B-35 Effect of soil physical stress on the morphological characters of coconut roots

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Soil phycical properties including water stress are generally known as key factors that affect the processes of gas exchange, water and nutrient absorption. Absorption cells and respiratory organs of coconut roots are mainly involved in water and nutrient absorption and exchange of gas in the root-soil interface. The objective of the study was to evaluate the morphological adaptations of absorption cells and respiratory organs of coconut roots in response to soil physical stress.

Two soil series with contrasting soil physical characteristics namely Andigama (low productive) and Madampe series (high productive) were selected for this study. There months old coconut seedlings, just after root initiation, were exposed to different layers of Andigama and Madampe series at a given water potential in their root zone. Morphological characters of root absorption cells and respiratory organs of coconut roots under soil physical and moisture stress were studied using scanning electron microscope technique (SEM).

The experimental results showed that the high soil compaction reduced the growth of coconut roots due to low availability of water and low aeration capacity. Moreover, soil physical stress was also found to enhance inactive roots by suberization and dehydration processes.

SEM photographs showed that (a) soil physical and water stress reduced the cell volume per unit area of the absorption zone and the number of openings of respiratory organs of coconut roots resulting in retardation of water and nutrient absorption, and air exchange processes. (b) Gravel particles reduced the contact surface of coconut roots with soil in the root-soil interface. The malfunction of above processes resulted in retardation of growth and development of coconut seedlings.

These findings on adaptations of morphological characters of coconut roots are of importance in adaptive research programmes and for proper management practices with a view to optimizing coconut production.

Financial assistance by the Council for Agricultural Research Policy (Research grant 12/175/149) is acknowledged.