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## Biofertilizers and Their Future

\*Arijit Acharjee and Haobijam James Watt

School of Agriculture, Lovely Professional University, Phagwara, Punjab, India

\*Corresponding Author's email: [arjitacharjee761@gmail.com](mailto:arjitacharjee761@gmail.com)

**B**iofertilizers are natural fertilisers. These fertilisers have helpful microorganisms that help plants grow by making the soil more fertile and giving them the nutrients they need. They are good for the environment, promote farming that lasts, and save money. In the process of nitrogen fixation, nutrient absorption, and disease control, various types of biofertilizers, such as Rhizobium, Azotobacter, Azospirillum, and Mycorrhizae, play important roles. Even though they take a long time to work and need certain conditions to work, they are a great way to keep soil healthy and boost crop production because of the long-term benefits they offer. Organic and environmentally friendly farming will use biofertilizers in the future.

### Introduction

The term "biofertilizer" refers to natural products that contain living microorganisms that increase the amount of nutrients in the soil, thereby facilitating the growth of plants. Chemical fertilisers, on the other hand, are bad for the environment and can hurt the soil's ability to grow plants. They make the soil healthier, promote organic farming, and cut down on the use of chemicals. As people learn more about how to keep soil healthy, biofertilizers are becoming a big part of sustainable farming and the future of farming.

### Features of Biofertilizers

- Made of beneficial microorganisms like bacteria, fungi, and algae.
- Improve soil fertility and nutrient availability.
- Help recycle nutrients naturally in the soil.
- Safe for the environment and support organic farming

### Different Types of Biofertilizers

- Azospirillum: This type is used for non-leguminous crops like maize, rice, and wheat. It also helps in nitrogen fixation and promotes root development.
- Azotobacter: It is a free-living nitrogen-fixing bacteria used for crops like cotton, vegetables, and cereals.
- Blue-Green Algae (Cyanobacteria): These are used mostly in paddy fields as they add nitrogen naturally to the soil.
- Phosphate Solubilizing Microorganisms (PSM): These help to convert unavailable forms of phosphorus into a form that plants can easily absorb.
- Mycorrhiza: It is a fungus that forms a relationship with plant roots and helps plants absorb water and nutrients more efficiently.

### Benefits of Using Biofertilizers

Biofertilizers, which are made of living microorganisms and are good for the environment, can help the soil become more fertile and plants grow better. They work as a cheap substitute for chemical fertilisers and help keep the soil and water cleaner. They give plants the nutrients they need, help crops grow, and support farming that is good for the environment.

Biofertilizers also make the soil healthier by encouraging the growth of helpful microbes and adding more organic matter.

### Disadvantages of Biofertilizers

Biofertilizers work slowly as the microorganisms take time to grow and multiply. They are often crop-specific and may not perform well under extreme soil or weather conditions. Their shelf life is short and they need proper storage. Sometimes, introduced microbes compete with native ones, reducing their effectiveness. In addition, production and quality control can be challenging, making them less accessible to some farmers.

### Types of Microbes Used as Biofertilizers

Several types of microorganisms are used as biofertilizers. Rhizobium lives in legume roots and fixes nitrogen to improve soil fertility. Azotobacter and Azospirillum also fix nitrogen and promote root growth in non-legume crops. Mycorrhizae are fungi that help plants absorb nutrients and water more efficiently. Bacillus subtilis and Pseudomonas fluorescens protect plants from diseases and support healthy growth. Trichoderma is a fungus that controls soil-borne diseases and enhances plant growth.

### Conclusion

Biofertilizers are a natural and environmentally friendly method of enhancing the fertility of the soil and the growth of crops. They lessen the requirement for the use of chemical fertilisers, promote organic and sustainable farming practices, and contribute to the preservation of healthy soil. Because of the numerous advantages they offer, biofertilizers are poised to play a significant part in the agricultural industry of the future.

### References

1. Singh M., Jha S., Pathak D., & Maisnam G. (2025) Advancing biofertilizers: the evolution from single-strain formulations to synthetic microbial communities (SynCom) for sustainable agriculture. *Applied Soil Ecology* 171: 104396.
2. Mehra A. (2020). Biofertilizers market worth \$4.5 billion by 2026. Market sand Markets. Access on 10<sup>th</sup> May 2025 from <https://www.prnewswire.com/news-releases/biofertilizers-market-worth-4-5-billion-by-2026--exclusive-report-by-marketsandmarkets-301299679.html>