

## Factors influencing the efficacy of biofertilizers

Omprakash Tatarwal\*

ICAR- Indian Institute Of Maize  
Research- Ludhiana, Punjab 141  
004



### Article History

Received: 15. 01.2025

Revised: 20. 01.2025

Accepted: 25. 01.2025

This article is published under the  
terms of the [Creative Commons  
Attribution License 4.0.](#)

### INTRODUCTION

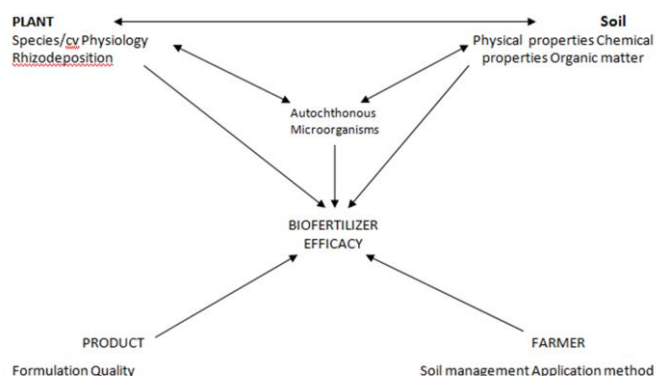
The term 'Biofertilizer' itself denotes that, it is a 'Live Fertilizer'. The efficacy of Biofertilizers different factors are influenced in biofertilizers efficacy such as microbial characteristics, effectiveness, consistency, limitations of biofertilizers efficacy not only at laboratory and production level as well as at field level too. Some factors are affecting the efficacy of biofertilizers such as- Host plant, Soil Fertility and Cropping practices.

#### Biological and environmental factors

**Host plant** :- Biofertilizers are very specific to be effective to the particular crop apply as recommended crop of the biofertilizer it is not apply in the all crops such as Rhizobium for legumes, Acetobactor for Sugercane and Sorghum, Azospirillum for cereals crop etc.

**Soil Fertility** :- Efficiency of biofertilizers is markedly dependent on soil character eg. Moisture content , PH, temperature, organic matter and types of resident microorganisms when these factors are unfavourable for biofertilizers may not be effective in increasing the soil fertility.

**Fig:** Major factors affecting the efficacy of biofertilizers in improving crop nutrition, growth and yield



## Factors Affecting the Biofertilizers Production

:

**microbial characteristics :-** soil microorganisms belonging to several groups such as bacteria, fungi, actinomycetes, yeast and protozoa colonizing the rhizosphere or the plant tissues, in this all groups of microbes are different characteristics for each other which can be utilized for the production of biofertilizers such as :-

(i) Viable cell count - The number of living cells is counted by spread plate or drop plate methods. Doing spread plate by making serial dilutions from  $10^{-1}$  –  $10^{-6}$  or  $10^{-7}$  (depend on concentration) then three replicates of 0.1 ml of aliquot from  $10^{-6}$  and  $10^{-5}$  are spread over the YMA+CR plates. Plates are incubated in incubator (28 – 30°C) or at room temperature for 7 days.

(ii) Contamination level – In case of *Rhizobium* check purity by streaking culture on glucose peptone agar plate, and incubate for 24 hours at 30 °C. No growth or poor growth should be obtained on GPA. Good growth and color changes can be expected from contaminants.

### Chemical characteristics :-

pH - it is a important chemical characteristics of biofertilizers such as slow-growing rhizobia such as rhizobia for soybeans, mung-bean and peanut produce a little basic compounds. After incubation, the pH will increase. (example, pH before growing = 6.0, after growing pH = 6.1 - 6.2). If broth pH decreases, it means some contaminants occur; lower pH indicates presence of contaminants.

### Efficiency characteristics:-

**Nodulation test :** +ve for *Rhizobium*

**Nitrogen fixed of sucrose consumed:** For *Azotobacter* (min 10 mg N/g gluc.)

**Formation of pellicle in semi solid medium:** For *Azospirillum* (white), *Acerobacter* (yellow)

### Nutrient solubilizers:

(a) **Solubilization zone (mm):** For PSB (5/3), ZSB (10/3), KSB (10 mm/10 mm)

(b) **P-phosphorus (%) solubilized by spectrophotometer:** For PSB (min. 30%)

### Physical Characteristics

#### Moisture content :-

The optimum moisture content of biofertilizers is between 30-40%. At low moisture rhizobia will die rapidly. If moisture is high, inoculant may

stick to the plastic bag and, thus, not good for rhizobial growth.

**Particle size:** biofertilizers carrier particle size not more than 72-75 mesh higher the particle size reduce the efficacy of biofertilizers

**Temperature :-** Store the packets of biofertilizers in cold place direct sun or hot wind affect the efficacy of the biofertilizers .

### Some Other Factors are affect the Efficacy of biofertilizers

**Time of uses :-** open the packets of biofertilizers only just before use, apply entire packet of biofertilizer in one application. Treat the seeds (seed coating) or seedling (dipping) under shade only. Avoid direct contact of chemical fertilizers and pesticides. In case of seed treatment with pesticides is essential, treat the seeds first with the pesticides followed by treatment of biofertilizer at the rate 2-3 time more of recommended dosage. To obtain best effect, treatment with biofertilizers is advised 3-4 hour before sowing.

**Mode of application :-** For convenience in application of biofertilizers, in case of soil application, admix recommended dose of biofertilizer with 50 kg pulverized soil or FYM and broadcast.. Every biofertilizer responds better if soil is enriched with sufficient quantity of available phosphate (apply superphosphate), organic matter (apply FYM), soil of neutral pH (apply lime).

### Limitations

- ✓ More time required to kill the insects as compared to chemical insecticides.
- ✓ Lack of knowledge and suspicion in farmers and dealers.
- ✓ Application needs to coincide with high RH and fungicide free period.
- ✓ Being a microbial agent it requires proper storage to maintain viability.

### CONCLUSION

The efficacy of biofertilizers, which are microbial inoculants that enhance soil fertility, is influenced by several factors related to the microorganisms, the soil, and the environment. Key factors include the microbial strain's viability and effectiveness, soil properties (pH, temperature, moisture, organic matter content), and environmental conditions (temperature, moisture, oxygen availability).