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Center for Smart Agriculture Organic Farming



Module 2: Preparation and application of organic inputs
Session 10: Biofertilizers: Type, application, benefits



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Bio-fertilizers are defined as preparations containing living cells or latent cells of efficient strains of microorganisms that help crop plants for uptake of nutrients by their interactions in the rhizosphere when applied through seed, roots or soil.

They accelerate certain microbial processes in the soil which augment the extent of availability of nutrients in a form easily assimilated by plants.

Use of biofertilizers is one of the important components of organic nutrient management, as they are cost effective and renewable source of plant nutrients.



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There are three ways of using biofertilizers

1. Seed treatment
2. Root dipping
3. Soil application



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Seed Treatment

Seed Treatment is a most common method adopted for all types of inoculants. The seed treatment is effective and economic.

In case of solid formulation, 200 g of carrier based biofertilizers are suspended in 300-400 ml of water and mixed thoroughly. Ten kg seeds are mixed and treated with this paste and dried in shade. The treated seeds have to be sown as soon as possible.

For application of liquid biofertilizer, a plastic bag having size (21" x 10") can be used. The bag should be filled with 2 kg or more of seeds. The bag should be closed in such a way to trap the air as much as possible. The bag should be squeezed for 2 minutes or more until all the seeds are uniformly wetted. Then the bag is opened, inflated again and shaken gently. Stop shaking after each seed gets a uniform layer of culture coating. The bag is opened and the seed is dried under the shade for 20-30 minutes.



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Root dipping

For application of *Azospirillum*/ /PSM on paddy transplanting/ vegetable crops this method is used. The required quantity of *Azospirillum*/ /PSM of 200 ml liquid inoculant or 200 g carrier based biofertilizer has to be mixed with 5-10 litres of water at one corner of the field and the roots of seedlings has to be dipped for a minimum of half-an-hour before transplantation



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Soil application

In case of liquid formulation, use 200ml of PSM per acre. Mix PSM with 400 to 600 kg of FYM along with $\frac{1}{2}$ bags(25kg) of rock phosphate if available. The mixture of PSM, FYM and rock phosphate have should be kept under any tree or under shade for overnight and maintain 50% moisture. Use the mixture as soil application in rows or during leveling of soil. In case of carrier based formulations, 6 kg of biofertilizers are mixed in 400 to 600 kg of compost and kept overnight under shade by maintaining 50% moisture and applied.



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Sl. No.	Particulars	Micro-organisms
N fixing biofertilizers		
1	Free living	<i>Azotobacter, Beijerinckia, Clostridium, Klebsiella, Anabaena, Nostoc</i>
2	Symbiotic	<i>Rhizobium, Frankia, Anabaena azollae</i>
3	Associative Symbiotic	<i>Azospirillum</i>
P solubilizing biofertilizers		
1	Bacteria	<i>Bacillus megaterium var. phosphaticum, Bacillus subtilis</i> <i>Bacillus circulans, Pseudomonas striata</i>
2	Fungi	<i>Penicilliumsp, Aspergillusawamori</i>
P mobilizing biofertilizers		
1	Vesicular Arbuscularmycorrhiza	<i>Glomussp., Gigasporasp., Acaulospora sp., Scutellospora sp. & Sclerocystis sp.</i>
2	Ectomycorrhiza	<i>Laccaria sp., Pisolithus sp., Boletus sp., Amanita sp.</i>
3	Ericoid mycorrhizae	<i>Pezizellaericae</i>
4	Orchid mycorrhiza	<i>Rhizoctoniasolani</i>
K mobilizing biofertilizers		
1	Bacteria	<i>Frateuriaaurantia</i>
Micronutrient solubilizing biofertilizers		
1	Zinc and silicate solubilizer	<i>Bacillus sp.</i>



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Thank You