

Development of Cost Effective Carrier Material for the Bio Fertilizer to Enhance Eppawala Phosphate Solubility

T. Rajhkumar, C.M. Peries, J.T. Cooray

Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

Plants acquire phosphorus (P) from soil solution as phosphate anion. It is the least mobile element in plant and soil contrary to other macronutrients. Phosphorus solubilizing bacteria play role in phosphorus nutrition by enhancing its availability to plants. Bio fertilizers are inputs containing microorganisms which are capable of mobilizing, nutritive elements from non-usable form to usable form through biological processes. This study focused to develop a cost effective carrier material for the bio fertilizer to enhance the solubility of Eppawala phosphate. Eppawala Rock Phosphate samples were collected and microbial isolation was performed. Isolated microbial strains were inoculated on Pikovskaya's medium (PVK), a selective medium to screen Phosphorous Solubilizing Microorganisms. Thereafter, High-grade Eppawala Rock Phosphate (HERP) was mixed with carrier materials such as Kaolin, Fly ash and *Glyceride* were used because of containing high amount of plant nutrients and having the ability to increase the soil fertility. Kaolin and fly ash proportions were mixed in different proportions and apatite and gliricidia were maintained in constant in every treatment. Carrier material packets were prepared by mixing the broth cultures with sterile other ingredients. The P content was determined by the UV spectrophotometer at 400 nm. Two bacterial strains (B1 and B2) were selected as potential phosphate solubilizes on PVK agar medium. There was significant effect on carrier material type and the bacterial type for the P solubilization ($p < 0.05$). Both B1 and B2 bacterial types were shown high performance of the P solubilization with the addition of carrier material compare to the control. The most effective proportion of carrier material was Treatment 03 for the B1 bacterial types (Bacteria 1+ Rock Phosphate (40 g) + *Gliricidia sepium* (10 g) + Kaolin (30 g) + fly ash (20 g)) with the p value of 0.043 ($p < 0.05$). Both B1 and B2 bacterial types were shown highest P solubilization in 1S¹ week. It can be concluded nutrient enriched carrier material can enhance the activity of phosphorous solubilizing bacteria for solubilizing phosphorus in HERP. Further, it can useful to develop the bio fertilizer with combining low water soluble HERP and the microbial population.

Keywords: Bioleaching, Carrier material, Phosphorus solubilizing bacteria