Guadua in Columbia

Words and Photographs by Walter Liese[1]

Guadua is the most species-rich and, at the same time, the most important bamboo type in Middle and South America. Its occurrence spans from the South of Mexico to Brazil and to an altitude of approximately 2,500m. *Guadua angustifolia* (Kunth) is the most prevalent, especially in Columbia, as well as Ecuador and Venezuela. In Columbia, its coverage spans approximately 51,000 hectares of which approximately 5,300 hectares is made up of plantations, most of which are found in the well developed, so called "coffee region" on the West slopes of the Cordillera Central range. The dense Guadua crop, with its umbrella-like crowns, strikingly frames the landscape.

Plantation of *Guadua angustifolia*

Worldwide, *Guadua angustifolia* belongs to the most productive bamboos. After approximately six months, a culm will reach a height of 20 to 30 metres and an average diameter of 11cm.

The average wall of a culm at the base will be approximately 30 to 35mm thick and declines to about 10mm at the top. With a daily stretch of approximately 10 to 15cm, a shoot will "visibly" grow and a view of these "asparagus tips" is quite an experience.

The growth of the big shoots is equal to a daily production of approximately 500cm^3 of biomass; no tree can achieve such high daily production. It's even more astonishing when one considers that, from the leave sheaths, encased stems achieve their end height of 20m, without green leaves for the assimilation of the necessary growth energy, which tree seedlings must develop immediately after germination as a "power house". As branches with leaves only emerge after the culm reaches its full height, the impressive biomass of the young shoot is fed only by carbohydrate, which is stored in the plant's rootstock and older culms in the clump. The physiological processes responsible for hydrolysis, transport to the growth zones, as well as transformation to cell substances, still belong to the big, mostly unknown mysteries of a bamboo's life. The impressive storage of carbon dioxide is, however, not long term; in nature

the culm dies after approximately ten years and through decomposition again becomes part of nature's life cycle.

A Guadua clump with young, still leafless shoots, approximately 20m

Young shoots

Natural crop of Guadua

Guadua culm, white-haired around the node, with Dr. Ximena Londono, President of the Columbian Bamboo Society

A Guadua crop in Columbia, with approximately 6,000 culms per hectare, has a biomass provision of approximately 1,100m^3. Annually, an additional 700 culms emerge, which equates to a gross growth of around 60m^3. With a green density of 0.5 to 0.6g/cm^3, the wall substance comes to approximately 30m^3. In general a culm equates to around 0.1m^3.

The culm of *Guadua angustifolia* is characterised by a white-haired zone around its node as well as thorny branches, which hinder during harvest and occasionally lead to injury. Guadua is a versatilely used material in Columbia, which widely replaces wood. The spectacular buildings of architects Simon Velez, Oscar Hidalgo and others are well known internationally, as well as the bridge constructions of Jörg Stamm


Bamboo bridge in Pereira. Architect: Jörg Stamm

The pavilion at EXPO 2000 in Hannover, with its 3,500 culms the largest bamboo construction, is still remembered. In Columbia, Guadua is used for rural and social housing construction, multi-storey houses, bridges and other constructions, for example, technical products used in daily life, musical instruments and much more.


University building of Gran Colombia in Armenia

Guadua is also used for erosion control and stabilising of river banks. After the devastating earthquake in the coffee region in 1999, many destroyed houses were rebuilt using bamboo frameworks which cost less than a provisional tent city. However, even in Columbia, bamboo has the stigma of being a “cheap” material for poor people so that bamboo houses are often clad with cement, which also acts as non-chemical protection against weather and infestation.

Coffin made from laminated bamboo

Bamboo house with cemented walls

Although Guadua has considerable resilience to biological damage, the culms can soon be afflicted with fungi if stored incorrectly. Therefore, it's important it is well dried, either outdoors or in chambers. The constructive protection to keeping components dry is impressively prevalent in Columbia. Initial protection methods against biological damage were adopted from Japan and further developed, whereby damp culms are "smoked". However, as the technical method requirements appear unclear and the results often did not meet expectations, the immersion method is now mostly used with good results.

Fresh culms are immersed in a boron solution for a minimum of five days, and air-dried, or for a fewer number of days in plant or mineral oil with insecticide addition. To saturate the inner wall layer, which is especially susceptible, the internodes are drilled on both sides or the nodes inside the culm are drilled through lengthwise, with subsequently less dry cracks. Quality management of the drying processes and the protection methods have improved considerably in the last few years.

Restaurant building

The long, straight culms, which have considerable wall strength, result in high stability with a low tendency for cracking and are also increasingly exported. Columbian Guadua was used for the pavilion in Vergiate, as well as for the parking garage at Leipzig Zoo. In addition to the use of the culms, laminated bamboo is increasingly produced for both the domestic market as beams for furniture and plates, as well for export, with good potential for further development.

The importance of Guadua to Columbia and the continent is also evident in the country's organisation of international Bamboo Symposia in 1993, 2002 and most recently in 2004, which is unique for Latin America.

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