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Transformation of Coffee Plantations through Tropical Timber Production in the Region of Soconusco, Chiapas, Mexico

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Introduction

Chiapas is the most important coffee producing state of Mexico, with one third of the national coffee production (Stamm, 2002). Due to the low coffee prices, coffee farmers from emerging countries are in a bad economic situation. The adaptation to the new conditions of the world market requires a transformation of the present cultivation in the Soconusco. The goal must be to create social and ecological contractual cultivation systems, which protect the diversity of species of flora and fauna, the water catchment basin and the soil of the fragile ecological system. Above all, it should guarantee its economic profitability (Barrera et al., 2004; Pohlan et al., 2004). The issue is how to convert cultivation areas in the Soconusco, which are unsuitable for coffee plantations into tropical timber production, considering the altitude and the edapho-climatic requirements of the timber species. The actual problem is that the coffee farmers do not want to abandon there coffee plantations and the forestry sector can not provide reliable data for the afforestation of the coffee zone (Pohlan, 2006). The research approach was to document the transformation process from coffee to timber production as well as the growth rates of tropical timber species in the Soconusco.

Material and Methods:

This study has been carried out between August and November 2006, on a former coffee farm, located in the vicinity of Tapachula in the Vega de los Gatos (15°01´40.5´´N, 92°14´10.2´´ W and between 392 and 565 m.a.s.l.). Five different timber species, *Acrocarpus fraxinifolius, Cedrela odorata, Swietenia humilis, Tectona grandis* and *Khaya senegalensis*, were planted

between 2003 and 2006. The completely randomized design consists of 18 fields allotted to the five species. Within each field a five row-plot (32 x 88 m) of 5 x 12 plants was measured. Tree height and diameter (D.B.H.) were measured twice, to show the growth rates and to document the changes of the ecosystem structure in horizontal and vertical distribution, as influenced by site-specific factors over time. For the biomass assessment of the soil cover, 4 samples of 1m² were taken in each experimental field. The soil cover samples consisted of coarse litter, fine litter, monocotyle and dicotyle plants. Fresh matters are presented.

Results and Discusion:

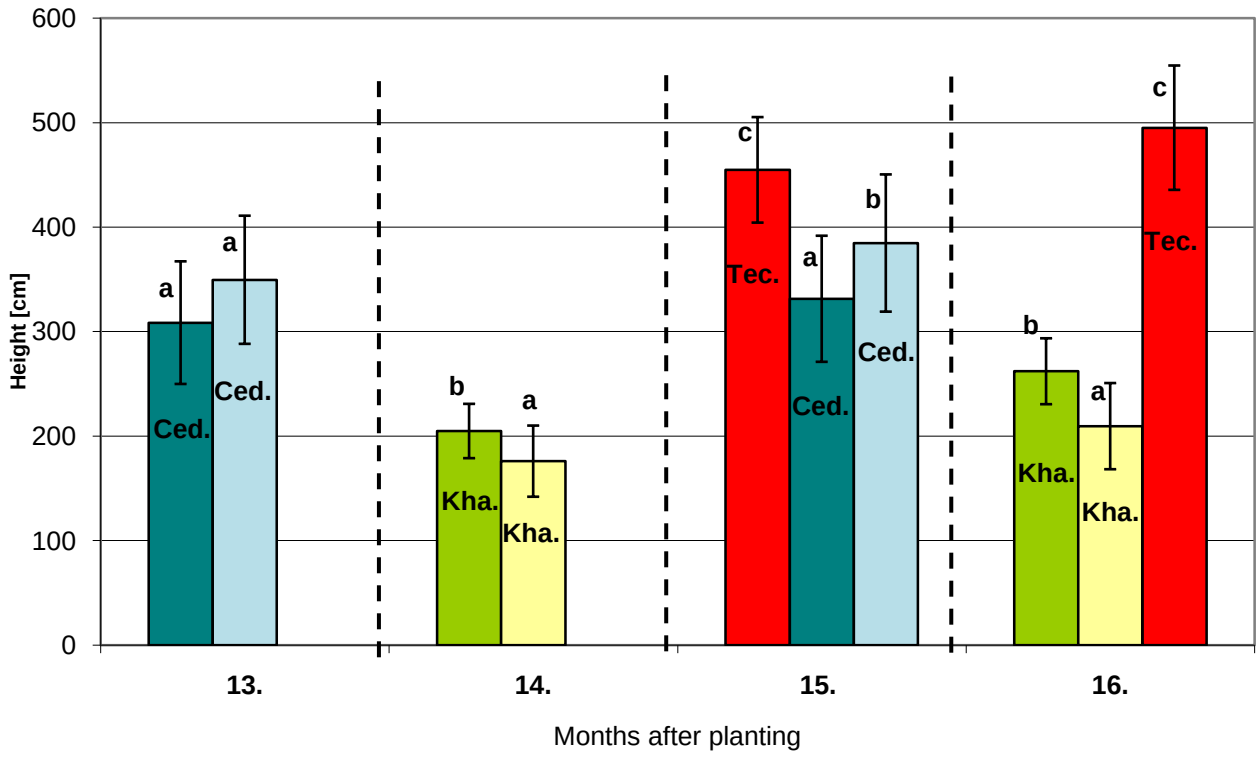
Acrocarpus fraxinifolius shows with 6925,0 g the highest average per samples of soil cover biomass, *Tectona grandis* follows with 5755,0 g and *Cedrela odorata* with 5475,0 g. There is no significant influence of timber species on the soil cover biomass (coarse litter, fine litter, monocotyle, dicotyle plants) 37 months after planting.

