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# Characterization of the anatomy of *Guadua angustifolia* (Poaceae: Bambusoideae) culms

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ABSTRACT

Anatomical characterization of *Guadua angustifolia* (Poaceae: Bambusoideae) culms was carried out using material collected at four different localities in the Colombian Coffee zone. Anatomical features such as size, form and distribution of the vascular bundles, diameter and percentage of metaxylem, and percentage of fibers along the width and length of the culm's wall, were analyzed. The features evaluated showed variation in relation to the thickness of the culm's wall, with a higher concentration and smaller size of the vascular bundles towards the periphery. There is no relationship between anatomical features and the culm's age. We also observed the number of vascular bundles per unit of area (cross section) at different heights of the culm. Fiber percentage of wall area increases from the base to top of the culm. The culm of *Guadua angustifolia* is formed by 40% fiber, 51% parenchyma and 9% vascular tissue on average.

Bamboos (Bambusoideae: Poaceae) differ from the other grasses in leaf anatomyin the following ways: non radiated mesophyll with fusoid and arm cells; vascular bundles usually found in groups of than one, and over the mid nerve; and silica cells are vertically oriented (Soderstrom and Ellis, 1987). Studies such as those of Soderstrom and Ellis (1987) and Ding and Zhao (1994) show that there is a significant correlation between the anatomy of the bamboo leaves and the different taxa. Soderstrom and Ellis (1987), for example, grouped the woody bamboo of the world into nine sub-tribes based on anatomical characters of the leaves.

Research conducted by Grosser and Liese (1971) on 53 species of Asian bamboos from 14 genera showed that the anatomy of bamboo culms shows differences in the structure of the vascular bundles between genera and between species and thus has considerable value for taxonomy. Vascular bundles in bamboo culms are characterized by their shape, size and grouping in most of the species studied, thus supplying the basis for an anatomical classification system that includes four categories (Grosser (1971), Grosser and Liese (1971, 1973), Grosser and Zamuco (1973) and Liese (1998). From Liese (1998). We know that the physical properties of bamboo culms are determined by their anatomy so these characteristics of the culm will ultimately reflects its usability. For example, mechanical properties of the culm, important in building materials, are determined by its specific gravity, which depends mainly on the density and diameter of the fibers and the thickness of the fiber cell walls (Liese, 1998). The length of the fibers is also an important feature for paper industry (Latif and Liese, 2001).

In Colombia, *Guadua angustifolia* is a sustainable natural resource with a high growth rate (11 to 21 cm per day). Several native and rural communities satisfy basic necessities with this material. It is an ideal construction material with a high percentage of fibers, a specific gravity of 0.5 to 0.6 and excellent structural properties such as a high resistance-to-weight-ratio, a high capacity to absorb energy and excellent flexability. Thus, Guadua houses are very resistant to failure in earthquakes, but