

## Preface

Rhizospheric soils of different crops and wild trees of Darjeeling hills were screened for the presence of phosphate solubilising microorganisms using Pikovskaya's (PKV) agar medium. A series of screening experiments resulted in the isolation of twenty four phosphate solubilising bacterial (PSB) strains and no fungi could be isolated as phosphate solubilisers during the screening period. Microbial colonies associated with clear zones around them were considered phosphate solubilisers in contrast to the colonies without any clearing areas adjacent to them.

All the twenty four isolates selected as phosphate solubilisers were subjected to determine different characteristics like solubilisation of phosphate in liquid medium, their activities in altered media composition with respect to principal constituents like glucose and tricalcium phosphate (TCP), response to physical factors like temperature and pH; ability to synthesise growth regulators like IAA; Gram staining and morphology; PAGE profile; biochemical characteristics like carbohydrate fermentation and enzymatic activities; sensitivity to antibiotics; effect on seed germination; seedling growth; performance on crop yield in the field conditions.

All the soil samples were with acidic pH; moderate organic carbon, available nitrogen, phosphorus and potassium content with rich moisture content and moisture holding capacity.

All the PSB isolates were also efficient in TCP solubilisation in liquid media also. Majority of them followed the conventional pattern of enhanced phosphate solubilisation associated to pH decrease, succeeding the previous theories. The solubilisation process was found to be slow and continuous up to the study period of four weeks.

Increase in the concentration of principal components like glucose and tricalcium phosphate in the PKV broth resulted increased yield of soluble phosphate with pH fall to still lower values than the standard PKV broth. This finding was in line to organic acid theory of phosphate solubilisation because more glucose yielded more organic acids resulting decrease in pH of the medium.

Ability of PSB isolates to solubilise phosphate in wide pH ranges and giving rich population in sterile soil for longer incubation period qualified the

isolates for further evaluation in seed germination, seedling growth and crop yield in the field.

Inoculation of isolates to fenugreek seeds resulted in increased rate of germination. PSB isolates also showed positive effect in on farm trials. Increased yield of cash crops like pea and potato was observed in presence of PSB isolates. Growth of bacterised seedlings of orange also found better than the untreated ones.

Equal number of Gram positive and negative members among the PSB isolates reflects the prevalence of diverse groups of microorganisms as phosphate solubilisers in soil.

Isolation of PSB from variety of crops followed by wide variation in biochemical properties as well as antibiotic sensitivity pattern of the isolates reflected the broad diversity of phosphate solubilisers.

More studies are warranted to understand the activities of the PSB isolates before their certification as biofertilisers.