

### **B-36 Study of the effective root zone of coconut in relation to soil compaction**

L P Vidhana Arachchi<sup>1</sup>, H Somapala<sup>2</sup>, R B Mapa<sup>3</sup>, P A J Yapa<sup>4</sup>  
(<sup>1</sup>Coconut Research Institute, Lunuwila, <sup>2</sup>Dept. of Agriculture, <sup>3</sup>Dept. of Soil Science, Univ. of Peradeniya, <sup>4</sup>Dept. of Botany, Univ. of Sri Jayewardenepura, Nugegoda)

Soil compaction is a key factor that affects the availability of water, nutrients and aeration in soil. These conditions play a major role in coconut root growth and proliferation. The objective of the present study was to (a) evaluate the effect of soil compaction on root growth and proliferation and (b) define the effective root zone of coconut in relation to the water absorption process.

Twenty soil series in the coconut triangle were categorized into low productive and high productive groups by a cluster analysis. Andigama and Madampe series fall into the above groups respectively.

For root measurement of coconut in Andigama and Madampe series, core samples of soils of 100 cm<sup>3</sup> volume were obtained from the bole of palm vertically upto 1.5m depth and horizontally upto 3 m distance. Roots penetration resistance was examined in vertical and horizontal directions using cone and pocket penetrometers respectively. Water extraction process by coconut roots in respect to soil compaction was examined using the neutron probe method. Five coconut palms were selected randomly from each series for this study.

Study of soil strength revealed that penetrometer resistance higher than 100 N/cm<sup>2</sup> limited coconut root growth and proliferation.

Coconut root distribution in Andigama and Madampe series showed that 75 - 80% of roots of adult coconut palms were localized to the depth range of 20 to

80 cm. About 5% of roots were beyond 100 cm depth and 15 - 20% were in the top layer (0-20 cm) of soil respectively. Neutron probe studies in respect of soil compaction showed that high moisture extraction by coconut roots was confined to the depth range 20 - 80 cm and enhanced upward capillary movement of water in soil profile. Study of soil strength of Andigama and Madampe series revealed that soil strength was negatively correlated ( $r=0.8298$ ;  $p<0.01$ ) with coconut root growth and soil compaction. Soil strength higher than 100 N/cm<sup>2</sup> hindered the water absorption process and resulted in retardation of the growth and proliferation of coconut roots. Financial assistance by the Council for Agricultural Research Policy (Research grant 12/175/149) is acknowledged.