

## **The Quesungual Slash and Mulch Agroforestry System (QSMAS) - CPWF Project 15**

The Quesungual Slash and Mulch Agroforestry System (QSMAS) is a production system practiced by resource-poor smallholders on steep slopes in the sub-humid tropics of the southwest Honduras. It has been the basis of a successful development strategy promoted by the FAO-Lempira Project that has focused on improving rural livelihoods in the Lempira Department, formerly the poorest region in Honduras. During the initial implementation of the project by FAO it was found that, although slash and burn practices were extensively practiced by small farmers there was a small group of farmers in the village of Quesungual who planted crops under a slash and mulch system without burning. The project concentrated on efforts to improve and generalize this practice in the region, initiating a process to test the technological components of the QSMAS with the active participation of farmers. Local organizations, farmer communities, and small enterprises developed over time along with the process of supporting the adoption of improved land and water management practices associated with the QSMAS. Burning was banned by local government officials and resulted in an almost 100% reduction of fire in several villages of the region.

### **A unique system**

QSMAS is proving to be a unique system, capable of improving food security and maintaining resource quality. Farmers cite a number of advantages to QSMAS, including improved soil water availability (moisture retention and longer duration of moisture availability for crops in the extended dry season) resulting in considerably reduced crop losses due to drought. A two-fold increase in crop yields (maize from 1200 to 2500 kg/ha, beans from 325 to 800 kg/ha) and cattle stocking rates, and significant reduction in costs associated with agrochemicals and labor in comparison to the traditional slash and burn (SB) system has led to the widespread adoption of QSMAS by more than 6,000 households in 7,000 ha.

QSMAS is based on planting annual crops in an improved (through practices adapted by technicians and farmers) indigenous slash and mulch management system that avoids burning. Management of the system includes annual production of maize as a main crop in the first rainy season (long) and beans or sorghum as a second rainy season (short) crop using zero-tillage, seasonal slashing and mainly pruning of native trees and shrubs, maintaining soil cover through mulching, spot application of fertilizers, and application of pre-emergence herbicides. The main objective of the CPWF Quesungual project is to define the key driving forces and principles behind the social acceptance and the biophysical resilience of QSMAS (by determining the role each of the components of the system plays) and its buffer capacity to sustain crop production and alleviate water deficits on steeper slopes with high risk for soil erosion.

{[Photo #06 here](#)}

### **Achievements to date**

So far, the collaborative research between the project's partners, the TSBF-LA (Tropical Soil Biology and Fertility Institute of CIAT-Latin America) and MIS (Integrated Soil Management) consortium (with active participation from 14 students) in Central America, contributed to the following major findings:

- QSMAS is a production system with small farms (size of 0.5 to 1.0 ha) inserted into the landscape. Tree cover is similar in QSMAS and secondary forest
- Local biodiversity is favored through the conservation of trees and shrubs within the system
- The combined effect of permanent soil cover and other components of the system reduce soil erosion and improve crop water productivity and water quality, compared to the SB system
- The layer of mulch derived from pruning of trees and crop residues is a source of essential plant nutrients such as nitrogen and phosphorus
- QSMAS markedly improves the activity of soil macrofauna (earthworms, termites) that enhances nutrient availability and soil aggregation
- The system is an important source of firewood for domestic consumption and has no significant negative effects on greenhouse gas emissions
- Dissemination mechanism of farmer-to-farmer has contributed to testing and validation in other parts of Central America (Nicaragua)

{[Photo #07 here](#)}

### **The way forward**

Future challenges for the project include:

- Defining dynamics of water, nutrients and greenhouse gases in the system and understanding their relationship with productivity and sustainability

- Identifying key principles and components that contribute to the agronomic success of the system
- analyzing the socioeconomic impact of QSMAS and the driving forces for its adoption
- Identifying suitable sites for the validation of the system
- Develop guides for the establishment and management of QSMAS as part of a dissemination strategy.

By understanding the capacity of QSMAS to improve water quality and water productivity and its potential application to regions in the world with similar biophysical and socioeconomic constraints, the project can facilitate further adoption of the system, thereby improving crop water productivity and natural resource management, access to water, and water quality for upstream and downstream users. QSMAS contributes to increasing and stabilizing productivity in areas where large populations risk their food security due to water scarcity. A significant effort will also be made to develop guides for the establishment and management of QSMAS as part of the strategy for its diffusion and dissemination.