

Impacts of Conversion of Rubber to Oil Palm Plantations on Soil Water Dynamics in the Low Country Wet Zone of Sri Lanka

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Conversion of land-use from rubber to oil palm may have implications for soil and water resources. This study investigated the impact of converting rubber plantations to oil palm on soil water storage (SWS) dynamics in the low-country wet zone of Sri Lanka. Volumetric soil water content of multiple soil depths (0-25, 25-50, 50-75, and 75-100 cm) was monitored in three replicates in adjacent 12-year-old oil palm and rubber plantations over December 2022 to March 2024 in *Yatadolawatta* estate, *Mathugama*. Soil water dynamics were assessed by comparing the SWS and change in SWS (Δ SWS) at various depths within the 1 m of soil profile. The mean SWS was higher in rubber grown soils (271.56 ± 21.67 mm) compared to oil palm (214.42 ± 21.66 mm), which was attributed to significantly greater soil organic carbon (0-25 cm) and clay content (0-25, 25-50, 75-100 cm). A net increase in surface SWS, attributed to rainfall recharge, occurred in both land uses, while subsurface layers were depleted by root water uptake. Depletion in the 25-50 cm layer was significantly greater under oil palm, likely due to water uptake by its dense shallow root system. However, the extent of water depletion in the deeper layers (50-75 cm and 75-100 cm) and the 0-100 cm layer showed no significant difference. Conversion from rubber to oil palm did not lead to additional depletion of water in the deeper soil layers studied, indicating no significant impact on groundwater recharge potential. Further research across diverse soils and climates is recommended.

Keywords: Change in water storage, Oil palm, Rubber, Soil water storage

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