

## Biofertilizer—Why Are not You Famous?

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We are already familiar with the Greek word *bios* meaning life. As the conventional definition goes, fertilizers are chemicals applied in the soil to enhance crop growth and development. ‘Biofertilizer’ is a life containing fertilizer, yes indeed. So how come a chemical contains life? In the form of microorganisms. Tiny microscopic beings with unbelievable capacity of fixing the primary as well as secondary plant nutrients when brought about in a solution containing sufficient numbers, it acts as a living thing supplying the plants the nutrients they need.



### Can Any Solution Containing Microorganisms Be Used as Biofertilizers?

of course not. It has to fulfil some specific criteria,

- Right type of microorganisms- those who are biologically proven to fix sufficient amounts of nutrients for plant use
- Sufficient number-  $10^9$  CFU (Colony forming units) per mL of the broth
- Active Strains- they must be in the log phase of growth and very much alive.

### Examples

- ❖ Cyanobacteria, Azolla, *Rhizobium sp.*, *Azotobacter sp.*, *Azospirillum sp.* :Can fix 20-60 Kgs of N per ha.
- ❖ *Frateuria aurantia*, *Pseudomonas sp.*, *Bacillus sp.*; Can fix 20-30 Kgs of K per ha.
- ❖ *Aspergillus sp.*, *Penicillium sp.*, *Pseudomonas sp.*; Can fix 15-20 Kgs of P per ha.
- ❖ Mycorrhizal biofertilizers; Can fix Zn, Cu, P, K

### Merits Of Using Biofertilizers Instead of Chemical Fertilizers:

- These help in improving soil health and sustainability. It has been scientifically proven that adding biofertilizers can make the soil stable upto 40yrs which is only 10yrs if chemical fertilizers are used alone.
- Helps in plant metabolic processes by harboring PGPRs (Plant Growth Promoting Rhizobacteria) while chemical fertilizers can only increase the yield.
- Plants or soil can tolerate an excess of biofertilizers but once excess chemicals are administered, it becomes toxic for plants or the soil flora.
- These are less expensive as they are required in very small quantities and they require less energy for production as compared to chemical fertilizers.

### Constraints of Using Biofertilizers

- The yield increase is not easily detectable, i.e. it isn't a share market, has a fixed but slow rate of interest.
- Not all biofertilizers fulfill the required criterion, to incur profit sometimes the manufacturer may not use proper raw materials which are more costly.
- Lack of proper storage and transport facilities, so the biological activity of the organism decreases, and farmers are reluctant to use it.
- Lack of proper methods of application leads to degraded quality and undesirable soil reactions.
- Lack of right type of microorganisms for a specific cross inoculation group- *Rhizobium phaseoli* the Phaseoli Bean rhizobia grows under very specific conditions, that too in limited regions, so it's culture and application is challenging.

### Why Are Biofertilizers Not Farmer Friendly?

- Biofertilizers are not supplements, they are complementary to chemical fertilizers:

Biofertilizers alone cannot increase the yield, farmers tend to mistake that. They can reduce the usage of chemical fertilizers by 25%.

$1/3 \text{ biofertilizers} + 2/3 \text{ chemical fertilizers} =$   
 Yield by 1 unit of chemical fertilizer



- **Lack of soil organic matter:** Microbes need food for their metabolic activities that they derive from soil organic matter. But modern-day soil is unhealthy as it acts as a restraint for proliferating microbes.
- **Specificity:** Unlike chemical fertilizers, not all biofertilizers can be applied to different plants. For specific plants, specific biofertilizers are required to get maximum returns.
- **Elaborate process of application:** As these are living materials, they mustn't be applied along with chemicals like insecticides, pesticides, conventional fertilizers. Also, they must be applied just before or at the time of sowing. Not following the above conditions will lead to death of the microorganisms present and it will render the product nonviable.
- **Short life span:** Unlike chemical fertilizers, which can be stored and utilized in the crops of successive seasons, biofertilizers have a short lifespan of 6 months or rarely upto a year under no special storage facilities.
- **Economy of farmer:** Indian farmers are too poor to provide special facilities for application and storage of biofertilizers and they find it easier to apply chemical fertilizers instead.
- **Lack of tech-savy-ness of farmers:** Indian farmers are not properly well equipped to utilize biofertilizers, so as the technical officers employed in the job. Proper guidance is missing.
- **Fear of Experimentation:** Indian farmers are familiar with chemical fertilizers and they show a reluctance to use biofertilizers as they aren't familiar with what the results might be.

### **Measures That Should Be Taken to Make Biofertilizers More Famous Among the Farming Community of India:**

The Government should have strict measures for the reduction in the use of chemical fertilizers as they not only harm the soil, but harm the entire biosphere. Also, guidance should be provided regarding the application and use procedure to the farmers, their benefits more clearly explained. Local training or advertisement sessions can be also proved useful.