**Abstract**

Effect of various cultural conditions on the phosphorus solubilizing activity of *Mycobacterium cosmeticum* was tested under different parameters such as carbon (Glucose, Fructose, Sucrose, Maltose and Lactose), nitrogen (Ammonium sulphate, Sodium nitrate, Potassium nitrate and Urea), pH (5.0, 7.0 and 9.0) and temperature (25°C, 35°C and 45°C) using Pikovskaya’s medium amended with 0.5% tri calcium phosphate (TCP) as an insoluble source of P. Solubilization efficiency of TCP by M.cosmeticum varied with different carbon and nitrogen sources in both plate and broth assay. The results of plate assay revealed that P-solubilizing ability of the isolate was more in the presence of glucose (237.3%) as C-source and potassium nitrate (140.2%) as N-source. Whereas for the broth assay lactose was found to be the best (9.0 mg/l) and ammonium sulphate was the best nitrogen source (6.5mg/l). The isolate exhibited its maximum ability to solubilize TCP at the pH of 7.0 and at the incubation temperature of 35°C in both the assays. Thus the study confirmed the efficiency of *M.cosmeticum* to solubilize insoluble form of P under various cultural conditions and can be used as a source of Bioinoculants to eradicate P deficiency in plants and this study was the first to report P-solubilizing activity of *M.cosmeticum.*