

# LARGE SCALE PLANTATIONS OF BAMBOO FOR CELLULOSE AND BIOMASS HELD IN NORTHEAST OF BRAZIL

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"Bamboo, the gift from the Gods": thus Hidalgo-Lopez, 2003, entitled his work, and describes this remarkable plant species most used by man. With many applications, ranging from construction to decoration, from medicine to food, from pulp and paper manufacture to biomass production, among many other uses, bamboo is a versatile plant, fast growing, easy establishment, maintenance and harvest.

Regarded as the holder of the largest nature reserve of bamboo in the world (approximately 180.000 km<sup>2</sup>, located in the Amazon region), Brazil has a great diversity of species from this subfamily. But, paradoxically, little known and/or explored to the National level.

In a pioneering way, during the 70's, the Industrial Group Built by João Santos implemented the first Brazilian pulp and paper factory using bamboo as its principal source. The identification of this biomass as having long fibers and wide adaptation to climate and soil conditions in the northeast of Brazil, allowed the planning and implementation of this culture in the region.

The development of bamboo forests arose from the need to have in this area a source of cellulose with long fibers and good quality to manufacture paper with high physical-mechanical resistance, especially to attend the bag market. The demand for companies that could produce this type of fiber and the not adaptation of *Pinus* sp. in northeast of Brazil made viable the project.

There were many challenges. After much persistence, and after 40 years since the planting of the first plant, this Industrial Group currently has approximately 30.000 hectares of bamboo planted in four Brazilian states: Pernambuco, Paraíba, Piauí and Maranhão.

However, the success of a good forest productivity begins with the choice of a proper bamboo species for attend the needs in question and its interaction with the local climate and soil. Seen it, we have elected *Bambusa vulgaris*: a world widespread species which met all these requirements and presents features like easy propagation, easy regrowth after cutting, rare flower formation, good productivity and fiber length that attends the papermakers purposes. On the other hand, this choice was also made because during the time of forest formation, there was not enough availability of bamboo species with the same profile.

Currently, all relevant cares to the forest development are taken; for example, in the nursery formation, by selecting seedlings and propagate these via asexual propagation, through cutting or micropagation and in appropriate fertilization for each type of soil. In sandy soils conditions, becomes necessary the fractionated fertilization.

Whereas in tropical regions there is great competition with invasive grasses which can prevent the growth of seedlings and regrowth of the stems after cutting, proper control is made. Another precaution to be taken into account is the incidence of fire during the driest periods of the year, either by natural or induced factors.

The purpose of our production (cellulose and biomass) allows us to use a cutting age of bamboo ranging from two to four years. The cut is predominantly manual, which is applied the clear-cutting method or total clump cut. This contribute to the process of machining, allowing the transit of machines throughout the cropped area, facilitating the removal of cut bamboo, as well as allows a homogeneity of regrowth and a proper control of forest area by age and by region, not per stem.

In this part of the production chain, we have focused on Forestry Development Programs that aim to the development of a cutting machine for bamboo. Other projects also work in the bamboo gathering and carrying in the field.

In order to optimize the bamboo processing, the chipping process is carried out in the growing field, close to the harvest areas. From there, transportation is provided to the place of delivery inside the factory. The quality of the produced chips is a very important factor in papermaking. Care is taken to sending the most homogeneous material as possible, avoiding contamination by various types of impurities that can be loaded from the field to the final delivery of the product at the factory. The type of soil and forest productivity (ton / ha) is directly related to the quality of fiber produced.

On the other hand, having a good yield does not imply having a low cost. Several factors may enhance the total cost. The land topography or the lack of an adequate access can endear harvest and derail its extraction. So the topography and access conditions throughout the year should be considered in planning the forest deployment. For machining purposes, flat areas where you can systematize activities more easily are preferable but, in Brazil, these areas are usually planted with other crops of agricultural or forestry importance. Because of that, bamboo areas are in declined topography. The use of labor and mechanization at all stages should be well sized and rationalized. The misuse of these facilities can cause extensive damage. The distance from the factory or delivery point, can also be a limiting factor.

The research and development works are currently focused on the planting optimization, in uprooting the forests productivity and the development of mechanization for extraction and processing bamboo to biomass and cellulose markets. In general, we will be discussing during the World Bamboo Congress, all the processes described herein, as well as those involving the formation of a bamboo forest on a large scale dimension.

## REFERENCE

HIDALGO LOPEZ, O. *Bamboo the gift of the gods*. Oscar Hidalgo Lopez editor, Bogotá. 2003, 553 p.