Title: **Water flux measurement and prediction in young cashew trees using sap flow data**
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Abstract

Measurements of sap flow, meteorological parameters, soil water content and tension were made for 4 months in a young cashew (Anacardium occidentale L.) plantation during the 2002 rainy season in Ejura, Ghana. This experiment was part of a sustainable water management project in West Africa. The Granier system was used to measure half-hourly whole-tree sap flow. Weather variables were observed with an automatic weather station, whereas soil moisture and tension were measured with a Delta-T profile probe and tensiometers respectively. Clearness index (CI), a measure of the sky condition, was significantly correlated with tree transpiration (r2 = 0.73) and potential evaporation (r2 = 0.86). Both diurnal and daily stomata conductance were poorly correlated with the climatic variables. Estimated daily canopy conductance gc ranged from 4.0 to 21.2 mm s-1, with a mean value of 8.0 +/- 3.3 mm s-1</SUP >. Water flux variation was related to a range of environmental variables: soil water content, air temperature, solar radiation, relative humidity and vapour pressure deficit. Linear and non-linear regression models, as well as a modified Priestley-Taylor formula, were fitted with transpiration, and the well-correlated variables, using half-hourly measurements. Measured and predicted transpiration using these regression models were in good agreement, with <I >r</I ><SUP >2</SUP > ranging from 0.71 to 0.84. The computed measure of accuracy indicated that a non-linear model is better than its corresponding linear one. Furthermore, solar radiation, CI, clouds and rain were found to influence tree water flux.