Soil moisture behaviour in red yellow podzolic soils under tea canopy and bare soil in Mapalana

G.V.T.V. Weerasooriya [1] and K.D.N. Weerasinghe [2]

[1] Dept. of Agricultural Systems, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura
[2] Dept. of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya

Abstract

Tea is the major export crop in Sri Lanka and is grown as a rain-fed plantation crop. All tea-growing areas receive rainfall, to satisfy the evaporation demand but rainfall distribution is not uniform throughout the year and often-dry spells are experienced. Under prolonged dry weather conditions, growth of the tea is adversely affected by plant water deficits created by the lack of soil moisture and associated high saturation vapor pressure deficit of the air. As there is no real understating of soil moisture regime, its movement pattern and the lack of relevant information, it is difficult to offer suitable agronomical practices to overcome the drought problem.

This study was conducted during June to October 2001, to collect relevant information on soil moisture regime, and its movement pattern. Diviner 2000 method, which is based on the dielectric capacitance, was used for the moisture assessment. The active root distribution of tea was determined using the soil profile root activated method. Soils were loamy sand with pH of 4.0 and had a compacted soil layer at 70 cm depth and thick lateritic layer at 40 -50 cm depth. Average bulk density of the surface layers was 1.4 g/cm^3 which increased with the depth.

Results revealed that moisture-holding capacity of tea soils is higher (7.67 %) compared to the bare land. The rapid increment of soil moisture in tea land was observed after the saturation or heavy rains. Root development was concentrated in upper 40 cm layer (95%) and at 80 – 100 cm depth. Rapid extraction of soil moisture at an average of 3.93 mm/day by the plantation was observed in upper 40 cm soil layer which was 47.31% higher than that of the bare soil. However, moisture depletion of the surface layer was due to high heat flux and the well-established canopy cover acted as a barrier to prevent surface evaporation. Soil moisture depletion was influenced by soil/air temperature, rainfall, evaporation, soil texture, pH value and root distribution pattern.

Keywords: Soil moisture distribution, Active Root Distribution