

RELATIONSHIP BETWEEN PHOSPHATE SOLUBILIZING BACTERIA AND SOIL PHOSPHORUS OF COCONUT GROWING SOILS

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Phosphorus is the second most frequently limiting macronutrient for plants. In recent years, the coconut research institute has observed that palms under no fertilization did not show any deficiencies of P by staying within the sufficiency range. As phosphate solubilizing bacteria (PSB) plays a crucial role in soil phosphorus cycle, this study was conducted to determine their role in making phosphorus available to palms by assessing the relationship between PSB and soil available phosphorus of coconut growing soils. Soil samples were collected from 25 unfertilized coconut lands in Kurunagala and Puttalam districts and were analyzed for soil pH, organic carbon, Olsen's P and total culturable heterotrophic bacteria and PSB populations. The most influential factor which determines soil Olsen's P and PSB populations were assessed using regression at 0.05 probability level. The pH of the tested soils varied from 4.7-8.4 while most of the soils were in slightly acidic to neutral range. Soil Olsen's P contents significantly correlated with soil pH, organic carbon and total bacteria population while soil pH was the most influential factor. The abundance of PSB in relations to heterotrophic bacteria ranged from 4.4% to 80.77%, but no significant relationships were observed with any soil parameter investigated. Population of PSB showed significant relationship with soil organic carbon and total bacterial population. The relationship between Olsen's P and PSB population was positive but not strongly correlated. A significant ($r^2 = 0.55$) and higher relationship between PSB and Olsen's P was observed in soils which have not received fertilizer for 10 to 20 years than the soils with the history of no fertilization less than 10 years ($r^2 = 0.21$). This suggests that with time PSB play an important role on Olsen's P content when external sources of P are not added to soils. However, this was not proven in soils which did not receive fertilizer for more than 30 years. Therefore, further investigation is recommended to study the role of PSB population on soil P in long term unfertilized coconut soils.

Keywords: Available Phosphorus, Coconut, Heterotrophic Bacteria, No Fertilization, Phosphate solubilizing bacteria