CGIAR Challenge Program on WATER & FOOD
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RESEARCH PROGRAM ON Water, Land and Ecosystems

Abandoning Slash and Burn for Slash and Mulch in Central America's Drought-Prone Hillsides

Photo: Steve Fonte

Maize and common beans production in a recently established QSMAS plot

HIGHLIGHTS

- ✓ The average increase in the grain yield of maize and bean from the QSMAS system is almost double that of traditional slash and burn
- ✓ From its village of origin, the slash and mulch agroforestry system expanded to cover 7,000 hectares of crops grown by 6,000 farming families

March 2013

Outcome Stories

Drought-prone hillsides in the sub-humid tropics suffer from seasonal water scarcity and dry spells. The incidence and impact of these events is increasing as a result of global climate change and the lack of adequate soil and crop management practices.

Local farmers in southeast Honduras and northeast Nicaragua found ways to cope with these adverse conditions, using the Quesungual Slash and Mulch Agroforestry System (QSMAS). In QSMAS, farmers undertake agricultural crop production within secondary forests, relying on the slash and mulch of existing trees in the area. QSMAS conserves moisture, reduces erosion, protects biodiversity, and improves carbon accumulation and nutrient cycling.

With this system, drought-prone hillsides can now be managed in a sustainable manner.

The QSMAS principles

QSMAS is an integrated land use management strategy based on principles of conservation agriculture that contribute to its superior performance in terms of biophysical resilience, productivity, and sustainability.

Supported by IFAD
Enabling poor rural people to overcome poverty

Photo: CPWF

QSMAS – Nicaraguan farmers visiting Lempira, Honduras

The key principles are:

- No slash and burn: management (partial, selective, and progressive slash and prune) of natural vegetation;
- Permanent soil cover: continual deposition of biomass from trees, shrubs, weeds and crop residues;
- Minimal disturbance of soil: no tillage, direct seeding, and reduced soil disturbance during other agronomic practices; and
- Efficient use of fertilizer: appropriate application (timing, type, amount, location) of fertilizers.

One of the main reasons for success was that the community was able to adopt a no-burning policy and self-enforce this.

Adoption of QSMAS was initially driven by short-term increases in crop yields at the farm level. Its widespread adoption by thousands of farmers was a result of a complex interaction between collective action, technological change and policies and incentives that promoted the adoption of new, more resilient production technologies (Ayarza *et al.* 2010).

Improving on tradition

Farmers and technicians who jointly designed QSMAS were responsible for its expansion within Honduras under the guidance of FAO and other national and international institutions.

During the drought of 1997 and the intense rains caused by Hurricane Mitch in 1998, farmers practicing QSMAS continued to be able to produce food crops when many other systems failed.

Maize production in a QSMAS plot, surrounded by a naturally regenerated (secondary) forest

Photo: Steve Fonte

Scaling out

The CGIAR Challenge Program on Water and Food (CPWF), Centro Internacional de Agricultura Tropical (CIAT) and their partners successfully introduced QSMAS to north-western Nicaragua in 2005. Farmer-to-farmer dissemination was used to promote and disseminate the system.

Farmers established experimental plots over three years from 2005 to 2007. After just one season, these farmers were already expanding the system more widely on their farms. Other farmers in the region soon followed suit. They were very willing to abandon their slash and burn practices as they now had an alternative.

From its village of origin, the slash and mulch agroforestry system expanded to cover 7,000 hectares of crops grown by 6,000 farming families. Over 60,000 hectares of secondary forest in Honduras are now conserved.

Several communities in the La Danta watershed in neighboring Nicaragua have adopted QSMAS too. It is estimated that 90% of the 120 farmers in the watershed have stopped slash and burn and more than 60% have adopted the QSMAS system.

The average grain yield of maize and bean from the QSMAS system is almost double that of traditional slash and burn, which gave farmers an improved cash flow and assures food security. For families who only have access to a single hectare, this transition has a huge impact on their livelihoods.

Farmers now also have a more sustainable source of wood supply for fuel and construction. Above all, the buffering effect of the naturally restored forest environment and

"QSMAS [Quesungual Slash and Mulch Agroforestry System] delivers ecosystem services, while simultaneously conserving biodiversity and restoring degraded landscapes. It is a holistic natural resource management strategy that delivers basic needs to farmers dependent on drought-prone hillsides in the sub-humid tropics."

protected soils makes their production system and food supply resilient to unusually dry or wet years.

The more dramatic effect is the increased productivity of water in the latter part of the rainy season, at a time of the year when rainfall is usually either irregular, with dry spells often occurring during key stages of crop development, or inadequate due to a shorter rainy season.

QSMAS can be considered a crop production strategy that delivers ecosystem services, while simultaneously conserving biodiversity and restoring degraded landscapes. The system performs best under sub-humid tropical conditions and on sloping soils of low fertility.

QSMAS has moved beyond its place of origin to become a major component of a holistic natural resource management strategy that delivers basic needs to farmers.

Most Significant Innovation

The farmer-to-farmer exchange of knowledge, and technologies and practices for converting the traditional slash and burn system into slash and mulch, assures food security while improving cash flows and ecosystem services.

References

Ayarza, M., Huber-Sannwald, E., Herrick, J.E., Reynolds, J.F., Garcia-Barrios, L., Wélchez, L.A., Lentes, P., Pavon, J. and J. Morales. 2010. *Changing human-ecological relationships and drivers using the Quesungual agroforestry system in western Honduras.* Renewable Agiculture and Food Systems, 25(3), 219-227. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=7853179&fulltextType=RA&fileId=S1742170510000074

CIAT. 2009. *Quesungual slash and mulch agroforestry system (QSMAS): Improving crop water productivity, food security and resource quality in the sub-humid tropics.* CPWF Project Report PN15. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food. http://mahider.ilri.org/bitstream/handle/10568/3906/PN15_CIAT_Project%20Report_Jun09_final.pdf?sequence=1

Woolley, J. 2010. *Legacy of CPWF PN15: Quesungual slash and mulch agroforestry system.* Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food.

Project Partners

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National University of Colombia-Palmira Campus
University of Western Australia
Assessment, Research, and Integration of Desertification Research Network Consortium, USA
Soil Management Collaborative Research Support Program
Consortium for the Sustainable Development of the Andean Ecoregion

About CPWF Outcome Stories

The CPWF Outcome Stories document changes in knowledge, attitudes and practices that have emerged through CPWF-funded research. Outcomes occur when research outputs foster engagement processes that result in changes in practice or changes in behavior. These stories capture outcomes at a specific point in time; outcomes may have evolved since the completion of these projects.

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About CPWF

The CGIAR Challenge Program on Water and Food was launched in 2002, with the aim to increase the resilience of social and ecological systems through better water management for food production (crops, fisheries and livestock). We do this through an innovative research and development approach that brings together a broad range of scientists, development specialists, policy makers and communities, in six river basins, to address the challenges of food security, poverty and water scarcity.

The CPWF is part of the CGIAR Research Program on Water, Land and Ecosystems. WLE combines the resources of 11 CGIAR centers and numerous international, regional and national partners to provide an integrated approach to natural resource management research. The program goal is to reduce poverty and improve food security through the development of agriculture within nature. This program is led by the International Water Management Institute (IWMI).

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