

# WORLD AGROFORESTRY IN PRACTICE

## THE QUESUNGUAL AGROFORESTRY SYSTEM

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**LOCATION** Latin America, Honduras

**ORGANISATION** ICRAF

**TYPE OF PRACTICES** Assisted Natural Regeneration and crops

**PRODUCTION** Maize, beans, wood, fodder

### 1 GENERAL CONTEXT

The Quesungual is an agroforestry system on the hillsides of South Western Honduras for the production of maize and beans. It evolved from a co-learning process where farmers, technicians and development agencies worked together to modify traditional slash and burn practices to produce maize and beans (milpas) towards agroforestry practices and the use of the pruned material for mulching and increase soil organic matter.



*Quesungual fields immediately after the field preparation (first pruning) before planting, pruned trees are lopped to 1,5-2m and biomass is used as mulch.*

**Agroforestry and soil conservation for production of maize and beans in the dry corridor of Central America**



### 2 ENVIRONMENTAL CHARACTERISTICS

The area studied was located in municipalities of Candelaria and Gualcince. Soil type are mainly Lithosols with shallow profile and poor drainage, in contact with stones, or fragipans at depths between 0 - 20cm. The climate is typical of Subtropical Humid Forest. Precipitation ranges from 1400- 2200 mm year-1 and temperatures between 17 to 25 °C.

### 3 DESCRIPTION AND INTEREST

Under the Quesungual system, annual crops are planted associated with a woody component divided into three strata: pruned trees, trees managed for wood and fruit, and saplings (natural regeneration). Tree pruning's generate biomass that is left on the fields as mulch for conserving water and soils. This system extends the period of land use, reduces the impacts of agriculture on soil erosion (particularly on hillsides) and improves soil fertility.

Traditional slash and mulch practices were rescued and combined with agricultural practices (particularly the use of external inputs, such as herbicides and fertilizers) to increase maize and bean yields while conserving soils. The combination of practices is the key for increasing yields. For instance, maize production is strongly driven by P fertilization, but also P fertilizer efficiency is increased in fields under



Quesungual management.

The system can be threatened by the evolution towards cattle ranching systems. As farmers produce enough to sell, normally investments tend to go towards transformation to mixed systems. Nevertheless, if stocking rates are not well managed the areas recovered can be degraded due to overgrazing and trampling, particularly in steep slopes.

## 4 TREE SPECIES

Most trees and shrubs come from natural regeneration, only a minor proportion are intentionally protected or planted. The most abundant species is the timber tree *Cordia alliodora*, *Diphysa robinoides* and *Swietenia* sp. Fruit trees are not common in the Quesungual fields, and are limited to: *Byrsonima crassifolia* (species with small fruits called nance), and *Simarouba glauca* whose seeds are used to make soap. For Pruned trees the most important species are *Bauhinia* sp., *Lonchocarpus* sp., and *Psidium guajava*.

## 5 PRODUCTS AND USES

The main products of the Quesungual are maize, beans and squashes. Mature trees provide timber that contributes to family needs for construction materials, and in some cases for sales (but it is not common). Pruned trees provide biomass for soil protection and firewood for cooking. Crop residues and some tree biomass provide fodder for cattle during the dry season.

## 6 LANDSCAPE MANAGEMENT

As the system relies on natural regeneration, there is no specific spacing of trees. Tree densities are quite variable among the three types:

- Timber trees are species left in the field during slashing in order to harvest timber and fruits. Maize yields decline when timber tree densities pass 200 trees/ha.
- Pruned trees are species that are lopped (apical pruning) at 2 m height. Leaves and branches are pruned twice a year, during field preparation and weeding. Higher maize yields were observed with densities of 600-800 trees/ha.
- Finally, saplings are young trees from natural regeneration. Densities vary from fields with no trees up to ~900 trees/ha. These trees correspond to prolific species, resistant to pruning.

Maize and been fields are mainly managed by men. There was a clear division of labor in the areas visited where men were mainly occupied with agricultural production and women were responsible for taking care of the family.



Farmer from Lempira showing his maize field under the Quesungual agroforestry system



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