

Contribution of Biofertilizers in Organic Certification of Horticultural Produce

***Tikam Das Vaishnav¹, Shruti², Sohin Hashmi² and Divya Menariya³**

¹Assistant Professor, RNT College of Agriculture, Kapasan (MPUAT, UDAIPUR)

²M.Sc. (Hort.) Scholar, Dept. of Horticulture, SHUATS, Prayagraj (U.P.)

³B.Sc. (Ag) Students, RNT College of Agriculture, Kapasan

***Corresponding Author's email: spstarpaval@gmail.com**

Organic horticulture emphasizes the production of safe, chemical-free fruits and vegetables through ecologically sustainable methods. Biofertilizers—microbial inoculants containing beneficial microorganisms—play a crucial role in improving soil fertility, nutrient availability, and plant productivity without using synthetic fertilizers. Their application is essential to meet organic certification standards. This article discusses the role of biofertilizers in securing organic certification, their mechanisms of action, ecological importance, application methods, and their contribution toward sustainable horticultural production.

Introduction

Organic certification is a legal mechanism that ensures horticultural produce is cultivated under approved organic standards, without chemical pesticides or synthetic fertilizers. Horticultural crops such as fruits, vegetables, spices, flowers, and plantation crops have high demand in domestic and international organic markets. Biofertilizers, due to their eco-friendly nature, cost-effectiveness, and soil-health improvement abilities, have become an essential input for organic farming. Their role aligns with the principles of “Soil Health – Nutrient Recycling – Safe Food Production”, which are key components of organic certification.

Concept of Biofertilizers in Organic Farming

Biofertilizers are **living microbial formulations** that, when applied to the rhizosphere, seeds, or soil, enhance nutrient uptake and promote plant growth naturally.

Major Categories of Biofertilizers Used in Horticulture

| Category | Microorganisms | Role |
|---------------------------|--------------------------------------|-------------------------------------|
| Nitrogen-fixers | Rhizobium, Azotobacter, Azospirillum | Fix atmospheric N ₂ |
| Phosphate solubilizers | Bacillus, Pseudomonas, PSF | Convert insoluble P to soluble form |
| Potassium mobilizers | Fratureia aurantia | Help K availability |
| Mycorrhiza (AMF/VAM) | Glomus, Gigaspora | Improves P & water uptake |
| Zinc solubilizers | Thiobacillus, Bacillus sp. | Makes micronutrients available |
| Consortium biofertilizers | Mixed strains | Used in fruits & vegetables |

Importance of Biofertilizers in Organic Certification

Organic certification bodies (NPOP-India, USDA-NOP, EU Organic) **strictly prohibit chemical fertilizers**, making biofertilizers compulsory. Their use helps in the following ways:

Ensuring Chemical-Free Production

Biofertilizers replace chemical fertilizers, helping farmers comply with **organic norms**.

Improving Soil Fertility & Biological Activity

They enhance:

- Soil structure & aeration
- Organic matter breakdown
- Beneficial microbial population
- Nutrient mineralization

Nutrient Efficiency

Biofertilizers support:

- Nitrogen fixation (20–40 kg N/ha)
- Phosphorus solubilization
- Micronutrient mobilization
- Better nutrient uptake efficiency for horticultural crops

Quality Improvement of Produce

Biofertilizers enhance:

- Fruit size, color, aroma
- TSS (sugar content)
- Vitamin content
- Shelf life (important for certification)

Cost-Effective & Sustainable

They reduce dependency on chemical fertilizers, making **organic production economically viable**.

Mechanisms of Action in Horticultural Crops

| Mechanism | Role in Organic Certification |
|--------------------------|------------------------------------|
| Nitrogen Fixation | Replaces urea & chemical N |
| Phosphate Solubilization | Increases P availability naturally |
| Mycorrhiza Symbiosis | Helps water & nutrient absorption |
| Hormone Production | Boosts root growth & flowering |
| Disease Suppression | Reduces chemical pesticide need |

Example Crops

Mango, banana, tomato, papaya, grapes, citrus, brinjal, capsicum, pomegranate, strawberry.

Role of Biofertilizers in Achieving Organic Certification

1. **Organic Nutrient Management Plan** → must include biofertilizers & manures.
2. **Input Traceability** → biofertilizers come with certificates and batch details.
3. **Residue-Free Produce** → helps pass certification tests.
4. **Soil Biological Health** → improves microbial biomass – a key certification parameter.
5. **Premium Market Value** → certified organic produce sells at higher price.

Application Methods in Horticultural Crops

| Method | Dosage |
|-------------------------|--------------------------------|
| Seed treatment | 20–25 g/kg seed |
| Nursery root dip | 1–2% suspension for 30 minutes |
| Soil application | 5–10 kg/acre mixed with FYM |
| Drip fertigation | Liquid formulation use |
| Foliar spray (for PGPR) | 2–3 ml/L water |

Challenges in Adoption

- Poor-quality biofertilizers in local markets
- Lack of awareness among farmers
- Requires proper storage (cool & dark place)
- Response is slow compared to chemicals
- Must be **certified & GMO-free**

Conclusion

Biofertilizers are vital components of organic certification in horticultural crops. They enhance nutrient availability, soil fertility, productivity, and quality of produce—without causing environmental harm. With increasing global demand for chemical-free fruits and vegetables, biofertilizers will become the backbone of certified organic horticulture in the future.

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