

Importance of Biofertilizers in Organic Farming

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Organic farming is the most important concept in sustaining the yield levels to meet the food requirements of ever-growing population in India. Organic agriculture encourages and influence the use of non-chemical-based source to supply nutrients. In this context, biofertilizers have greater role to play in plant nutrition. In organic farming, it is very challenging task to meet out the nutrient requirement of crop. So vermicompost, FYM etc., are used to supply primary, secondary and micronutrients which also help to improve soil physical status and enhance beneficial microbial activity. This is very important to enhance soil fertility to improve the productivity of soil and this can be done by adopting organic farming practices but not by chemical farming. So, in organic farming, biofertilizers are very important mediators as they make available the nutrients to the plants from unavailable forms. These biofertilizers supply nutrients by fixing nitrogen present in environment and some release the fixed phosphorus in soil to available form to plant thus reduce the cost on plant nutrition in addition to improvement in soil physical conditions. It is very much necessary to create awareness among the farmers to make use of biofertilizers.

Biofertilizer

Microbial inoculants or culture is the more appropriate name of biofertilizer. Biofertilizers are defined as the preparation containing specialized live microorganisms used for seed treatment or soil application with the objective of increasing the number of such organisms and accelerate the microbial process of converting unavailable form of the nutrients to available form

Biofertilizers can be classified in to three main groups

1. Nitrogen fixing biofertilizers

i) Symbiotic nitrogen fixers

a) Rhizobium

Rhizobium are symbiotic nitrogen fixing bacteria. It forms nodules on the roots of leguminous plant. *Rhizobium* can fix 50-150 kg nitrogen/ha/season and thus increases yield up to 30 per cent. It is used by treating the seeds with 4 g inoculant per kilogram of pulse seeds.

b) Azolla

Azolla is a water fern having symbiotic relation with blue green algae *Anabaena azolla*. Azolla is applied in the rice field at the rate of 7.5 kg per hectare as a green manure and is allowed to grow in the floody field for 2 to 3 weeks before transplanting. Later azolla is incorporated by ploughing after draining out of water. Azolla assimilates about 60-80 kg nitrogen per hectare.

ii) Asymbiotic nitrogen fixers

Azotobacter

It is non-symbiotic nitrogen fixing bacteria which can fix about 20-25 kg nitrogen per hectare per season and results in 10-15 per cent increase in crop yields. It can be used as seed treatment or soil application. Two kilograms of culture is mixed with 25 kg farmyard manure and broadcast in the field uniformly before sowing. The roots of seedlings of crop can be dipped in the culture slurry prior to transplanting.

Blue green algae (BGA)

BGA viz., *Nostoc*, *Anabaena* and *Oscillatoria* are mainly associated with the rice crop. It fixes nitrogen in flood condition and fixes about 20-25 kg nitrogen per hectare per season. It also improves the soil texture by addition of organic matter and aminoacids.

iii) Associated nitrogen fixers

Azospirillum

It has loose association with cereal crops especially wheat, sorghum, millets and rice. It can fix about 20-25 kg nitrogen per hectare per season. It is used as seed treatment as well as soil application. Two kilograms of carrier-based culture is mixed with 25 kg of farm yard manure and broadcast uniformly throughout the field before sowing. The roots of seedlings of crop can be dipped in the culture slurry prior to transplanting.

Phosphate Solubilizers

There are many microorganisms which have ability to solubilise insoluble phosphorus and make it available to plants. Some important microorganisms are *Bacillus polymyxa*, *B subtilis*, and *Pseudomonas striata*. These bacteria grow on sulphur in soil and sulphuric acid is synthesized which dissolves

phosphate from rock phosphate and make it available for plant use. It can be used for most of the agricultural crops.

Phosphatic mobilizers

Vesicular Arbuscular Mycorrhizae (VAM) are formed by association of Phycomycete fungi and most of the agricultural crops. VAM fungi infect and live inside the host root with the special structures known as vesicles and arbuscles. Arbuscles helps in transfer of nutrients from fungus to the root system and the vesicles which are sac like structures store 'P' as phosphosolids. VAM culture can be used for all crops including grasses, cereals and legumes.

Organic Matter Decomposing Cultures:

Microorganisms degrade organic substance to get nutrients for their growth and energy requirements. Insoluble constituents of organic matter are cellulose and lignin which delay the process of composting. Cellulose decomposing fungi are *Chaetomium*, *Trichoderma*, *Aspergillus*, *Penicillium* and bacteria such as *Cellulomonas*, *Clostridium*, *Actinomyces* and *Streptomyces* while the lignin

decomposing fungi are *Cephalosporium*, *Humicola*, *Phaenerochete*, *Pleurotus*, *Paecilomyces* etc.

So, the beneficial microbes thus have their major role in plant nutrition in organic agriculture. Influencing the nutrients availability without addition of external inputs to the soil. Their population can be increased by means of seed treatment or other methods. And on the other hand, use of different composting cultures helps in hastening of decomposition of the waste material put in to the compost. By this way, microbes helps to avail the compost for applying to the fields in early period rather

Problems in biofertilizer Usage:

- Unawareness and unavailability of biofertilizers to the farmers.
- Sometime poor quality of biofertilizers or they may reach expiry date so they are not effective if they are used in the field.
- Unsuitable transport and storage system may create high temperature which destroy the microbial population in the inoculants.

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