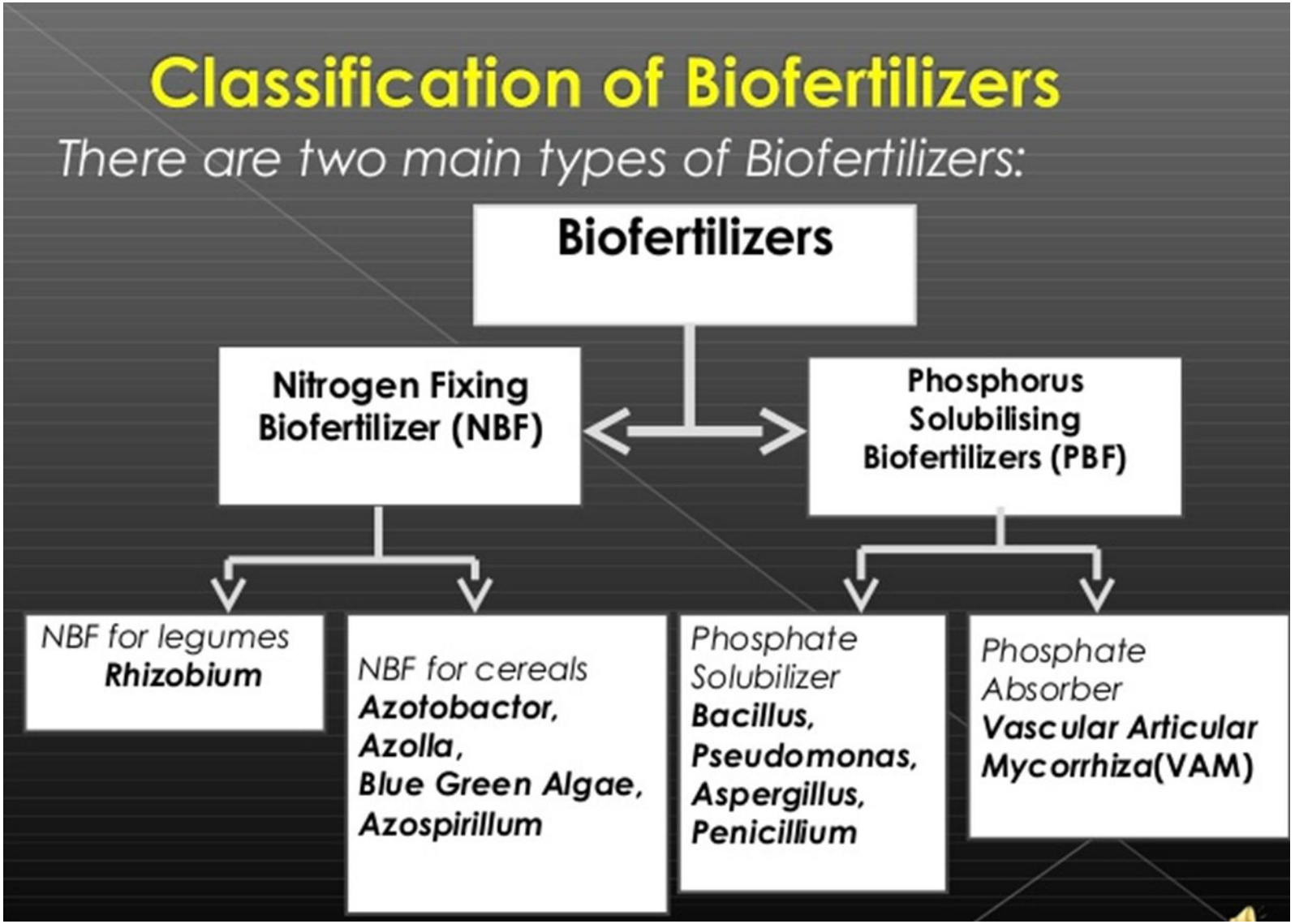


What is the need of using biofertilizers?

- Biofertilizers are required to ***restore the fertility of the soil***.
- Prolonged use of chemical fertilizers degrades the soil and affects the crop yield.

- Biofertilizers, on the other hand, ***enhance the water holding capacity*** of the soil and ***add essential nutrients*** such as nitrogen, vitamins and proteins to the soil.

- They are the natural form of fertilizers and hence, widely used in agriculture.


