MAURITIAN STANDARD **MS 185-2:2017**

First edition
2018-01-06

# Microbial bio-fertilizers

## Part 2: Specification for Phosphate solubilising bacteria



**ICS 65.080**

**Mauritius Standards Bureau**

Moka



Mauritius Standards Bureau
Villa Road
Moka
Mauritius

*Telephone* *+ (230) 433 3648*
*Fax* *+ (230) 433 5051/ 433 5150*
*E-mail* *msb@intnet.mu*

 

## Contents

## Foreword

This Mauritian Standard was drawn by the **Chemicals Standards Committee** through its Subcommittee on **Bio-fertilizers** and approved by the **Standards Council** on 27 September 2017. It was notified in the Government Gazette on **6 January 2018***

In preparing this standard assistance was derived from the following publications:

1. Biofertilizers and Organic Fertilizers in Fertilizer (Control) order, 1985

2. IS 8268:2001, *Rhizobium inoculants - Specification*

3. IS 14807: 2000, *Phosphate solubilising bacterial from inoculant (PSBI) - Specification*

Acknowledgement is made for the use of information the above publications



*** General Notice No. 22 of 2018**

## Introduction

Commercial farming to meet food security involving intensive land use relies heavily on agricultural inputs such as chemical fertilizers and synthetic pesticides. However, increasing continuous use of chemical fertilizers over years has caused environmental damage such as ground water contamination, eutrophication of water bodies. Long term sole reliance on excessive use of chemical fertilizers and synthetic pesticides has also adversely impacted on soil quality, fertility and soil microbial biodiversity.

With the increasing demand for food to meet the growing population, food production can be enhanced by increasing the productivity of existing agricultural land sustainably and/or bring additional land under cultivation. Ensuring sustainable long term land productivity can be achieved through an integrated nutrient management system involving a combination of environmentally friendly sources of plant nutrients including organic microbial fertilizers and chemical fertilizers.

Biofertilizers are defined as preparations containing living cells or latent cells of efficient strains of microorganisms that help crop plants' uptake of nutrients by their interactions in the rhizosphere when applied through seed 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. Biofertilizers generate plant nutrients like nitrogen and phosphorus through their activities in the soil or rhizosphere and make available in a gradual manner to plants.

MS 185 limits itself to microbial bio-fertilizers only. The other types of bio-fertilizers are not covered.

Microbial bio-fertilizers are preparations containing live microbes which help in enhancing soil fertility by fixing atmospheric nitrogen, solubilisation of phosphorous, mobilization of nutrients or decomposing organic wastes or by augmenting plant growth by producing growth hormones with their biological activities.

## Potential benefits of using microbial bio-fertilizers are:

i) To provide an eco-friendly alternate renewable source of nutrients.
ii) Sustain soil health
iii) Decompose plant residues, and stabilize C:N ratio of soil
iv) To enhance soil biological activity and improve availability of plant nutrients.
v) To improve chemical, physical and biological properties of soil.
vi) To promote plant growth and improve crop yield.
vii) Solubilize and mobilize nutrients

Microbial fertilizers are supplement to chemical fertilizers but not substitute to it. They usually cause increase in crop yield. However, they do not cause marked increase in productivity like chemicals.

Efficiency of microbial fertilizer is markedly dependent on soil character, for example moisture content, pH, temperature organic matter and types of resident microorganism. When these factors are unfavourable microbial fertilizers may not be effective in increasing the soil fertility.

**Phosphate solubilising bacteria (PSB)**



 

Phosphate solubilizing bacteria (PSB) are beneficial bacteria capable of solubilizing inorganic phosphorus from insoluble compounds. Many phosphate solubilizing bacteria (PSB) belong to the Pseudomonas, Bacillus, Rhizobium, Agrobacterium, Burkholderia, Achromobacter, Micrococcus, Aerobacter, Enterobacter, Flavobacterium, and Erwinia genera.

Most soils are deficient in soluble forms of phosphorus (P), one of the major essential macronutrients required for plant growth. Phosphorus makes up to about 0.2% of plant dry weight and has a defined role in plant metabolism such as cell division, development, photosynthesis, breakdown of sugar, nuclear transport within the plant, transfer of genetic characteristics from one generation to another and regulation of metabolic pathways.

The plants obtain their phosphate requirements from the soil pool as inorganic phosphate, produced by weathering by parent rock or as organic phosphate derived from decayed plant, animal or microorganisms.

The phosphate available for plant growth depends not only on the total amount of phosphorous in the environment but also on its solubility, which in turn is dictated by chemical reactions and biological interaction in the soil. The makeup of a soil (soil texture) and its acidity (pH) determine the extent to which nutrients are available to plants. The diverse soil phosphate forms can be generally categorized as soil solution phosphate, insoluble organic and insoluble inorganic phosphate.

**Uses of PSB**

PSB can be used for all crops including paddy, millets, oilseeds, pulses and vegetables. Methods recommended for application are:

- Seed treatment
- Seedling dipping
- Soil application

MS 185 consists of the following parts, under the general title *Microbial bio-fertilizers* —

*Part 1: Specifications for nitrogen fixing bacteria*

*Part 2: Specifiction for Phosphate solubilising bacteria (PSB)*

**Part 3: Specification for Potassium mobilising bacteria*

* - Document under development

# Microbial bio-fertilizers – Part 2: Specification for Phosphate solubilising bacteria

## 1 Scope

This Mauritian Standard specifies the requirements and methods of test for Phosphate Solubilising Bacterial inoculant (PSBI) for use in laboratories.

This part of MS 185 is applicable to both solid and liquid microbial bio-fertilizers.

The standard does not cover nitrogen fixing microbial bio-fertilizers which are covered in MS 185-1 and potassium mobilising bacteria.

The requirements specified in this standard are limited to laboratory performance and it does not cover field efficacy test.

## 2 Normative references

The following documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest document (including any amendments) applies.

MS 185-1 *Microbial bio-fertilizers – Part 1: Specifications for Nitrogen fixing bacteria*

ISO 11133 *Microbiology of food, animal feed and water – Preparation, production, storage and performance testing of culture media*

## 3 Terms and definitions

For the purposes of this standard the definitions given in MS 185-1 and the following applies.

**3.1**
**phosphate solubilising bacterial inoculants** (PSBI)
a product having high population of a strain(s) of bacteria intended to solubilise insoluble phosphate of the soil.

## 4 Requirements

### 4.1 General requirements

a) For solid microbial bio-fertilizers, the carrier used shall be of a nature that is not harmful to the environment and the colour of the inoculants would be dependent on the colour of the carrier.

b) Carrier material such as peat, lignite, peat, charcoal or other similar material may be used. It shall be neutralized with calcium carbonate and then sterilized. The carrier material shall be in the form of powder capable of passing through 150 to 212 micron (72 to 100 mesh) sieve.



 