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Popular Article

Biofertilizers application and Their Benefits

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Abstract

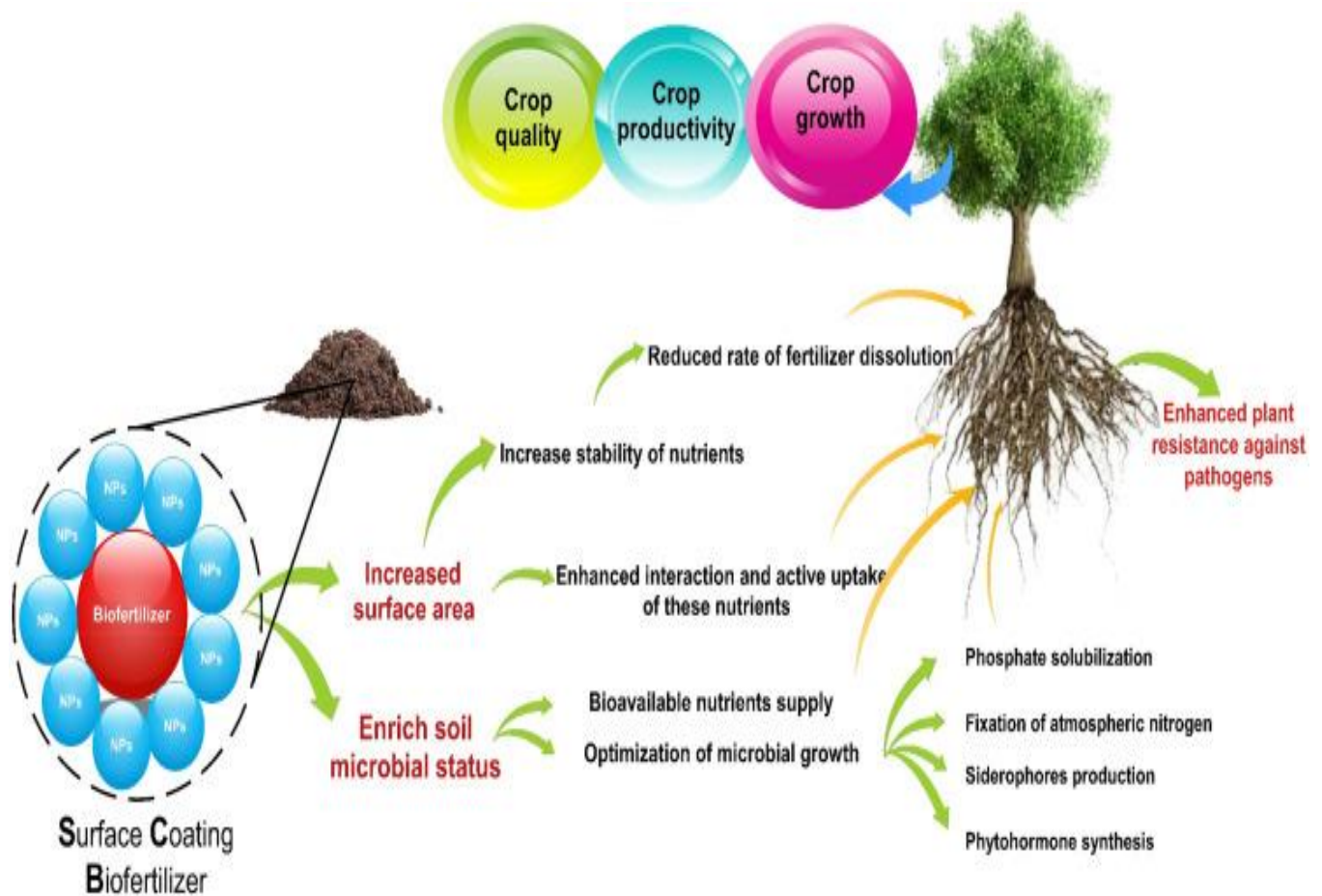
Biofertilizers, containing living microorganisms, offer a sustainable approach to enhance nutrient availability and promote plant growth. Unlike chemical fertilizers, they improve soil health and fertility naturally. This abstract explores the various types of biofertilizers, their application methods, and the diverse benefits they offer to agriculture and the environment. Biofertilizers offer a sustainable and environmentally friendly approach to enhance nutrient availability, promote plant growth, and improve soil health. Their diverse benefits make them an invaluable tool for sustainable agriculture and environmental conservation. As we strive towards a more sustainable future, biofertilizers are poised to play a crucial role in ensuring food security and environmental sustainability.

Key word: Biofertilizers, food security, Sustainable agriculture, soil health and fertility,

Introduction:

Biofertilizers are substances that contain living microorganisms. When applied to seeds, plants, or soil, they promote plant growth by increasing the availability of essential nutrients. 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 mycorrhizal fungi, blue-green algae, and bacteria. Mycorrhizal fungi preferentially withdraw minerals from organic matter for the plant whereas cyanobacteria are characterized by the property of nitrogen fixation. Nitrogen fixation is defined as a process of converting di-nitrogen molecules into ammonia. For instance, some bacteria convert nitrogen to ammonia. As a result, nitrogen becomes available for plants.





