



Deutscher Tropentag, October 11-13, 2005, Hohenheim

“The Global Food & Product Chain—  
Dynamics, Innovations, Conflicts, Strategies”

## Modelling Agroforestry Systems in Hillside Cropping of North-East Thailand by Using WaNuLCAS

THOMAS HILGER<sup>1</sup>, WANWISA PANSAK<sup>1</sup>, THANUCHAI KONGKAEW<sup>2</sup>, GEORG CADISCH<sup>1</sup>

<sup>1</sup>*University of Hohenheim, Plant Production in the Tropics and Subtropics, Germany*

<sup>2</sup>*Naresuan University, Department of Agricultural Science, Thailand*

### Abstract

In Northeast Thailand, soil erosion by water is a severe problem in uplands, contributing to low productivity of hillside cropping systems and a poor food security. Agroforestry systems may play an important role to control water induced soil erosion. However, experimental testing of their potential application domain and design is costly and time consuming. Modelling can be used to investigate these systems relatively quickly and at relatively low cost. The Water, Nutrient and Light Capture in Agroforestry Systems (WaNuLCAS) model was developed to deal with a wide range of agroforestry systems with minimum parameter adjustments. Examples for applications are crop rotations, hedgerow intercropping systems at different hedgerow spacings and pruning regimes, crop-fallow mosaics and parkland systems with a circular geometry. Safety-net function of deep tree roots, lateral interactions on flat or sloping land, tree-soil-crop interactions across a rainfall gradient, water and nutrient use efficiencies of agroforestry systems can also be tested. However, models must first be validated to assess satisfactory simulation of the target systems. Climatic, edaphic, crop and tree growth data collected from an erosion trial at Ban Bo Muang Noi, Loei province were used to test the model sensitivity for the northeast of Thailand. Maize yields and tree growth were quite well predicted by the model and corresponded to real-world observations. However further model validation is required before any soil, climate, tree and crop specific model prediction can be made as the predicted data's goodness of fit with the experimentally observed data was low. Possible entry points are pedotransfer functions and other default settings.

**Keywords:** Erosion, fruit trees, hedgerow, maize, soil conservation