

Stable oxygen and deuterium isotope techniques to identify plant water sources

Abstract

There is still very little information on the sources of water absorbed by oil palm plant. This information is very important for water management system in oil palm plantation. Thus, this study was carried out to determine current water sources absorbed by the oil palm roots using oxygen ($\delta^{18}\text{O}$) and deuterium isotopes (δD) techniques. Samples of oxygen and deuterium isotope were total rainfall, throughfall, runoff, measurement at 5 soil depths (namely: 20 cm, 50 cm, 100 cm, 150 cm, and 200 cm), and oil palm stem. Results of this study showed huge variance in the values of oxygen and deuterium isotope. Based on Least Significant Difference (LSD) test, there was no significant value in the oxygen and deuterium isotope of stem water and others; however, a similar value was obtained at the depths of 0 - 20 cm and 20 - 50 cm with the stem water. This indicated that oil palm absorbed water from 0 - 50 cm depth. This result agreed with the oil palm rooting system, which has verified that the root quarter is the most active root of oil palm.

Keyword: Deuterium isotope technique; Plant water sources; Stable Oxygen