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Center for Smart Agriculture

Course: Organic Farming



Rhizobium



Azotobacter



Azospirillum



PSM



Azolla



Cyanobacteria



**Topic: Phosphorous Solubilizing
Bacteria**



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Phosphate solubilizing bacteria (PSB)

PSB are beneficial bacteria capable of solubilizing inorganic phosphorus from insoluble compounds.

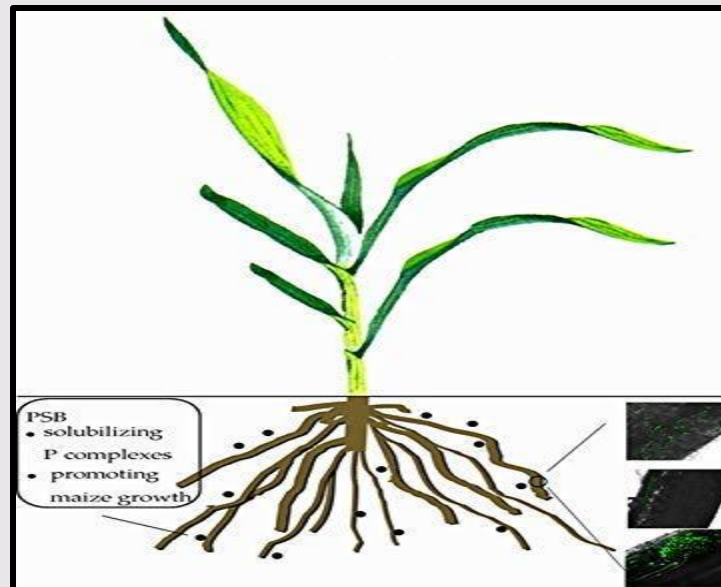
- P-solubilization ability of rhizosphere microorganisms is considered to be one of the most important traits associated with plant phosphate nutrition.



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- The mechanism of mineral phosphate solubilization by PSB strains is associated with the release of low molecular weight organic acids, through which their hydroxyl and carboxyl groups chelate the cations bound to phosphate, thereby converting it into soluble forms.



PSB
bacteria
attraction
to plant

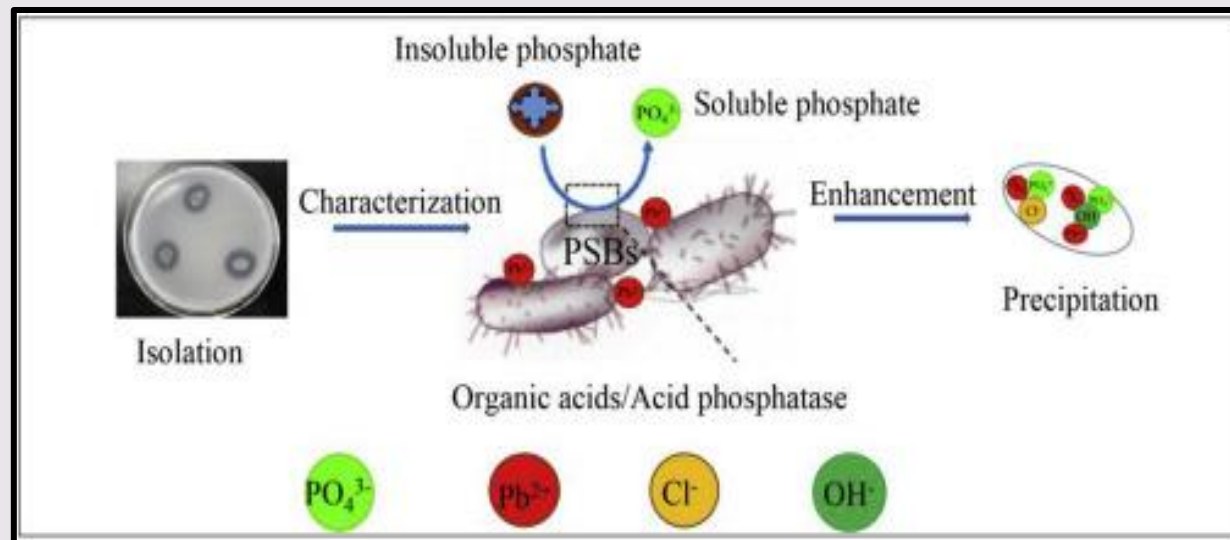


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Phosphorus (P) is one of the major essential macronutrients for plants and is applied to soil in the form of phosphate fertilizers.

- However, a large portion of soluble inorganic phosphate which is applied to the soil as chemical fertilizer is immobilized rapidly and becomes unavailable to plants.





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- Currently, the main purpose in managing soil phosphorus is to optimize crop production and minimize P loss from soils.
- PSB have attracted the attention of agriculturists as soil inoculums to improve the plant growth and yield.
- When PSB is used with rock phosphate, it can save about 50% of the crop requirement of phosphatic fertilizer.



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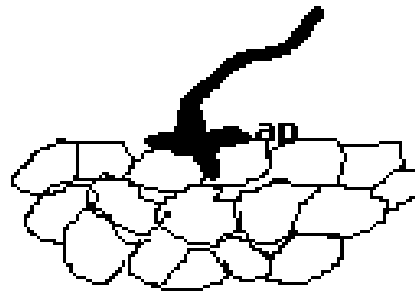
- The use of PSB as inoculants increases P uptake by plants. Simple inoculation of seeds with PSB gives crop yield responses equivalent to 30 kg P_2O_5 /ha or 50 percent of the need for phosphatic fertilizers.
- Alternatively, PSB can be applied through fertigation or in hydroponic operations.
- Many different strains of these bacteria have been identified as PSB, including *Pantoea agglomerans* (P5), *Microbacterium laevaniformans* (P7) and *Pseudomonas putida* (P13) strains are highly efficient insoluble phosphate



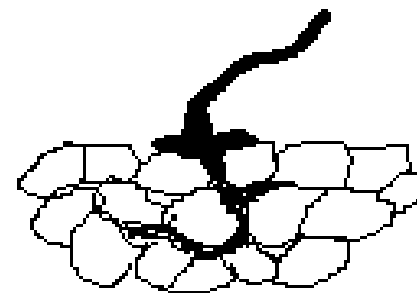
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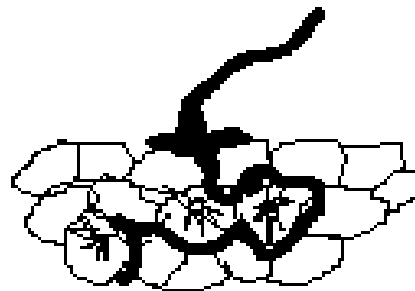
Mechanism of establishment of Endomycorrhizal symbiosis



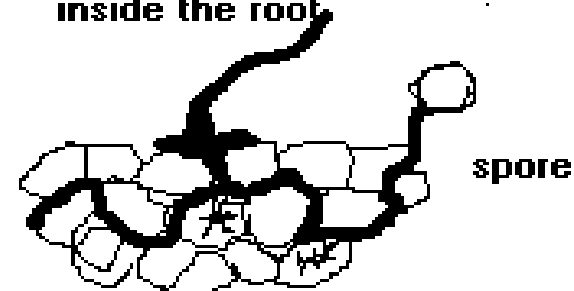
Apresoria formation



Internal hyphae spreading inside the root



Arbuscule formation inside root cortical cells



vesicle and external spore formation



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THANK YOU