Types of Biofertilizers

1. Nitrogen-Fixing Bacteria (symbiotic nitrogen-fixing bacteria)

Nitrogen-fixing bacteria play a vital role in the nitrogen cycle, fixing more than 90% of all nitrogen. Nitrogen is a component of proteins and nucleic acids, and is essential for life on Earth. However, most organisms can't use nitrogen in its atmospheric form. Symbiotic nitrogen-fixing bacteria converts atmospheric nitrogen into a form usable by plants. Rhizobium is one of the vital symbiotic nitrogen-fixing bacteria. Here bacteria seek shelter and obtain food from plants. In return, they help by providing fixed nitrogen to the plants. Examples: Rhizobium, Azotobacter, Azospirillum.

2. Phosphorus-Solubilizing Microorganisms (PSM)

The phosphate solubilizing microorganisms (PSM) are the important contributors to soil P pools which constitute 0.4% to 2.4% of total P in arable soils. They also decompose the organic residue by immobilization and mineralization thus maintaining equilibrium with soil solution P pools. Converts insoluble phosphorus in soil into a soluble form, improving plant uptake. - Examples: Bacillus, Pseudomonas.

3. Potassium-Mobilizing Bacteria:

Potassium mobilizing bacteria (KMB) are microorganisms that help plants absorb potassium by converting insoluble potassium compounds into a more soluble form. KMB are also known as potassium solubilizing bacteria or potassium dissolving bacteria. Potassium mobilizing bacteria makes potassium more available to plants. Examples: *Frateruria aurantia*.

4. Mycorrhizal Fungi:

Mycorrhizal fungi are beneficial fungi that form a symbiotic relationship with plant roots, providing plants with nutrients and water while receiving sugars in return. This mutually beneficial arrangement is called a mycorrhiza, which means "fungal root". Mycorrhizal fungi Improves nutrient absorption, especially phosphorus, and enhances plant root development.

5. Organic Waste Decomposers:

Organic waste decomposers are natural materials that help break down organic waste into compost, which can be used to improve soil health and plant growth. Use of waste decomposer in rice fields helped farmers to get relatively higher yields. This technology has also reduced the input cost and use of chemical fertilizers that improved the profitability of rice cultivation.



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. Plant roots are dipped in a biofertilizer solution before transplantation to ensure effective nutrient absorption.

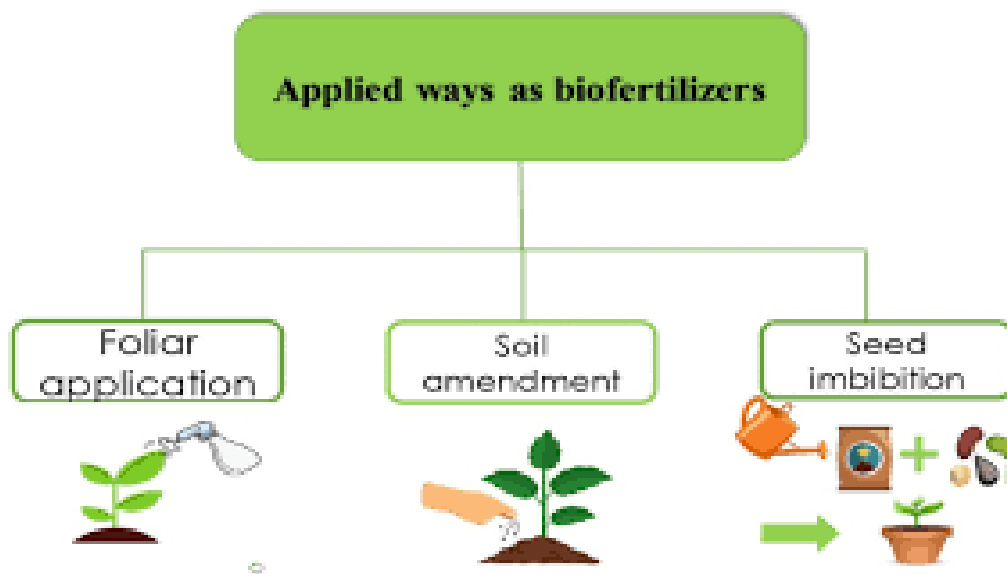


Seed Treatment

The seeds are dipped in a mixture of nitrogen and phosphorus fertilizers. These seeds are then dried and sown as soon as possible. Seeds are coated with a biofertilizers solution before planting to improve the seed germination and early growth.

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. Biofertilizers are mixed with compost or applied directly to soil to enhance the soil microbial activity.



Benefits of Biofertilizers

- Biofertilizers are important for the following reasons:
- Improves soil health and fertility.
- Reduces the need for chemical fertilizers, promoting sustainable agriculture.
- Biofertilizers improve the soil texture and yield of plants
- Environmentally friendly and cost-effective.
- They do not allow pathogens to flourish.
- They are eco-friendly and cost-effective
- Biofertilizers are proved to be effective even under semi-arid conditions

Key Considerations for Effective Use

- Biofertilizers should be stored in a cool and dry place.
- Apply during the early morning or evening to avoid sunlight damage.
- Avoid using chemical fertilizers or pesticides immediately after biofertilizer application.

