

# FOR SOIL AND HYDROPONIC SYSTEMS

**100%**  
SATISFACTION  
GUARANTEED



# MICROBIAL MASS

## Microbial Enhancer for Plants

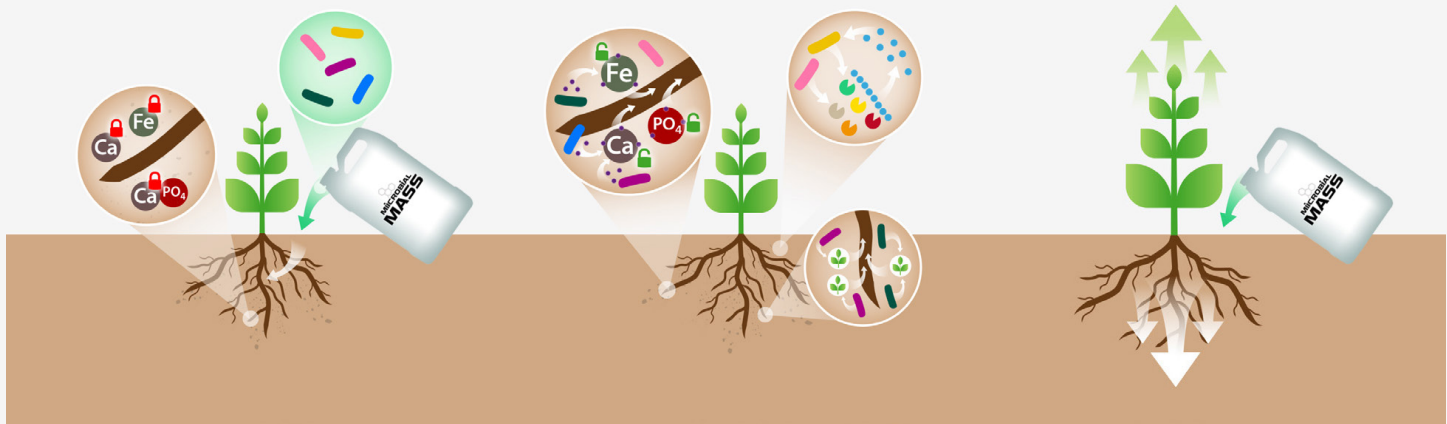
**Unlocks Phosphorus and Micronutrients to Maximize Yield**

**SAFE FOR USE IN: SOIL OR HYDROPONIC GARDENING • COMMERCIAL AGRICULTURE • FIELD CROPS • GREENHOUSES**

# WHAT IS MODE OF ACTION?

A mode of action (MoA) is a term used to describe change at a cellular or molecular level. This transition can be anatomical or functional and always results from exposure to another living organism or any chemical or biological change in the cellular or molecular environment of a living organism.

For example, when referencing mode of action in terms of phosphorus solubilisation, it refers to a change made to the phosphorus at a molecular level that makes this nutrient more soluble and bioavailable for the plant.



## MODE OF ACTION:

# PHOSPHORUS SOLUBILISATION

**Microbial Mass** uses a mode of action to ensure phosphorus solubilisation for robust plant growth, health, and development.

Phosphorus solubilisation is just one important mode of action used in the **Microbial Mass** formula, but it is an **essential part of providing the plant with everything it needs to thrive.**

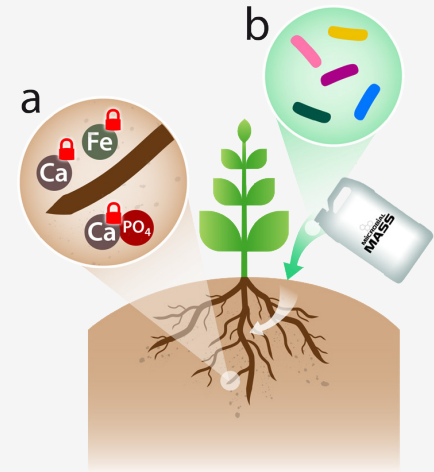
## WHY PHOSPHORUS SOLUBILISATION IS NECESSARY

Phosphorus is one of the most important nutrients required for plant growth, alongside calcium, nitrogen, and potassium.

Phosphorus is vital for a range of plant stages and features, including the early stages of development, tissue stiffness, root growth, fruit formation, inflorescence (flowering), and also resistance to cold and disease.

Unfortunately, the problem with phosphorus is that even though it is naturally abundant in soil, most of it occurs in forms that are not bioavailable for the plant – meaning that the plant cannot absorb the phosphorus it needs.

