BIOFERTILIZERS

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Insights of Biofertilizers

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Introduction

Biofertilizers are the preparations containing live or latent cells of efficient strains of micro-organisms used for seed or soil applications with the objective of increasing the number of such microorganisms in soil or rhizosphere and consequently improving the extent of microbiologically fixed nitrogen and other nutrients for the plant growth and development. They are in trend because they are environmental friendly, no nitrogen losses through denitrification, volatilization and leaching, cheap source, increase nitrogen fixation and nutrient availability etc. Some of the examples of biofertilizers are blue green algae, VAM., azospirillum, azotobacter etc.

Why Biofertilizer is need of present?

With the advent of HYV seeds, resulting into green revolution, countries have achieved self-sufficiency in food production. This all became possible with the use of large amounts of fertilizers, pesticides, irrigation water etc, which latently affected the environment. Increasing population and decreasing landholdings forced farmers to produce maximum to maximum food production to feed such a large population, without considering the

negative effects of these practices to present and future generations. This can be sensed in present times by various ecological imbalances. Some of the cynical effects of Chemical fertilizers experienced are as follows;

1. Their production efficiency is less as compared to Bio-fertilizer
2. Made up of fossils that are non- renewable source
3. Chemical fertilizers are energy intensive
4. Cost of Production is high
5. Contaminate groundwater
6. Deteriorates soil health
7. Their losses are high
8. Entering food chain
9. Long shelf life
10. Air pollution

Classification: For better understanding

- Nitrogen Fixing
  - Symbiotic: Rhizobium
  - Non symbiotic: Azotobacter, Azolla, BGA, Azospirillum
- Phosphorus mobilizing
  - Phosphorus solubilizing: Pseudomonas straita, Bacillus megaterium
  - Phosphorus absorbers VAM
- Plant Growth Promoting Rhizobacteria
  - Arthrobacter, Bacillus
- Sulphur solubilizing bacteria
  - Thiobacillus, Thiooxidans

Characters, crop associations and contribution of various types of Bio-fertilizers

Sr. No.	Bio-fertilizers	Crop Associated	Amount of Nutrient Fixed
1.	Rhizobium	Soyabean, Clover, Lucerne, Moong bean	40-60 kg N/ha
2.	Azotobacter	Cereals crops	10-20 kg/ N/ha
3.	Azolla	Paddy	20-146 kg N/ha
4.	Azospirillum	Cereals crops and grasses	15-20 kg N/ha
5.	BGA	Paddy	20-30 kg N/ha
6.	VAM	Vegetable, Forest and horticultural trees	25-30% saving of P fertilizers
7.	PSB	Cereals, vegetables and forage crops	30-50 kg P_2O_5 /ha
8.	PGPR	Many cereals crop and legumes	

1. **Rhizobium** - Fix N symbiotically with legumes, nodule formation.
2. **Azotobacter** - Synthesize IAA, GA, B, Antifungal antibiotics.
3. **Azolla** - Aquatic fern with 3-5% N on dry weight basis, used as manure or dual crop.
4. **Azospirillium** -Associative micro aerophilic N fixer, secretion of mucilage, release plant protection chemicals.
5. **BGA** - Free living, residual effect like organic matter buildup and improvement of soil properties.
6. **VAM** - Improve overall plant growth by improving plant nutrition, increased disease tolerance in plants, increase uptake of Zn, Cu and Fe.
7. **PSB** - Excrete organic acids, produce fungi and growth promoting substances.
8. **Plant growth promoting rhizobacteria** - Excretes beneficial effect on plant growth, suppress growth of harmful bacteria

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