

**EVALUATING ROOT DISTRIBUTION PATTERN  
OF SELECTED COCONUT CULTIVARS AT YOUNG  
STAGE UNDER DIFFERENT CLIMATIC AND SOIL  
CONDITIONS**

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## ABSTRACT

Coconut is one of the main commercial plantation crops in Sri Lanka. Human inhabitation and climatic changes are the main contributory factors for reduction of extent of coconut growing lands in traditional areas. As a consequence, move to cultivation has to be non traditional areas. The limitations in soil, climate and water pose a great challenge for coconut cultivation in those areas. Strong, well distributed root system is extremely important in withstanding frequent dry spells experienced in those marginal areas. Present experiment was conducted to identify the root distribution pattern of *CRISL 98* (a cross between Tall and San Ramon) and *Kapruwana* (a cross between Dwarf Green and San Ramon) cultivars at young palm stage under different climatic and soil classes and also to identify their active root zone and its variation under different environments.

Experiment was conducted as a three factor factorial using around 3 year old coconut palm of *Kapruwana* and *CRISL 98* cultivars under intermediate zone (IZ) and wet zone (WZ) in S1/S2 and S3/S4 land suitability classes. Soil core samples were taken from different distance from the base of the palm and at five depths in two opposite directions. Roots collected from the soil mass were separated and number, dry weight, total root length and root volume were measured for primary and secondary roots separately. Data were analyzed using ANOVA and means were separated using Duncan's new multiple range test (DNMRT) using SAS (version 8) computer software.

Two improved cultivars showed significantly higher ( $P < 0.001$ ) root distribution in IZ compared to those in WZ with respect to all parameters investigated. Frequent dry spells in IZ may have enhanced the growth of roots to explore more soil profiles for water and other soil based resources. Differences in root growth between coconut cultivars were marginal at this age. Horizontal distribution of roots decreased with increasing distance from the base of the palm while having more than 60% of roots within the first 50 cm and more than 80% within the 100 cm distance from the base of the palm. Thus, the application of agronomic practices should be limited to this root zone area at the age of 2 to 3 years. Vertically downward root growth decreased with increasing depth in both cultivars having more than 70% of roots within the top 60 cm layer of soil and more than 80% within the top 80 cm depth. Accordingly, roots of

coconut palms are mostly within a shallow layer of top 80 cm soil profile at this age and therefore, palms are substantially vulnerable for abiotic stress conditions thus need more attention and care specially during the periods of abiotic stress conditions until their roots grow far distances from the base and into deeper layers of the soil.

**Key words:** Root distribution pattern, climatic zone, *Kapruwana* and *CRISL 98*, Seedlings, Root samples