DETERMINATION OF PHOSPHOROUS ADSORPTION BEHAVIOR IN SELECTED CINNAMON GROWING SOILS

K.G.C. Dewindi[1], D.N. Smaraweera[2] and M.G.T.S. Amarasekara[1]

[1] *Department of Soil and Water Resources Management, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura.*
[2] *Cinnamon Research Station, Department of Export Agriculture, Matara.*

Phosphorus (P) deficiency is the most prevalent problem in wet zone soils due to acidic nature and abundance of Al^{+3} and Fe^{+3} ions. According to literature, high P fixation is a major problem in acidic soils. A study was conducted to determine the nature of P adsorption in six cinnamon growing locations (*i.e.* Matara, Kamburupitiya, Akkuresse, Malimbada, Weligama and Dondra) in Matara District. Soil samples were separately collected from high yielding and low yielding plantations, which were identified by extension officers. A laboratory experiment was conducted to determine P adsorption behavior in sampled soils. P was added at the rate of 100, 200, 400 and 600 μg g^{-1} of soil. Results showed that P adsorption increased significantly with increasing levels of added P. Soil P adsorption were comparatively low in high yielding sites of Matara, Akkuresse, Malimbada and Dondra when compared to the low yielding sites. P adsorption data were fitted to Langmuir and Freundlich adsorption isotherms, which are widely used to explain P adsorption behavior in the soil matrix. The sorption parameters [P adsorption maxima (b), bonding energy (k), buffering capacity (kxb)] were determined from the Langmuir adsorption isotherm. Low yielding sites in Akuresse reported highest P adsorption (89.57%) and highest P adsorption maxima of 526.32 μg g^{-1}. Lowest P adsorption (57.36%) and lowest P adsorption maxima of 204.08 μg g^{-1} were reported in high yielding sites in Matara. Buffering capacity was low in all sites of high yielding than sites of low yielding. The maximum buffering capacity of 500 ml g^{-1} and minimum buffering capacity of 80 ml g^{-1} were observed in low yielding and high yielding, sites in Matara, respectively. Low yielding sites of six areas showed high P fertilizer requirement due to high buffering capacity and split wise P fertilizer application can be recommended.

Key words: Buffering capacity, Freundlich and Langmuir adsorption isotherms, Phosphorus adsorption, Phosphorus deficiency