

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

Hertel, M.¹, Schmitter, P.¹, Vien, T. D.², Dercon, G.¹, Hilger, T.H.¹, Cadisch, G.¹

¹ University of Hohenheim, Institute of Plant Production and Agroecology in the Tropics and Subtropics, Stuttgart, Germany.
² Hanoi Agricultural University, Vietnam

Introduction



The mountainous regions of Northern Vietnam are characterized by relatively steep slopes, being highly susceptible to water induced erosion. During heavy rainfall events soil particles are translocated by runoff water to lower areas where deposited sediments may have a significant impact on the nutrient balance, yields and growth performance of paddy rice.



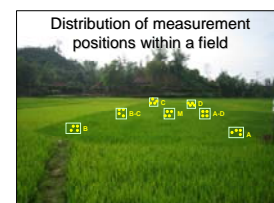
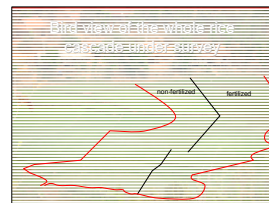
Location map of the research area in NW Vietnam

Materials & Methods

- Chieng Khoi Commune, Yên Châu district, Son La province, Vietnam (20°37'0 N, 106°4'60 E),
- Tropical monsoon climate with very hot, wet summers and dry, cool winters; experimentation period: March - June 2007,
- Cassava and maize in uplands, paddy rice in valleys,
- The study was conducted in a cascade of paddy rice (*Oryza sativa* L.) fields, planted with variety Nep 87 ("sticky rice"),
- All fields were divided into a fertilized and a non-fertilized part; application rate followed the local recommendations (3 kg of Urea, 15 kg of NPK and 0.8 kg of Kali per 100m²),
- At four growth stages (tillering – T, maximum tillering – MT, maximum tillering to panicle initiation – MT/PI, and flowering - F), leaf area index (LAI) and the chlorophyll content of the leaves were determined with a Licor plant canopy analyzer LAI2000 and a Konica chlorophyll-meter SPAD 502, resp., on seven spots within each field. At final harvest, rice grain yield was assessed at the same spots.

Objectives

- to gain a better understanding of the influence of land-use intensification and related nutrient flows from uplands on the productivity of paddy rice in the lowlands
- to assess the effect of sediment loaded irrigation water on the spatial variability of rice growth and yield along a sequence of paddy rice terraces.

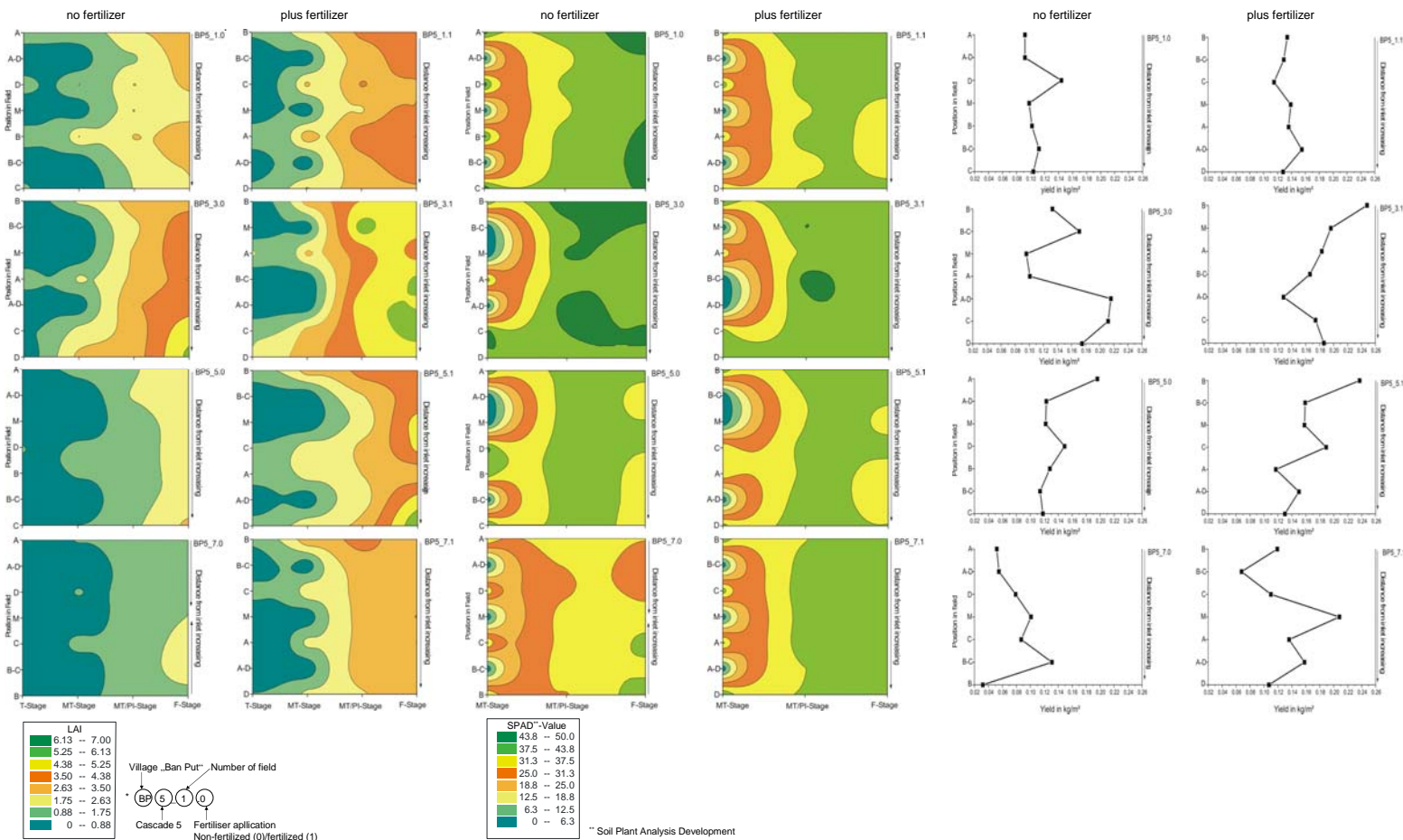


Results

Spatial variability in Leaf Area Index (LAI)

Spatial variability in chlorophyll concentration of uppermost leaf

Spatial variability in grain yield



Conclusions

- Spatial variability in LAI, chlorophyll concentration and grain yield was found within fields, along the cascade as well as between fertilized and non-fertilized fields.
- Higher LAI, chlorophyll concentrations and grain yield in fertilized fields and a clear trend towards a peak in middle fields was observed when looking at the entire cascade.
- With increasing distance from inlet a higher LAI was recognised in fertilized fields, but in yield no clear trend was noticed.

Contact: Maja Hertel/T. H. Hilger
Institute of Plant Production and Agroecology
in the Tropics and Subtropics
University of Hohenheim (380a)
70593 Stuttgart, Germany
Email: t.hilger@uni-hohenheim.de
Email: Maja.Hertel@web.de

This study was funded and supported by the Eiselen Foundation Ulm within the framework of the DFG funded SFB 564 - Uplands Program.