

DETERMINATION OF THE OPTIMUM SOIL AVAILABLE PHOSPHORUS TESTING METHODS IN DIFFERENT AGROECOLOGICAL ZONES FOR CINNAMON-GROWING SOILS

W.M.S. Nethsarani¹, K.H.G.M. Tharanga² and M.G.T.S. Amarasekara¹

¹*Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka.*

²*National Cinnamon Research and Training Centre, Department of Cinnamon Development, Thihagoda, Sri Lanka.*

Cinnamon (*Cinnamomum zeylanicum*), a valuable spice, is widely cultivated in Sri Lanka, particularly within its wet and intermediate agroecological zones. Optimal cinnamon growth is highly dependent on soil fertility, especially the availability of phosphorus (P). However, due to unique soil and climatic variations across regions, traditional phosphorus assessment methods may vary in effectiveness. In this study, soil P availability across diverse agro-zones in Sri Lanka was investigated, using multiple testing methodologies, including the Olsen, Bray 1, and Bray 2 tests. These methods evaluated the most suitable and region-specific method for assessing available P in cinnamon-growing soils. Soil samples were collected from four cinnamon cultivation sites in wet, intermediate, and dry zones. Subsamples from 0-15 cm (topsoil) and 15-30 cm (subsoil) layers were extracted using a soil auger and combined into composite samples to ensure representative data. ANOVA was used to compare the mean phosphorus levels extracted by the three methods across different soil pH ranges. Results indicated significant variability ($p < 0.05$) in the effectiveness of the methods, confirming that soil pH strongly influences phosphorus availability and the suitability of extraction methods. The study found that the Bray 1 and Bray 2 methods were more effective in acidic soils (pH 4.9-5.5), commonly observed in the *Thihagoda* and *Kalutara* regions. Bray 1 recorded higher extracted phosphorus levels compared to Bray 2, indicating its suitability for low-pH soils. In contrast, according to Pearson correlation, the Olsen method showed a positive correlation with phosphorus availability in neutral to alkaline soils (pH 5.5-8), suggesting its effectiveness in these conditions. Overall, the findings support a site-specific approach for phosphorus measurement in cinnamon cultivations. This study offers a pathway for more precise soil available P testing strategies that enhance cinnamon yields by selecting appropriate methods for each agroecological zone.

Keywords: Extraction methods, Phosphorus availability, Soil pH