Asian J. of Bio Sci. (2007) Vol. 2 No. 2 : (149-155)

Selected pesticides inhibit phosphate solubilizing activity of *Gluconacetobacter* sp. and *Burkholderia plantarii*

STEPHEN JOSEPH AND M.S. JISHA*
Department of Microbiology, School of Biosciences, Mahatma Gandhi University, KOTTAYAM (KERALA) INDIA

(Accepted : September, 2007)

Native Phosphate solubilizing bacteria (PSB) possessing the ability to solubilize insoluble inorganic phosphates were isolated from rhizosphere soils of crop plants. Eighty one potential PSBs thus obtained were quantitatively screened for phosphate solubilization. The amount of P solubilized for different bacteria varied between 11.38-72.97 mg/100 mL. Of these, two bacteria (PSB 12 and 73) found to be efficient phosphate solubilizers. These organisms were characterized on the basis of morphological, cultural and biochemical characteristics as *Gluconacetobacter* sp. and *Burkholderia plantarii*. The isolates were further tested for their tolerance to pesticides, Ekalux, Tagban, Sevin, Metacid and Hinosan. The two organisms showed remarkable difference in pesticide tolerance. Their minimum inhibitory concentration (MIC) values range between 48-3125 µg/mL. Quantitative estimation of soluble P in pesticide containing Pikovaskaya's broth indicates that pesticides have an inhibitory effect on phosphate solubilizing activity.

Key words : Pesticides, P solubilization, Rhizosphere.

INTRODUCTION

In modern agriculture, pesticides are frequently applied to the crop fields to increase crop production. Besides combating pests, a significant amount of the pesticides eventually reaches the soil in the form of "insecticidal fall out" and is accumulated in top soil (0-10 cm) where maximum microbiological activities occur (Alexander, 1978). There are some pesticides, which exert adverse effect on proliferation of microorganisms and their associated transformations in soil (Martinez-Toledo *et al*., 1992). Moreover, the insecticidal effects on soil microorganisms and their associated transformations of nutrients are very specific since individual members within a group vary in toxicity (Simon and Fournier, 1979). The pesticides have direct effect on soil microbiological aspects by causing changes in the populations of *Azotobacter, Rhizobium*, cellulolytic and phosphate dissolving microorganisms (Kalam *et al.*, 2004). Among which phosphate solubilizing bacteria (PSB) solubilize insoluble phosphate and make it available to plant growth, development and reproduction (Anu and Kundu, 2005). These organisms are extremely important in maintaining P nutrition to plants since soluble forms of P fertilizers applied to soil are easily precipitated as insoluble non available forms. This often leads to an excess application of P fertilizer to crop land without being utilized by the plants (Kim *et al*., 1998). This unmanaged excess is both an environmental and economic problem. Hence an attempt has been made to isolate efficient phosphate solubilizing bacteria from rhizosphere soils and *in vitro* studies were made to find out the effects of selected pesticides on phosphate solubilizing activity.

MATERIALS AND METHODS

Isolation of phosphate dissolving bacteria :
Isolation of phosphate dissolving bacteria were carried out from rhizosphere soils of different crop plants. Pikovaskaya's medium was used for the isolation, cultivation and maintenance of phosphate solubilizing bacteria (Gaur, 1990).

Screening of phosphate solubilizing bacteria :
One hundred mL of Pikovaskaya's liquid medium containing tricalcium phosphate (TCP, 5g/L) as sole P source was dispensed in 250 mL Erlenmeyer flasks. The flasks were inoculated with 0.5 mL of 24 h active culture suspension of each culture. Uninoculated medium served as control in each case. Each experiment was done in triplicate set. All the flasks were maintained at 30^0C for 14 days with intermittent shaking twice a day. The soluble P_2O_5 in the supernatant solution was determined by vanadomolybdophosphoric yellow colour method, in nitric acid system (Subba Rao, 1982). The final pH of the culture medium was recorded using digital pH meter (Spectronic