

**Agricultural Sciences, Food Security and Natural Resource Management
in the Tropics and Subtropics**

M.Sc. Thesis

**Assessment of spatial variability in
yield and growth performance along rice paddies in the
mountainous regions of North-West Vietnam**



University of Hohenheim

Institute of Plant Production and Agroecology in the Tropics and Subtropics

Abstract

Assessment of spatial variability in yield and growth performance along rice paddies in the mountainous regions of North-West Vietnam

In the mountainous regions of Northern Vietnam, the majority of the rapidly growing population depends on the cultivation of paddy rice (*Oryza sativa* L.) in lowlands and crops such as maize (*Zea mays* L.) and cassava (*Manihot esculenta* Crantz) on upland areas with relatively steep slopes which are highly susceptible to degradation by erosion. Both systems, however, are often linked with each other. The aim was, to assess the effect of sediment loaded irrigation water on the spatial variability of rice growth and yield along toposequences of paddy rice terraces as well as on the spatial variability within a field. Crop performance (e.g. LAI, chlorophyll, plant height,...) and yield parameters (e.g. harvest index (HI), 1000 grain weight,...) of NEP 87, a short term hybrid rice variety of 120 days were examined in four growth stages, from tillering until flowering during March and June 2007 for four toposequences and a fertilizer trial. All fields were subdivided into fertilized and non-fertilized parts. Chlorophyll concentration and LAI were assessed by using a Chlorophyll meter SPAD-502 (Konica Minolta Co. Ltd.) and a LAI-2000 (Licor, USA) respectively. The analysis of variance (ANOVA) was used for assessing the overall spatial variability as average of all four toposequences whereas the spatial variability within a field was evaluated with a frequency analysis by comparing two selected sequences with different inflow premises. It was shown that all parameters were significantly affected by fertilizer application and distance of field from irrigation channel as well as by the interaction of fertilizer and distance. Mainly unfertilized fields in the middle of a toposequence showed better performance than the other fields. The results were traced back to soil fertility due to influshing sediments while in the fertilized fields the effect of sedimentation cannot fully be proven as all fields obtained the same amount of fertilizer. The results of the analysis of spatial variability of the fertilized and unfertilized part of the toposequences provided information for improving agricultural production in these fragile ecosystems.

Keywords Spatial variability, paddy rice, crop performance, LAI, SPA