

# Preface

Bamboo is the fastest-growing and most versatile plant on Earth. For centuries, bamboo has played an indispensable part in the daily life of millions of people in tropical countries. In the last decades, it has gained increasing importance as a substitute for timber.

Bamboo is a unique group of tall grasses with woody jointed stems. Bamboo belongs to the subfamily Bambusoideae of the grass family Poaceae (or Gramineae). There are about 75 genera with approximately 1,300 species and varieties covering 25 million hectares worldwide. In cooler and temperate regions of Central Asia, bamboo plants grow single stemmed apart from each other (leptomorph type) or in dense clumps (pachymorph type) in warm, tropical regions of Western Asia, Southeast Asia, and South America. The culm (stem) is mostly hollow and characterized by nodes with internodes in between. The nodes give the plant its strength. The culms arise from buds at the underground shoot–root system, the so-called rhizome. Shoots emerge with the rainy season and expand within a few months to their final length of 10–30 m and diameters from 5 to 30 cm.

During the growth of the culms, bamboo produces the highest amount of living biomass in the plant realm. Depending on type, location, and climate, the annual growth rate is about 5–12 metric tons of air-dried biomass per hectare.

After 3–4 years, the culms are selectively harvested. Bamboo is a self-regenerating, renewable raw material. Due to new shoots, which appear each year, its production continues after individual culms have been harvested. Depending on the species, the culms of one population flower after 40–80 years, mostly with a subsequent dying of the entire population across large regions. This simultaneous flowering can have substantial economic implications by depriving people of their basic natural resource.

There are over 1,000 described uses of bamboo. Bamboo provides food, renewable raw material, and regenerative energy. Culms have excellent technological properties and are used for construction, scaffolding, handicraft products, furniture, and as material for secondary products such as bamboo mats, boards, or flooring.

Over 1 billion people live in bamboo houses, from simple dwellings to four-story city houses and engineered structures.

Bamboo processing is often done at craft level associated with relatively low capital investment. The fibers are a valuable material for pulp and paper as a substitute for wood. Bamboo crops are also used to provide wind protection in farming and to stabilize riverbanks and hillsides by the interlocked rhizome system.

Due to the overexploitation of natural forests and the increasing demand for woody material, bamboo is gaining importance as a substitute resource material for timber. In many areas, the increase of plantation areas, the improvement of utilization, and the development of innovative uses is a widely accepted goal. However, problems with stand management, harvest, storage, and biological hazards and the need for preserving natural bamboo forests against overexploitation by expanding demands have to be considered. In times of declining forest populations, increased need for renewable resources and regenerative energies, and a change of an economic paradigm from market economy to green economy, bamboo has a promising future.

The current book is intended to be a primer on bamboo. The focus is on the relevant biological basis, production, and utilization of bamboo. Our intent is to give an introduction and overview about basic concepts and principles, which can be adapted for real-world situations.

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## Bamboo

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