

UNIVERSITÄT HOHENHEIM
INSTITUT FÜR AGRARTECHNIK
Agrartechnik Tropen und Subtropen
Prof. Dr. J. Müller



Master-Thesis
Allgemeine Agrarwissenschaften
Fachrichtung Agrartechnik

cand. M. Sc. André Schönhaar

**Assessment of water consumption of juvenile “Nam Dokmai”
mango trees (*mangifera indica* L.)**

This work was financially supported by the
Foundation fiat panis

Abgabe: 02.12.2016

Abstract

With temperatures rising and precipitation decreasing in the tropical and subtropical regions, water scarcity will increase in the future and the use of water needs to be reassessed.

This study was conducted on the assessment of water consumption of three-year-old mango trees (*mangifera indica l.*) in an experimental orchard in Chiang Mai, Northern Thailand from November to February in the year 2015/16.

The trees were planted in containers, soil covered by a roof but the canopy exposed. Micro sprinklers were used to irrigate five different experimental lines with different amounts of water previously calculated by the Penman-Monteith method (FAO 56) with k_c originally set to 0.4, 0.6, 0.8, 1.0 and 1.2. Volumetric soil water content as well as stomatal conductance were measured regularly, and the use of new type heat balance sap flow gauges was assessed.

Furthermore, images of the tree canopies were taken with a digital camera and evaluated with the software "Easy Leaf Area" to measure the canopy area. Water consumption was then calculated with a water balance model.

The volumetric soil moisture content as well as the stomatal conductance showed a continuous decline during the period between January 4th and February 4th, the actual crop evapotranspiration ET_a calculated with the water balance model averaged between 3.3 mm day⁻¹ and 5.5 mm day⁻¹. Correlation between canopy area estimated by picture analysis and measurements taken manually showed $r^2 = 0.47$. Use of the sap flow gauges returned inconclusive data. Generally, methods of sensing of plant response need to be improved. The less irrigated mango trees only showed minor signs of water stress during the period of the experiment. Assessment of water consumption in trees planted in containers is deemed a valid method, since the factors of precipitation and soil evaporation can be excluded. Longer term studies are to be conducted to further substantiate the numbers published and improve methods of observation of the response of the plant to water stress.