

## **Effect of different levels of soil moisture stress on the physiological performance of three improved cultivars of coconut (*Cocos nucifera* L.)**

The physiological mechanisms activated in improved coconut cultivars, CRIC 60 (TxT), CRISL 98 (TxSR), and CRIC 65 (DxT) in response to different soil moisture stress conditions were assessed in a field experiment conducted by using seventeen-year-old adult palms of each variety. Three soil moisture treatments were accomplished by considering natural rain-free periods in the field, viz; field capacity (FC) - after a continuous rainy period, mild (MiS) and moderate stress (MS) -25 and 65 days of rain free periods respectively. The ninth frond (counted from youngest frond as one) of adult palms was used for the physiological measurements. Rate of transpiration (TRANS), stomatal diffusive resistance (SDR), leaf water potential (LWP), relative water content (RWC), rate of photosynthesis (PHOTO) and water use efficiency (WUE) were measured. A Randomized Complete Block Design (RCBD) was followed with 8 replicates per treatment. Data were analysed using SAS statistical package.

The statistical analysis revealed that there was no significant interaction between varieties and soil moisture treatments, except the WUE, indicating that they are independent of each other. There was a significant difference among varieties for LWP, RWC and WUE. Irrespective of the soil moisture treatment, LWP, RWC and WUE of DxT palms were significantly higher than TxT and TxSR. DxT too showed the highest WUE. There was a significant difference in PHOTO, LWP, TRANS, SDR and WUE between stressed and unstressed palms. Moreover, there was a significant difference in TRANS and SDR among the three soil moisture treatments. The lowest TRANS ( $0.45 \mu\text{g}/\text{cm}^2/\text{s}$ ) and the highest SDR ( $50.25 \text{ s}/\text{cm}$ ) were obtained for the palms under moderate stress. The study revealed that none of the varieties could maintain satisfactory physiological functions even at moderate water stress (two months of rain-free period) under field conditions and sensed water deficit by increasing the stomatal resistance. If the soil moisture levels were not limiting, DxT showed the best physiological performance. Further, the RWC did not show any significant difference among the treatments. Therefore, RWC could not be used as an indicator to determine the plant responses to moisture stress under field conditions.