Tab. 1: Influence of the timber species on the soil different timber species, *Acrocarpus fraxinifolius, Cedrela odorata, Swietenia humilis* cover biomass 37 months after planting

Timber species	Soil cover biomass	
Cedrela odorata	5475,0	a
Tectona grandis	5755,0	a
Acrocarpus fraxinifolius	6925,0	a

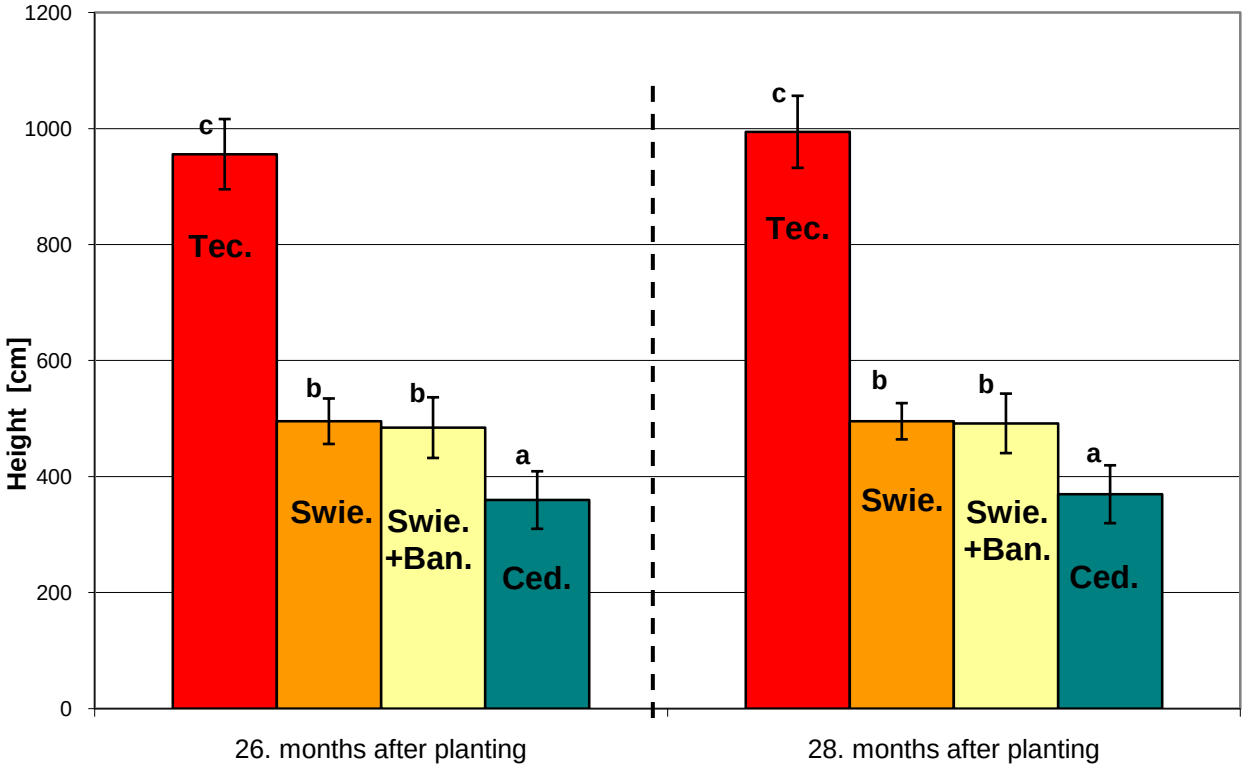
Method: 95,0 % LSD

Furthermore the results shows that *Cedrela odorata* has a tree height of 350 cm (± 117 cm) and 309 cm (± = 123 cm) 13 months after planting. The tree height of *Khaya senegalensis* 14 months after planting was 205 cm (± = 52 cm) and 176 cm (± = 68 cm). *Tectona grandis* has a tree height of 455 cm (± = 101 cm) 15 months after planting and is significant higher than *Cedrela odorata* with 385 cm and 331 cm. 15 months after planting Tectona grandis shows with 495 cm a significant higher growth than *Khaya senegalensis* with 262 cm and 210 cm (Graph 1).

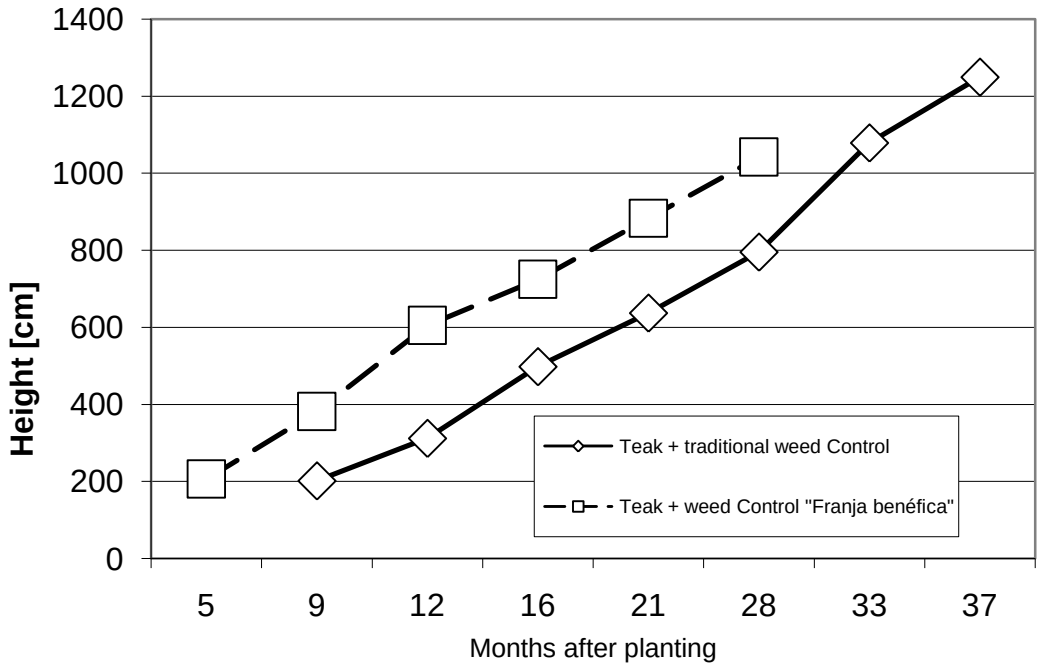


Graph 1: Tree height 13 till 16 months after planting.

26 months after planting *Tectona grandis* has with 956 cm (± = 121 cm) a significant higher growth than *Swietenia humilis* with 495 cm (± = 78 cm) and 484 cm (± = 105 cm) and *Cedrela odorata* with 360 cm (± = 99 cm). 28 months after planting Tectona grandis has with 994 cm (± = 124 cm) again a significant higher growth than *Swietenia humilis* with 495 cm (± = 62 cm) and 492 cm (± = 103 cm) and *Cedrela odorata* with 370 cm (± = 100 cm). There was no significant influence of bananas in the first year on the tree heights of *Swietenia humilis* (Graph 2).



Graph 2: Tree height 26 and 28 months after planting.



Graph 3: Development of the tree height of *Tectona grandis* under different management systems.

The principle of the weed control management "Franja benéfica" is to tolerate a free growth of the existing Flora as well as the additional legumes such as *Crotalaria spp.* and *Cajanus cajan*.

The tree height from the plantation under the weed control system “Franja benéfica” was superior the traditional system with herbicides applications, all times (Graph 3).

Conclusion:

The study documents the high potential of tropical timber production for the promontories of the Soconusco. The system “Franjas benéfica” worked satisfactorily four years after planting for the transformation of the coffee agro-ecosystem to timber production the system. Due to its ecological sustainability, this system favours growth and vitality of the forest trees at lower operating costs.

References:

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