Diversity of trees and their use in cocoa agroforestry systems in Alta Verapaz, Guatemala

Villanueva Gonzalez Carlos [1,2], Lojka Bohdan [1], Archila Carlos Ernesto [2], Ruiz-Chután José Alejandro [1]

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Introduction

Agroforestry systems (Agrofor. Syst.) provide numerous opportunities for biodiversity conservation and livelihood development. In Latin America indigenous communities have played a fundamental role in the management and conservation of biodiversity, such as it happens in Q'eqchi' indigenous communities of northern Guatemala, who are in charge of protecting a diversity of plant species in traditional agroforestry systems which have been fundamental for the development of the economy and culture [1]. Different studies in the Tropics have shown that diversity in the floristic composition of agroforestry systems is the key factor to generate important products and services which help to the satisfaction of fundamental needs of the population, such as food, fuel, and medicine, as well as the provision of services; shade, erosion control and soil improvement [1,3].

The current study determined the typology, diversity, and richness of trees in cocoa agroforestry systems. From the point of view of food security and contribution to well-being, the systems were evaluated using ethnobotanical methods among the local population, which allowed to establish the importance and value of each species in this location.

Methodology

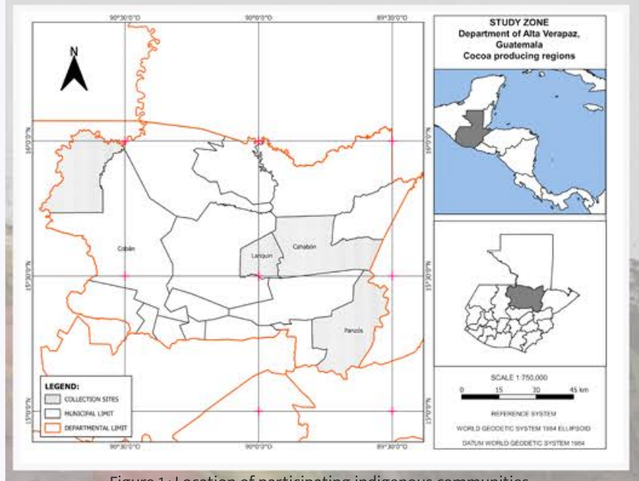

Figure 1 : Location of participating indigenous communities (Lanquín, Cahabó, Cobán and Panzos) in Alta Verapaz departament

- The field work included cocoa roducers from four municipalities In the department of Alta Verapaz (Figure1).
-Field work was carried out over a 10 month period.
-We evaluated the typology and diversity of trees in 40 cocoa AFS

The relative ecological importance of each species was determined by quantifying the importance value index (IVI); which consists of the sum of the relative values of abundance, frequency, and dominance (3,4).

-**A: abundance** number of individuals per species found in the community
-**F: frequency** the number of times a species occurs in each quantity at sampling points
-**D: dominance** represents the influence of the species on the community's composition and form.

Results

- Fifty four tree species belonging to 27 families were registered
- Larger families: Leguminosae (10 spp.), Anacardiaceae (3 spp.), Lauraceae (3 spp.)
- Most mentioned uses: construction materials, firewood, animal fodder, and medicinal uses

Six most important trees in cocoa AFS

Common name: Madre cacao
Scientific name: *Gliricidia sepium* **(Jacq.) Walp.***(Leguminosae)*
Cited uses: Forage, firewood, construction materials
Ar.= 31.68 Fr.= 13.02 Dr.= 32.33 IVI= 25.68%

Common name : Caoba
Scientific name : *Swietenia macrophylla* **King** *(Meliaceae)*
Cited uses: Timber
Ar.= 16.32 Fr.= 8.04 Dr.= 13.90 IVI= 12.75%

Common name: Cedro
Scientific name: *Cedrela odorata* **L.** *(Meliaceae)*
Cited uses: Timber
Ar.= 5.48 Fr.= 8.42 Dr.= 8.01 IVI= 7.30%

Common name : Laurel
Scientific name: *Cordia alliodora* **(Ruiz & Pav.) Oken** *(Boraginaceae)*
Cited uses: Timber
Ar.= 6.03 Fr.= 5.74 Dr.= 7.55 IVI= 6.44%

Common name: Copal
Scientific name : *Protium copal* **(Schltdl. & Cham.) Engl.** *(Burseraceae)*
Cited uses: Medicinal
Ar.= 8.36 Fr.= 3.83 Dr.= 4.86 IVI= 5.68%

Common name : Aguacate
Scientific name: *Persea americana* **Mill** *(Lauraceae)*
Cited uses : Fruit
Ar.= 2.05 Fr.= 4.98 Dr.= 2.40 IVI= 3.14%

Conclusions

Agroforestry represents an opportunity for vulnerable areas around the world and helps to provide resources and services for population development. Additionally, it strengthens food security for families, especially for those who live in rural areas. More importantly, these systems have the capacity to host a high diversity of trees in relatively small areas, which contribute to local development and biodiversity conservation Cocoa agroforestry systems in Alta Verapaz, Guatemala, are a strategy at the rural level to face the different phenomenon which threaten the conservation of biodiversity, such as lost of natural forest, degradation of ecosystems, and the effects of climate change.

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1 Czech University of Life Sciences Prague Faculty of Tropical AgriSciences
2 Universidad Rafael Landívar Tradición Jesuita en Guatemala