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Evaluation of Water Saving Potentials in Lychee Production with Different Irrigation Practices

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Abstract

Lychee production is becoming more and more prominent in the northern highlands of Thailand. The increasing water demands in dry season led in the past to water conflicts between highland and lowland farmers. Therefore, focus was set on improving lychee irrigation efficiency in the framework of the Uplands Program (SFB 564, University of Hohenheim).

Within the first field campaigns, potentials for improving irrigation efficiency were identified. Besides a better system maintaining, a more site adapted irrigation scheduling as well as site adapted irrigation techniques were proposed. In addition it could be impressively shown, that Time Domain Reflectometry (TDR) controlled irrigation might reduce water consumption up to 80 %.

Based on these findings, the ongoing research sets emphasis on TDR controlled micro irrigation using conventional low-pressure sprinklers as well as pressure compensating drippers and micro-sprinklers.

The objective of the present study is to evaluate the water saving potentials of the three irrigation practices mentioned above by soil water balance modelling with the Hydrus 2D programme. Since potential evaporation under the trees was found to be half of that aside, irrigation is assumed to be applied under the tree crown only. Water content is monitored in 30 cm depth, in which a pressure head of h=-450 cm is set as threshold for initializing irrigation.

As upper boundary condition, precipitation is set equal to zero. Averaged Epot and Tpot values of dry season 2002 are assumed to recur every day. The hydraulic properties are taken from (Spohrer et al. 2005). Modelling time is set to 50 days.

Water input and water losses by evaporation, transpiration and seepage will be balanced at the end of the modelling time. Thus, the efficiency of the different irrigation practices can be compared to each other. Further on, the results shall help to identify possible weaknesses of the different irrigation practices, which will in turn help to support current research activities.

Keywords: Irrigation, water balance modelling

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