



Tropentag, September 19-21, 2012, Göttingen -  
Kassel/Witzenhausen

“Resilience of agricultural systems against crises”

## Quesungual Slash and Mulch Agroforestry System: Improving Livelihoods of Smallholders in Central America

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### Abstract

Food insecurity and poverty are major problems in rural areas of Central America, particularly for those farmers who depend on maize-bean-livestock systems in sub-humid ecosystems. Intensive use of agricultural lands and farming in not suitable areas, and limited use of soil conservation practices, have led to an extensive degradation of natural resources. Earlier work on hillsides of Central America has shown that both the Quesungual Slash and Mulch Agroforestry System (QSMAS) and silvopastoral systems with improved forages can enhance eco-efficiency to improve livelihoods of poor farmers by increasing agricultural productivity and profitability, and facilitating the generation of other ecosystem services.

This research compares QSMAS, in combination with improved (stress-adapted) food crops (maize and bean) and multipurpose improved forages (grasses and legumes), to the traditional crop-livestock system based on slash-and-burn agriculture and traditional pastures. Experimental plots were established in 16 farms in two regions of Nicaragua. Baseline studies on ecosystem parameters included soil quality, fertility, macrofauna, erosion, and carbon stocks. Agricultural productivity and ecosystem benefits of improved crop-livestock systems are being assessed on the experimental plots with natural forest as reference. Sociocultural and socioeconomic factors driving adoption are defined of both participating and non-participating farmers, to support the development of strategies for translating the results into practice.

Preliminary results (one year) show no significant effects of treatments on crop yields, although in one region maize productivity tended to be higher with improved varieties and improved management. Erosion is highest in the traditional (especially slash-and-burn) system, and lowest on QSMAS plots. Although in general QSMAS did not show significant differences in physical and chemical soil quality parameters when compared to the traditional system, abundance of macrofauna was greater suggesting improved soil conditions.

Out and up scaling activities have included several workshops and field days with farmers, technicians and researchers, directly and indirectly (through NGOs and local authorities) involved in the project. In the coming year evaluations of food crops will continue, as well as the monitoring of ecosystem parameters. In addition, grazing trials will be implemented to assess the effect of the improved sylvopastoral system on milk production.

**Keywords:** Bean, Central America, maize, multipurpose forages, quesungual slash and mulch agroforestry system, slash-and-burn