Classification of Biofertilizers
There are two main types of Biofertilizers:
Biofertilizers
Nitrogen Fixing Biofertilizer (NBF)
Phosphorus Solubilising Biofertilizers (PBF)
NBF for legumes
Rhizobium
NBF for cereals
Azotobactor,
Azolla,
Blue Green Algae,
Azospirillum
Phosphate Solubilizer
Bacillus,
Pseudomonas,
Aspergillus,
Penicillium
Phosphate Absorber
Vascular Articular Mycorrhiza(VAM)

Classification of Biofertilizers

S.N	Groups		examples
A	**N2 fixing Biofertilizer**		
	1.	Free-living	Azotobacter, Clostridium, Anabaena, Nostoc,
		Symbiotic	Rhizobium, Anabaena azollae
	3.	Associative Symbiotic	Azospirillum
B	**P Solubilizing Biofertilizer**		
	1.	Bacteria	*Bacillus subtilis, Pseudomonas striata*
	2.	Fungi	*Penicillium sp, Aspergillus awamori*
C	**P Mobilizing Biofertilizers**		
	1.	Arbuscular Mycorrhiza	*Glomus sp. , Scutellospora sp..*
	2.	Ectomycorrhiza	*Laccaria sp., Pisolithus sp., Boletus sp., Amanita sp.*
	3.	Ericoid Mycorrhiza	*Pezizella ericae*
D	**Biofertilizer for Micro nutrients**		
	1.	Silicate and Zinc solubilizers	*Bacillus sp.*
E	**Plant Growth Promoting Rhizobacteria**		
	1.	Pseudomonas	*Pseudomonas fluorescence*

TYPES OF BIOFERTILIZER

- **1. For Nitrogen**
  - **Rhizobium** for legumes crops
  - **Azotobacter**/Azospirillum for non legume crops
- **2. For Phosphorous**
  - Phosphatika for all crops to be applied with **Rhizobium, Azotobacter**, Azospirillum and Acetobacter
- **3. For enriched compost**
  - Phosphotika and **Azotobacter** culture

Nitrogen Biofertilizers

This group fixes nitrogen symbiotically.

- Nitrogen biofertilizers help to correct the nitrogen levels in the soil.
- Nitrogen is a limiting factor for plant growth because plants need a certain amount of nitrogen in the soil to thrive.
- Different biofertilizers have an optimum effect for different soils, so the choice of nitrogen biofertilizer to be used depends on the cultivated crop.

- E.g ***Rhizobia*** are used for legume crops,
  Azotobacter or Azospir*illum* for non-legume crops,
  Acetobacter for sugarcane and
  blue-green algae and Azolla for lowland rice paddies.

Phosphorus Biofertilizers

Just like nitrogen, phosphorus is also a limiting factor for plant growth.

- Phosphorus biofertilizers help the soil to reach its optimum level of phosphorus and correct the phosphorus levels in the soil.
- Unlike Nitrogen biofertilizers, the usage of phosphorus biofertilizers is not dependent on the crops cultivated on the soil.
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- ***Phosphatika*** is used for all crops with Rhizobium, Azotobacter, Azospirillum and Acetobacter.

Compost Biofertilizers

Combinations of microorganisms with compost act as a good biofertilizer which improves the fertility of soil and increases plant growth. Better results were produced by organisms in combinations like Azospirillum, Rhizobium and Azotobacter..

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- Suitable biofertilizers for compost use are cellulolytic fungal cultures and Phosphotika and Azotobacter cultures.

- A 100% pure eco-friendly organic fertilizer is ***Vermi Compost:*** this organic fertilizer has nitrogen, phosphorus, potassium, organic carbon, sulphur, hormones, vitamins, enzymes and antibiotics, which helps to improve the quality and quantity of yield.

ADVANTAGES OF BIOFERTILIZERS

- Renewable source of nutrients
- Sustain soil health
- Supplement chemical fertilizers.
- Replace 25-30% chemical fertilizers
- Increase the grain yields by 10-40%.
- Decompose plant residues, and stabilize C:N ratio of soil
- Improve texture, structure and water holding capacity of soil
- No adverse effect on plant growth and soil fertility.

DISADVANTAGES OF BIOFERTILIZERS

- Biofertilizers require special care for long-term storage because they are alive.
- must be used before their expiry date.
- If other microorganisms contaminate the carrier medium or if growers use the wrong strain, they are not as effective.
- Biofertilizers lose their effectiveness if the soil is too hot or dry.

- **Importance of Biofertilizers:**

1. Eco friendly.
2. In addition to N2 ,Provide certain PGP substances like hormones , vitamins,… .
3. Supplying N2 , continuously throughout the entire period of crop growth in the field under favorable conditions.
4. Without toxic effects.
5. When applied to soil improve the soil structure.
6. Low production cost.

Applications of Biofertilizers

Following are the important applications of biofertilizers:

- **Seedling root dip**

This method is applicable to rice crops. The seedlings are planted in the bed of water for 8-10 hours.

- **Seed Treatment**

The seeds are dipped in a mixture of nitrogen and phosphorus fertilizers. These seeds are then dried and sown as soon as possible.

- **Soil Treatment**

The biofertilizers along with the compost fertilizers are mixed and kept for one night. This mixture is then spread on the soil where the seeds have to be sown.


Thank you