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Evaluation of soil phosphorus extraction methods for coconut growing soils of the Low Country Intermediate Zone of Sri Lanka

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In the Low Country Intermediate Zone of Sri Lanka, coconut is cultivated as the major plantation crop, while crops, such as, coffee, banana, ginger, turmeric etc., are also cultivated as intercrops under coconut. Phosphorus is one of the most limiting plant nutrients for coconut in this area and therefore an effective phosphate fertilizer recommendation programme is essential for this zone. In this regard, methods available for soil phosphorus extraction needs to be evaluated and properly calibrated for a particular soil – crop combination. The objective of this study was to compare the effectiveness of various phosphorous extraction methods for different soils in the Low Country Intermediate Zone of Sri Lanka.

Eight soil phosphorus extraction methods, i.e. (i). Bray and Kurtz 1, (ii). Bray and Kurtz 11, (iii) Olsen's bicarbonate extraction, (iv) 0.01 M calcium chloride extraction (v) water extraction (vi) anion exchange resin 4h (AER) method, (vii) anion exchange resin + cation exchange resin 4h (AER + CER) method, (viii) 2.5% acetic acid, were compared and evaluated for ten coconut growing soil series (pH 4.6 to 5.9) in the Low Country Intermediate Zone of Sri Lanka. Relative yields of *Panicum maximum* that were grown in pots filled with the soils, and placed in a green house (1g TSP per pot) with and without phosphate fertilizer, but with a basal treatment of nitrogen, potassium and magnesium fertilizer were determined and used as the plant index for soil phosphorus availability. The suitability of the methods were evaluated by goodness of fit of correlation data (relative yields of the crop and P status of each soil prior to treatment application were estimated by the above phosphorus extraction methods) to Cate and Nelson model.

Results showed that correlation coefficient (R^2) of Olsen's bicarbonate (0.62***), 2.5 % acetic acid (0.49***), AER (0.49***) and AER + CER (0.49***) fitted highly significantly to the Cate and Nelson model than to the other methods. Bray and Kurtz 1 (0.47*) and Bray and Kurtz 11 (0.47*) methods showed moderate correlation while water extraction (0.40) and 0.01M calcium chloride (0.16) methods showed poor correlations. Therefore, it is concluded that the most suitable method for soil phosphorus extraction is Olsen's bicarbonate followed by 2.5% acetic acid in Low Country Intermediate Zone of Sri Lanka.

Keywords: soil phosphorus, relative yield, Cate & Nelson model, coconut, extraction Methods