Inorganic phosphorus in the soil is often complexed (bonded) with other minerals such as calcium, aluminium, magnesium, and iron. Additionally, organic phosphorus is largely immobilised (essentially made non-bioavailable) in organic matter in the form of inositols and phytate.



**a)** Many essential nutrients for plant growth such as phosphorus, calcium and iron are under forms that are unavailable for plant absorption.

**b)** **Microbial Mass** contains a synergy of bacteria that is applied during watering of germinating or growing plants. These strains have a high growth rate in all substrates commonly used in agriculture including hydroponic and aquaponic systems.

## MIICROBIAL MASS

Was specially developed to **maximize plant yield** using several bacterial strains that are shown to **promote plant growth** and enhance microbial life in and around plant roots.

## MIICROBIAL MASS

Increases the bioavailability of **phosphorus and calcium** to the plant through the use of phosphate and calcium-solubilizing bacteria.

Increases the bioavailability of **iron** through the use of siderophore-producing bacteria.

Promotes good soil health with **enzymes** that hydrolyze substrate into useful byproducts for the rhizospheric microbial communities.

## BENEFITS

- Dramatically increases yield
- Improves plant immunity
- Improves stability under stress

## THE BENEFIT OF MIICROBIAL MASS AND THE MODE OF ACTION

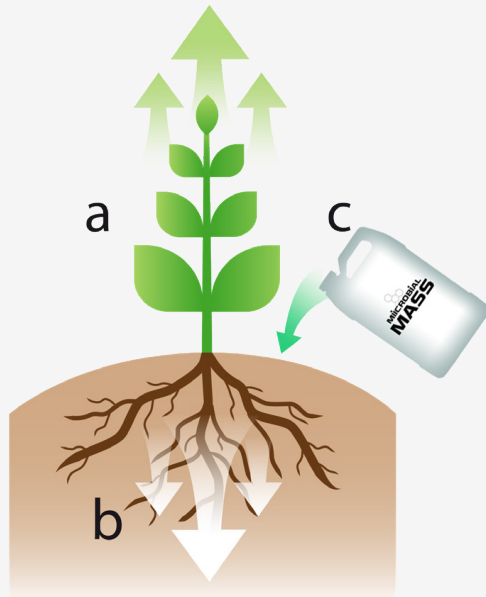
**Microbial Mass** harnesses the power of bacteria from the genus *Bacillus* to transform both inorganic and organic phosphate to make them more bioavailable so the plant can absorb this much-needed nutrient.

For inorganic phosphorus that is complexed to other minerals, the bacteria release the inorganic phosphorus from this complex by producing organic acids. These acids decrease the pH locally, which in turn solubilises the inorganic phosphorus and therefore it turns into a form that the plant can absorb.

In the case of organic phosphorus that has been immobilised, certain bacterial strains have the power to produce phytases enzyme, which convert the phosphorus into a bioavailable form ready for plant absorption.

**Microbial Mass** features two bacterial strains (*Bacillus megaterium* and *Bacillus megaterium*) that have the capacity to produce phytases and organic acids to ensure solubilisation of both organic and inorganic phosphorus.

This product therefore allows the plant to absorb phosphorus, an essential nutrient, for better health and growth throughout multiple stages of its development.



The use of **Miicrobial Mass** increases (a) foliar and (b) root system growth and development, therefore enhancing yield, resilience and speed by which plants mature.

c) Optimal results are obtained through multiple applications of **Miicrobial Mass** throughout plant development.

## MODE OF ACTION:

### SIDEROPHORE PRODUCTION

**Miicrobial Mass** doesn't only focus on macro-elements. Iron is also an essential nutrient, and of the microelements necessary for plants to function properly, iron is chief among them.

Iron is essential for plant health and growth as it is largely responsible for the production of chlorophyll, and is also heavily involved in oxygen transport throughout the plant, DNA stability and repair, certain intermediate metabolisms, and cellular respiration.

Even though iron is extremely common (it is the fourth most abundant element on Earth), plants can struggle to absorb this nutrient as it occurs naturally in soil. Usually, iron occurs as a form of ferric ion ( $Fe^{3+}$ ), which is difficult for a plant to assimilate.

Again, certain bacteria have been found to be hugely beneficial in resolving this iron absorption issue for plants. These bacteria have developed the ability to create molecules called siderophores, which are capable of binding to  $Fe^{3+}$  ions, and in turn are able to be absorbed by the plant.

**Miicrobial Mass** features this bacterial strain (*Bacillus velezensis*), and therefore promotes improved iron absorption for better plant health and development.



**MICROBIAL  
MASS**

[www.microbialmass.com](http://www.microbialmass.com)