Bio-fertilizer applications in India: Current status and future prospects

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Biofertilizers in Indian Agriculture

- India is one of the 12 mega-biodiversity countries of the world. With only 2.5% of the land area it already accounts for 7-8% of the recorded species of the world. **Indian soils are losing C and hence its biodiversity is critically affected.**

- As population is increasing, to increase the food production in India will require additional fertilizers (N+P+K). Visualizing the economic burden and environmental cost of applying this huge quantity of additional fertilizer, even if a small part of this increased demand if can be met from biological sources like biofertilizers, will have large impact.

- Biofertilizers are known to not only improve yields and produce quality **but also improve nutrient use efficiency.**

- The use of cheap and eco-friendly inputs like biofertilizers is especially important for India where most of the farming will continue to be in the hands of small farmers.
## Extent of benefits rendered by microbial inoculants

<table>
<thead>
<tr>
<th>Microorganisms used as biofertilizer</th>
<th>Nutrient fixed (kg/ha/year)</th>
<th>Beneficiary crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhizobium</td>
<td>50 to 300</td>
<td>Groundnut, Soybean, Redgram, Greengram, Black-gram, Lentil, Cowpea, Bengal-gram and Fodder legumes</td>
</tr>
<tr>
<td>Azotobacter</td>
<td>0.026 to 20</td>
<td>Cotton, Vegetables, Mulberry, Plantation Crop, Rice, Wheat, Barley, Ragi, Jowar, Mustard, Safflower, Niger, Sunflower, Tobacco, Fruit, Spices, Condiment, Ornamental Flower</td>
</tr>
<tr>
<td>Azospirillum</td>
<td>10-20</td>
<td>Sugarcane, Vegetables, Maize, Pearl millet, Rice, Wheat, Fodders, Oil seeds, Fruit and Flower</td>
</tr>
<tr>
<td>Blue Green Algae</td>
<td>25</td>
<td>Rice, banana</td>
</tr>
<tr>
<td>Azolla</td>
<td>900</td>
<td>Rice</td>
</tr>
<tr>
<td>Phosphate solubilizing bacteria and fungi</td>
<td>Solubilize about 50-60% of the fixed phosphorus in the soil</td>
<td>All Crops (non specific)</td>
</tr>
</tbody>
</table>
Biofertilizer production at different zones of India

- South Zone
- West Zone
- North Zone
- East Zone
- North East Zone

Carrier based biofertilizer (MT)

Recent introductions in biofertilizer in India

- *Acetobacter diazotrophicus* – Endophytic N-fixer in sugarcane
- K-mobilizer (*Fraturia* and *Bacillus sp*)
- Zn-solubilizer (*Pseudomonas*, *Bacillus* and *Thiobacillus*)
- EM- Effective microorganisms – a mixture of Yeasts, *Lactobacillus* and *Rhodopseudomonas*. Excellent for quick residue degradation and fixed nutrient solubilization
Biofertilizer promotion schemes

• Government of India has been implementing the scheme for the promotion of bio-fertilizers since 7th Five Year Plan. Under this scheme, one national centre-NCOF and six regional centres-RCOFs have been established.

• The main function of these centres includes the promotion of bio-fertilizer through training, demonstration and supply of 10 efficient culture for production of bio-fertilizers.

• The total estimated current demand for bio-fertilizers in India is 18,500 tonnes per year, whereas estimated production is about 10,000 tonnes per year.
## Financial support for biofertilizer production

<table>
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<tr>
<th>Component</th>
<th>Pattern of assistance</th>
</tr>
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<tbody>
<tr>
<td>1. Setting up of State of art Biofertilizer units</td>
<td>100% Assistance to State Govt Agencies up to a maximum limit of Rs.160 lakh /unit. 25% of cost limited to Rs.40 lakh/unit for individuals/private agencies through NABARD</td>
</tr>
<tr>
<td>2. Setting up of Bio-fertilizer testing Quality Control Laboratory (BOQCL) or Strengthening of existing Laboratory under FCO.</td>
<td>Assistance up to Rs. 85 lakh for new laboratory and up to a maximum limit of Rs. 45 lakh for strengthening of existing infrastructure to State Government Laboratory.</td>
</tr>
<tr>
<td>3. Promotion of Biofertilizer on farmer’s field</td>
<td>50 % of cost subject to a limit of Rs. 5000/- per ha and Rs. 10,000 per beneficiary.</td>
</tr>
</tbody>
</table>
All India Network Project on Soil biodiversity - Biofertilizer

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Recent Development in Biofertilizer Technology in India

Maize seed coated with Azospirillum, Phosphobacteria and Pseudomonas
Green gram seed coated with Rhizobium, Phosphobacteria and Pseudomonas
Soybean seed coated with Rhizobium, Phosphobacteria and Pseudomonas
Training of tribal farmers on application of biofertilizers
Summary and conclusion

✓ Our dependence on chemical fertilizers and pesticides sustained and encouraged the growth of chemical input industries which not only affected human health but also disturb the ecological balance.

✓ Shifting the focus from chemical fertilizers to biological fertilizers will lead to proliferation of biofertilizer industries and incentivizing the ecological benefits will encourage the farming community for application of biofertilizers.

✓ Biofertilizers would play a key role in productivity and sustainability of soil and protect the environment as eco-friendly and cost effective inputs for the farmers.

✓ Strain improvement using genomic and biotechnological tools for better nutrient fixation/solubilization and plant growth promoting attribute will further lead to gain confidence in biofertilizers by stakeholders.
✓ Selection of effective and competitive multi-functional bio-fertilizers for a variety of crops.
✓ Quality control system for the production of inoculants and their application in the field.
✓ Study of microbial persistence of biofertilizers in soil under stressful environments conditions.
✓ Establishment of "Bio-fertilizer Act" and strict regulation for quality control in markets and application.
Thank you for your attention