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## Analysis of the diversity and timber potential in cocoa agroforestry systems in alta Verapaz, Guatemala

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### Abstract

The production of timber in agroforestry systems holds immense potential in promoting environmental and economic sustainability, particularly for rural families. Despite its significance in Guatemala, little is known about the potential of timber and its contribution to the sustainability of traditional agroforestry systems. This study aims to analyse the timber resource in cocoa agroforestry systems of different ages and evaluate variables such as floristic composition, species diversity, and potential for timber production from the species present in the evaluated systems. To achieve this objective, the researchers established 20 temporary sampling plots and measured dasometric variables in each plot, including total height (th), commercial height (ch), and diameter at breast height (DBH) of the inventoried species. The presence of species was statistically analysed using cross-tabulation and Pearson's Chi-square test (2) to determine the frequency distribution of species among the ages of the evaluated agroforestry systems. The study identified 827 trees of 38 species belonging to 19 families. The most represented species within the age range of the evaluated systems were *Gliricidia sepium* (Jacq.) Kunth. (35.07%), *Swietenia macrophylla* G.King (19.11%), and *Inga sapindoides* Willd (7.62%). The trees occupied a basal area of 33.29 m<sup>2</sup>, and a total volume of 352.35 m<sup>3</sup> was recorded, of which 148.9 m<sup>3</sup> were for commercial use. The most frequent uses were firewood (38.21%), thin plank (30.23%), and poles (22.85%), while the use of thick planks was the least common (8.71%). The study highlights the wide diversity of shade tree species present in cocoa agroforestry systems, indicating their significant potential for timber production, especially for firewood. This information is relevant for the planning of management and conservation strategies for cocoa agroforestry systems in the region.

**Keywords:** Botanical composition, cocoa agroforest systems, dasometric variables, species diversity, timber production