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“Bridging the gap between increasing knowledge and decreasing resources”

Water Use by Rubber and Oil Palm Plantations in the Lowlands of Jambi, Indonesia

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Abstract

In Asia oil palm as well as rubber plantations are rapidly expanding. In both plantation types there is concern about the integrity of the hydrological cycle. Our study aimed at a comparison of the transpiration rates of the two plantation types with respect to seasonality and site conditions. In the lowlands of Jambi (Indonesia), we studied eight rubber and eight oil palm plantations, which were between 7–17 years old and 9–16 years old, respectively. For the assessment of seasonality, one rubber and one oil palm plot was measured for 12 months. Additionally, three plots of each plantation type were measured pair-wise with one relatively dry and one relatively wet plot for three to four weeks. We used Granier-type thermal dissipation probes for an assessment of the tree and palm water use. For the palms, sensors were installed in the leaf petioles and four leaves per palm, and four to ten palms per site were studied. For rubber, two sensors per tree were installed in the trunk and six to ten trees per site were studied. New equations for estimating the sap flux density were derived from lab calibration experiments. Our results suggest moderate average water use rates for both plantation types. Rubber transpiration underwent a strong seasonality as due to leaf shedding in the dry season. Also when rubber trees were fully leaved, their transpiration responded more sensitively to changes in soil moisture than oil palms. In other words, oil palm transpiration seems to be more conservative than that of rubber.

Keywords: Lowlands, oil palm, rubber, seasonality, site condition, thermal dissipation probes (TDP), water use