



BIO CATALYST

*A revolutionary new approach
to Phosphorous and Potassium
solubilising technology*

AVAILABLE PACKAGING:

100g, 1kg, 10kg, 25kg



PRODUCT INGREDIENTS:

Contains free-living phosphatase and organic acid producers
with applied sParK technology (patent pending).

PRODUCT METHODOLOGY:

sParK technology harnesses the energy production capability of photosynthetic organisms for greatly increased organic acid and phosphatase production in the soil independent from plant reaction.

APPLICATION RATES:

Apply 100 gram per ha water soluble powder at the beginning of the plant season or
when P and K availability is needed.

DIRECTIONS FOR USE:

- ✓ 100l water/ha for in-furrow applications
- ✓ 400l water/ha for bulk applications
- ✓ Can be applied through irrigation and fertigation systems
- ✓ Or as a wet seed coat on 1ha equivalent seed
- ✓ All Fulvigour products can be used and mixed together
- ✗ Do not apply with any biocides

*Dependant on total P and K present in soil

**NOT FOR
PUBLIC SALE**



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www.fulvigour.com



**INCREASES
AVAILABLE P
AND K IN THE
SOIL BY UP TO
500%***



BIO CATALYST

Biological solubilization of Phosphorus: *Pseudomonas fluorescens*, *Bacillus coagulans* and *Bacillus megaterium*

1. INTRODUCTION:

Phosphorus (P) is an essential nutrient for plant growth and its availability in the soil is crucial for crop productivity. However, a significant portion of phosphorus in soil remains in unavailable forms, limiting its uptake by plants. Biological phosphorus solubilization by phosphate-solubilizing bacteria (PSB) has emerged as a sustainable and eco-friendly approach to enhance phosphorus availability in the soil. This report presents a comparative analysis of three PSB species, *Pseudomonas fluorescens*, *Bacillus coagulans*, and *Bacillus megaterium*, regarding their phosphorus solubilization efficiency, mechanisms of action, and potential applications in agriculture.

Phosphorus is a vital macronutrient for plant growth, participating in numerous metabolic processes. However, its insoluble forms, such as phosphate rock, make a substantial portion of soil phosphorus unavailable to plants. Biological solubilization by phosphate-solubilizing bacteria has gained attention as an eco-friendly and sustainable solution to improve phosphorus availability in agricultural soils.

2. PSEUDOMONAS FLUORESCENS

Pseudomonas fluorescens is a Gram-negative bacterium that possesses the ability to solubilize phosphorus through various mechanisms. It produces organic acids, such as gluconic acid, citric acid, and oxalic acid, which acidify the rhizosphere and dissolve insoluble phosphates, making them accessible to plants. *P. fluorescens* also secretes phosphatases, enzymes that hydrolyze organic phosphorus compounds, releasing inorganic phosphates. Studies have shown that *P. fluorescens* can enhance plant growth and phosphorus uptake, making it a promising candidate for sustainable agriculture.

3. BACILLUS COAGULANS:

Bacillus coagulans is a Gram-positive, spore-forming bacterium with phosphorus solubilization capabilities. It secretes gluconic acid and 2-ketogluconic acid, which chelate with calcium, iron, and aluminum ions, liberating bound phosphates. This process converts insoluble phosphates into soluble forms, facilitating plant uptake. *B. coagulans* also produces organic acids and phosphatases, further contributing to phosphorus solubilization. The use of *B. coagulans* as a biofertilizer has shown promising results in improving phosphorus availability and plant growth.

4. BACILLUS MEGATERIUM:

Bacillus megaterium is another Gram-positive, spore-forming bacterium with phosphorus-solubilizing capabilities. Similar to *B. coagulans*, it secretes organic acids, including gluconic acid and malic acid, which solubilize phosphorus from mineral sources. *B. megaterium* also produces phytases, enzymes that hydrolyze organic phosphorus compounds present in plant residues, releasing available phosphates. Its potential as a biofertilizer has been studied for improving phosphorus availability and enhancing crop growth.

Pseudomonas fluorescens, *Bacillus coagulans*, and *Bacillus megaterium* are promising phosphate-solubilizing bacteria with the ability to improve phosphorus availability in soil. Their production of organic acids, phosphatases, and phytases enables them to solubilize insoluble phosphates, making them accessible to plants. Incorporating these phosphate-solubilizing bacteria into agricultural practices can contribute to sustainable phosphorus management, reduce the reliance on chemical fertilizers, and enhance crop productivity.