

Conversion process and reforestation practices of coffee plantations in Chiapas, Mexico

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Introduction

The Soconusco is considered the heart of coffee production in Mexico and belongs to the Mesoamerican coffee belt. The coffee agro-ecosystems are undergoing a thorough transformation process, although insufficiently documented as yet. In this study, different aspects of a gradual conversion process from coffee to timber production were evaluated, with the aim to understand, how the agro-ecosystem coffee changes in horizontal and vertical structure, in terms of biomass components, and which ecological conditions are prevailing in this process.

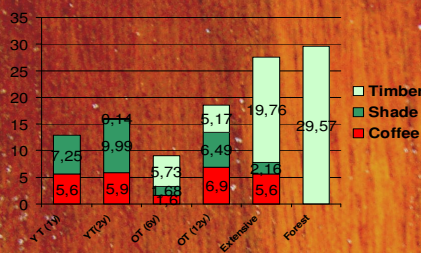
Materials and methods

The field study was carried out between 2003 and 2005 in five different farms in the Soconusco, within which 17 experimental areas were identified in an altitudinal range from 400 to 1000 masl and combined with different expositions to the sun. Dry biomass assessment was carried out in four different components: coffee plants, shade trees, timber trees as well as soil cover and litter (sub-divided into fine, coarse, monocotyledonae, dicotyledonae). After measuring height and basal area, biomass components were calculated for both timber trees and coffee plants, using allometric equations. Destructive sampling was used for shade trees, soil cover plants and litter. Plant species diversity was determined and ten most important species for commercial timber production were identified (*Acrocarpus fraxinifolius*, *Cedrela odorata*, *Colubrina arborescens*, *Cordia alliodora*, *Melia azederach*, *Ocotea* spp., *Swietenia macrophylla*, *Tabebuia donnell smithii*, *Tabebuia rosea*, *Tectona grandis*).

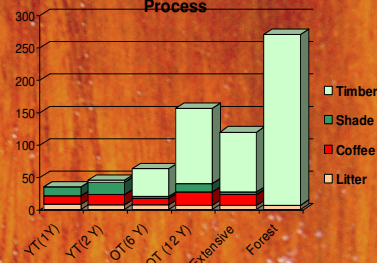
Treatments:

- YT1: Intensive coffee with young timber tree plantation (1 year old trees)
- YT2: Intensive coffee with young timber tree plantation (2 year old trees)
- OT6: Intensive coffee with old timber tree plantation (6 year old trees)
- OT12: Intensive coffee with old timber tree plantation (12 year old trees)
- NFT: Extensive coffee with natural forest trees cover
- FF: Natural forest fragment

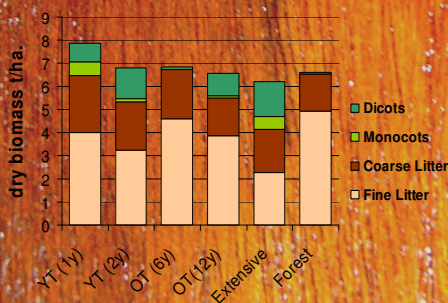
Total basal area of the systems



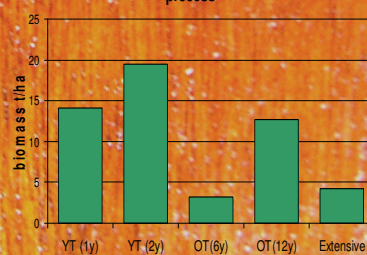
Biomass Change during the Conversion Process



Soil cover biomass distribution



Shade Tree Biomass during the conversion process



Results and discussion

The coffee agroforestry systems have between 1279 and 3978 coffee plants/ha. The study shows that total basal area and its partitioning among vegetation components is the mean issue in this conversion process. While timber trees grow, coffee biomass is not affected and shade tree biomass can be reduced. Also monocotyledonous and dicotyledonous biomass is being replaced by fine litter biomass while timber trees grow. The different variables were significantly influenced by timber tree age, altitude and exposition.

