

Role of Biofertilizers in Agriculture

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SUMMARY

A biofertilizer is a substance which contains living micro-organisms which, when applied to seeds, plant surfaces, or soil, colonize the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant. Biofertilizers add nutrients through the natural processes of nitrogen fixation, solubilizing phosphorus, and stimulating plant growth through the synthesis of growth-promoting substances. The microorganisms in biofertilizers restore the soil's natural nutrient cycle and build soil organic matter. Through the use of biofertilizers, healthy plants can be grown, while enhancing the sustainability and the health of the soil. Biofertilizers can be expected to reduce the use of synthetic fertilizers and pesticides, but they are not yet able to replace their use. Since they play several roles, a preferred scientific term for such beneficial bacteria is "plant-growth promoting rhizobacteria" (PGPR).

INTRODUCTION

Biofertilizers are the most advanced bio technology necessary to support developing organic agriculture, sustainable agriculture, green agriculture and non-pollution agriculture. This Bio-organic Fertilizer can increase the output, improve the quality and it is responsible for agriculture environment. Today, It have been widely used with excellent results in all kinds of plants and several countries. It is well known that the continue use and overuse of petrochemical based fertilizers and toxic pesticides have caused a detrimental effect to our soils, water supplies, foods, animals and even people. The biological grower is more sensible with sustainable approach and employs the resources of both science and nature to allow better results in his production. For centuries, peat moss has been recognized soil bacteria, fungi, earthworms, and other bio-organisms to enrich the soil to produce safe, nutritious and abundant crops. An excellent fertilizer sources. We have developed all natural organic fertilizers made with pure peat moss. Biofertilizer Contains a wide range of naturally chelated plant nutrients and trace elements, carbohydrates, amino acids and other growth promoting substances, acts as a soil conditioner by stimulating microbial activity in the soil which results in improved air-water relationships in soil, improved fertility and makes soil less prone to compaction and erosion. Organic Growers who use kelp in their regular fertility program report increases in yield, quality, shelf-life and resistance to environmental stresses such as drought, extreme heat, early frost, pest and disease problems.

Classification of Biofertilizers

Several microorganisms and their association with crop plants are being exploited in the production of biofertilizers. They can be grouped in different ways based on their nature and function.

- I (a) N₂ Fixing Microorganisms: *Rhizobium*, *Azospirillum*, *Azotobacter*, *Acetobacter*, *Beijerinckia*, Blue green algae, *Azolla* and *Frankia*
- (b) P Solubilizing / P mobilizing microorganisms: *Bacillus megaterium* var. *Phosphotium*, *Bacillus subtilis*, *Bacillus circulens*, *Pseudomonas striata*, *Penicillium* spp. *Aspergillus awamori*.
- II (a) Free living bacteria: *Azotobacter*, *Beijerinckia*, *Clostridium*, *Klebsiella*
- (b) Associative symbiotic: *Azospirillum*
- (c) Symbiotic: *Rhizobium*, *Frankia*
- (d) Blue green algae & *Azolla*: *Anabaena nostoc*, *Anabaena azollae*

Methods of Application of Biofertilizer

Seed Treatment: 200 g of biofertilizer is suspended in 300- 400 mL of water and mixed gently with 10 kg of seeds using an adhesive like gum acacia, jiggery solution, etc. The seeds are then spread on a clean sheet/cloth under shade to dry and used immediately for sowing.

Seedling Root Dip: This method is used for transplanted crops. For rice crop, a bed is made in the field and filled with water. Recommended biofertilizers are mixed in this water and the roots of seedlings are dipped for 8-10 h and transplanted.

Soil Treatment: 4 kg each of the recommended biofertilizers is mixed in 200 kg of compost and kept overnight. This mixture is incorporated in the soil at the time of sowing or planting.

Slurry method of inoculation: Prepare 10% solution of sugar or jaggary. Mix 200 g of inoculant in 1 litre of solution and make a homogenous slurry. Sprinkle the slurry over the seeds required to sow one acre of field. Mix the slurry with the seed gently so that the seeds are completely covered with the slurry. Dry the seeds in shade and sow within 24 hrs after treatment. Alternatively, the seeds are mixed with adhesive solution (10% sugar or jaggary) and the powder form of inoculant is sprinkled over the seeds and mixed uniformly.

Pallet inoculation: Completely dissolve 100 g gum arabic in 250 ml of fresh water by constant stirring. Heat if necessary and cool before adding inoculum. Add little quantity of calcium carbonate to neutralise the gum arabic solution. Mix the inoculant in required quantity in to the adhesive to form homogenous slurry. Pour the slurry on the desired amount of seed and mix it thoroughly as early as possible. Two hundred fifty ml of adhesive solution with inoculant is sufficient to inoculate 7 kg of small size seeds with 300 mesh calcium carbonate immediately after the slurry treatment. About 3.5 kg calcium carbonate powder is sufficient to pellet the seeds for one acre.

Advantages of Biofertilizers

- 1.They are eco- friendly as well as cost effective.
- 2.Their use leads to soil enrichment and the quality of the soil improves with time.
- 3.Biofertilizers do not show immediate results, but the results shown over time are spectacular.
- 4.They increase the phosphorous content of the soil by solubilising and releasing unavailable phosphorous.
- 5.Biofertilizers improve root proliferation due to the release of growth promoting hormones.
6. Microorganism converts complex nutrients into simple nutrients for the availability of the plants.
- 7.Biofertilizer contains microorganisms which promote the adequate supply of nutrients to the host plants and ensure their proper development of growth and regulation in their physiology.

Precautions

- 1.Never apply bio fertilizers with fungicides.
- 2.Never expose bio fertilizers to sunlight directly.
- 3.It should be stored at room temperature.

CONCLUSION

Biofertilizers being essential components of organic farming play a vital role in maintaining long term soil fertility and sustainability by fixing atmospheric di-nitrogen, mobilizing fixed macro and micro nutrients in the soil into forms available to plants. Biofertilizers play key role in enhancing soil health. Currently there is a gap of ten million tons of plant nutrients between removal of crops and supply through chemical fertilizers. In context of both the cost and environmental impact of chemical fertilizers, excessive reliance on chemical fertilizers is not practicable in the long run because of the cost, both in domestic resources and foreign exchange involved in setting up of fertilizer plants and sustaining the production.

REFERENCES

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