AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 02, Issue: 11 (November, 2025)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Biofertilizers in Enhancing Growth and Yield of Fruit Crops

*Abhishek Meena and Tikam Das Vaishnav
RNT College of Agriculture, Kapasan (MPUAT, Udaipur), Rajasthan, India
*Corresponding Author's email: abhishekmeena951157@gmail.com

Fruit crops require long-term nutrition and healthy soil conditions for sustained growth and productivity. Continuous use of chemical fertilizers leads to soil degradation, reduced microbial activity, and lower fruit quality. To overcome these problems, biofertilizers have emerged as eco-friendly, cost-effective, and sustainable alternatives. Biofertilizers consist of beneficial microorganisms such as *Rhizobium*, *Azotobacter*, *Azospirillum*, *Phosphate-Solubilizing Bacteria (PSB)*, *VAM (Vesicular Arbuscular Mycorrhizae)*, *Pseudomonas*, *and Trichoderma*. These microbes help in nutrient fixation, solubilization, hormone production, disease suppression, and improvement of soil fertility—leading to better growth and higher yield in fruit crops.

Concept & Mechanism of Biofertilizers

Biofertilizers enhance plant growth by performing biological processes in the rhizosphere (root zone):

Major Functions of Biofertilizers

- Biological Nitrogen Fixation
- Phosphate Solubilization & Mobilization
- Potash Mobilization
- Production of Plant Growth Hormones (IAA, GA)
- Improvement of Root Development
- Enhancement of Soil Organic Matter
- Disease Suppression & Stress Tolerance

These processes help fruit crops grow naturally, without heavy dependence on chemical fertilizers.

Types of Common Biofertilizers Used in Fruit Crops

Biofertilizer	Major Role	Suitable Fruit Crops
Azotobacter	Nitrogen fixation	Mango, Guava, Citrus
Azospirillum	Root development	Banana, Papaya
Rhizobium	Symbiotic nitrogen fixation	Leguminous fruit crops
PSB / PSM	Solubilizes phosphorus	Mango, Grapes
VAM Fungi	Water & P uptake	Papaya, Grapes, Banana
Trichoderma	Disease control	Pomegranate, Citrus
Pseudomonas	Stress resistance	All major fruits

Role of Biofertilizers in Fruit Crop Production

1. Improved Nutrient Availability

- Biofertilizers convert atmospheric nitrogen & locked nutrients into plant-available forms.
- **Example:**

✓ *Azotobacter* improves N supply in mango & citrus.
✓ *PSB* enhances phosphorus availability in grapes.

✓ *VAM fungi* increase uptake of P, Zn, & water in papaya & banana.

2. Improved Root Growth & Development

Biofertilizers stimulate cell division and root elongation. Deeper roots mean **better nutrient absorption** and **drought resistance**.

- VAM fungi increase root surface area.
- PSM improves early plant vigor in nurseries.

3. Higher Yield & Productivity

Biofertilizers improve metabolic activity and nutrient availability, leading to **10–30% yield increase**.

Fruit Crop	Biofertilizer Combination	Yield Increase
Mango	Azotobacter + PSB	20–25%
Banana	Azospirillum + VAM	Increased bunch weight
Grapes	VAM + PSB	Larger berry size
Papaya	PSB + VAM	Early flowering & maturity

4. Improved Soil Health

Long-term use of biofertilizers results in:

- Higher organic matter
- Better soil structure
- Increased water retention
- Enriched microbial population
- Healthy soil ecosystem

5. Reduction in Chemical Fertilizer Cost

Biofertilizers can **reduce chemical fertilizer usage by 20–30%**, leading to lower input costs and sustainable farming practices.

6. Better Fruit Quality

Biofertilizers improve:

- Fruit color, aroma & taste (TSS)
- Vitamin and mineral content
- Shelf life and firmness

7. Disease & Stress Resistance

- *Trichoderma* and *Pseudomonas fluorescens* protect fruit crops from **root rot, wilt, and fungal diseases**.
- Improve tolerance to **heat, drought, and salinity stress**.

Recommended Biofertilizers for Major Fruit Crops

Fruit Crop	Recommended Biofertilizers	Method of Application
Mango	Azotobacter + PSB	Pit & soil application
Banana	Azospirillum + VAM	Drip & root dipping
Citrus	Azotobacter + VAM	Nursery treatment
Grapes	VAM + PSB	Drip irrigation
Guava	Azotobacter + PSB	Pit application
Pomegranate	Azotobacter + Trichoderma	Soil treatment
Papaya	PSB + VAM	Root treatment

Methods of Application

- Seedling root dipping
- Soil treatment during pit preparation
- Drip irrigation (Fertigation)
- FYM + Biofertilizer mixture
- Foliar spray (for liquid formulation)

Advantages of Biofertilizers

- Cost-effective & eco-friendly
- Improves long-term soil fertility
- Increases fruit yield & vigour
- Enhances fruit quality & nutrition
- Safe for humans and environment
- Reduces chemical residues
- Promotes sustainable horticulture

Conclusion

Biofertilizers are highly beneficial for sustainable fruit production. They improve plant growth, soil fertility, yield, fruit quality, and resistance to diseases while reducing the use of chemical fertilizers. With increasing demand for organic and residue-free fruits, biofertilizers will become an essential component of modern horticulture and orchard management.