

P Sol B[®]
Bacillus megaterium
BioFertilizer

(Regd in Fertilizer Control Order, Govt of India)
APPROVED FOR USE IN ORGANIC AGRICULTURE

Introducing P Sol B[®] -BM

P Sol B[®] -BM is a biological fertilizer based on a selected strain of naturally-occurring beneficial eubacteria *Bacillus megaterium* (NCIM 2087, ATCC 10778). *Bacillus megaterium* is a gram positive, rod shaped, endospore forming bacteria. It is used as an effective soil inoculant.

P Sol B[®] -BM contains endospores of *Bacillus megaterium*. It is formulated as Wettable Powder with CFU count of 5×10^7 / g. P Sol B[®] -BM is registered under the Fertilizer Control Order- Govt of India. P Sol B[®] -BM is approved for use in Organic Agriculture.

Phosphorus is abundant in several soils and is one of the major nutrients limiting the plant growth. The overall Phosphorus use efficiency following phosphate fertilizer application is low because of the formation of insoluble complexes. Therefore this mandates frequent application of soluble forms of inorganic Phosphorus necessary for crop production. This results in leaching to the ground water and results in eutrophication of aquatic systems and pollutes soil.

Phosphorus is an important macronutrient which is applied to soil in the form of phosphatic fertilizers. A large portion of this soluble inorganic phosphate applied to the soil as chemical fertilizer is immobilized rapidly and becomes unavailable to plants. P Sol B[®] -BM aids in transformation of soil Phosphorus into an assimilable form and is therefore an integral part of the soil Phosphorus cycle as they help in releasing Phosphorus from inorganic and organic pools of total soil Phosphorus through solubilization and mineralization.

A Historical Brief

Bacillus megaterium, was discovered and described by A. deBary in 1884. *Bacillus megaterium* was used by Lwoff and Guttman in the studies that discovered lysogeny. *Bacillus megaterium* is one of the first bacteria's genome that has been fully coded.

The phosphate solubilising property has interested agriculturists as soil inoculums to improve the plant growth and yield (Young, 1994; Young et al., 1998; Goldstein et al., 1999; Fasim et al., 2002)

The mechanism of mineral phosphate solubilization by phospho bacteria strains has been associated with the release of low molecular weight organic acids as described by Halder et al in 1990, Goldstein in 1995 and Kim et al in 1997 in different experiments.

Mode of Action

Carbon utilization: The bacteria contained in P Sol B[®]-BM on application to the soil get activated and multiply by utilizing the carbon source of soil or exudates of the root and in this process secrete organic acids and enzymes.

Metabolite production: *Bacillus megaterium* produces organic such as lactic acid , gluconic acid , citric acid , succinic acid , propionic acid and enzymes that help solubilize the fixed phosphorus into exchangeable form.

These organic acids through their hydroxyl and carboxyl groups chelate the cations (mainly Calcium) bound to phosphate converting them into the soluble forms.

An inverse relationship is observed between the pH and soluble-Phosphorus concentration which indicates that organic acid production by phospho bacteria plays a significant role in the acidification of the soil medium facilitating Phosphorus solubilization and easier assimilation by plants.

Method of Application

Seed Treatment: Mix 10 g. of P Sol B[®]-BM with 10 g. of crude sugar in sufficient water to make a slurry and coat 1 kg of seeds. Dry the seeds in shade and sow / broadcast / dibble in the field.

Note: Do not store treated / coated seeds more than 24 hrs.

Seedling treatment: Mix 100 g. of P Sol B[®]-BM with sufficient quantity of water and organic manure to form a slurry. The seedlings are dipped in this slurry for 30 minutes prior to planting so that the bacteria get attached to the roots.

Soil application: Mix 3-5 Kg/ acre of P Sol B[®]-BM with compost and apply to an acre of soil.

Drip Irrigation : Mix 3 Kg/ acre of P Sol B[®]-BM in drip stream.

Target Nutrition

Phosphorus mobilization.

Crops

P Sol B[®]-BM is suitable for application on Cereals , Millets , Pulses, Oilseeds, Fibre Crops , Sugar Crops , Forage Crops , Plantation crops ,Vegetables, Fruits, Spices , Flowers , Medicinal crops , Aromatic Crops , Orchards and Ornamentals.

Compatibility

P Sol B[®] -BM is compatible with BioPesticides and other Bio Fertilizers.

Shelf Life

P Sol B[®] -BM is stable for a period of 1 year from the date of manufacturing.

Mass Composition

CONSTITUENT	W/W %	FUNCTION
<i>Bacillus megaterium</i>	2.0%	Active
Carrier Powder – Talc/Dextrose/Lignite	q.s	Inactive

BIOLOGICAL COMPOSITION

CONSTITUENT	CFU/g.	FORMULATION
<i>Bacillus megaterium</i>	5*10 ⁷	Powder

OTHER FORMULATIONS AVAILABLE

<i>Bacillus megaterium</i> CFU/ml	1*10 ⁸	Liquid
<i>Bacillus megaterium</i> CFU/g/ml	1*10 ⁹	Powder/ Liquid
<i>Bacillus megaterium</i> CFU/g	1*10 ¹⁰	Powder
<i>Bacillus megaterium</i>		Lyophilized

Free from Salmonella, Shigella , E.Coli

Cautions for handling and use of product

1. Mixing equipment is to be thoroughly rinsed with water and detergent before using the same equipment for formulating other fertilizers/ pesticides.
2. Surplus product may be disposed in crop lands
3. Do not eat / drink / smoke during application.

5. Direct incidence of P Sol B[®]-BM may cause irritation and therefore it is recommended that the operator should use protective gear viz gloves, apron, mask, eye gear and hood.

Antidotes

In the case of ingestion: Symptomatic treatment

In the case of contact with Eyes: Flush with water liberally for 20 minutes.

Citations

There are many citations in public domain for over a century on effectiveness of *Bacillus megaterium* as a BioFertilizer

Commitment to Nature

- P Sol B[®] -BM is approved for use in organic agriculture.
- P Sol B[®]-BM is safe to use along with bio fertilizer inoculums like Agri Life Nitrofix[™] (Nitrogen Fixing bacteria) ;; K Sol B[®] (Potash mobilizing bacteria); Zn Sol B[®] (Zinc mobilizing bacteria) :S Sol B[®] (Sulphur solubilizing bacteria) : Si Sol B[™] (Silica solubilizing bacteria) : Fe Sol B[®] (Iron / Ferrous solubilizing bacteria) : Mn Sol B[™] (Manganese solubilizing microbe) and Agri Life Agrivam[®] (Vesicular-arbuscular mycorrhiza)
- P Sol B[®]-BM can be used as an effective component in INM programmes, thereby leading to a reduction in use of chemical fertilizers and creating a safer environment.
- P Sol B[®]-BM does not lead to residue problems and doesn't cause resistance or resurgence problems.

Benefits from P Sol B[®] -BM

- P Sol B[®] -BM effectively solubilizes fixed phosphorus to exchangeable form and enables solubilization of 10 – 15 Kg of Phosphorus per acre.
- Natural Phosphorus solubilization improves both plant and soil health and also aids in soil remediation.
- The population of beneficial microbes increases and the organic content of soil improves owing to organic acid secretion by the bacteria
- P Sol B[®] -BM is earthworm friendly , pet friendly , eco friendly and infant friendly