

Bamboo: An Underutilized Resource with Extensive Application Possibilities

Melanie Harrison-Dunn¹ and Michael Hotchkiss²

¹ USDA, ARS, Plant Genetic Resources Conservation Unit, Griffin, GA
² USDA, ARS, Southeastern Fruit and Tree Nut Research Laboratory, Byron, GA



Introduction

Bamboo comprises a diverse set of ~115 genera with ~1070 species within the Poaceae family. Although morphologically similar to other grasses in several aspects, bamboo has distinct features such as woody culms and broad leaves that distinguish it from other grasses. Bamboo naturally occurs in both tropical and temperate climates with the majority of species being tropical in origin. There are two main types of bamboo based on the growing habit of the rhizomes - sympodial and monopodial. In sympodial species (runners), the rhizomes are long and thin and spread out rapidly. In monopodial species (clumpers), the rhizomes are short and thick and curve upward instead of reaching outward. Clumpers are therefore much less invasive than running bamboos due to their growth habit. However, there are many species of running bamboos that tend to be less vigorous and invasive. Bamboo has been in cultivation for thousands of years in Asia and has been used for a seemingly unlimited number of purposes including paper, fabric, construction materials, food, ornamental, and textiles - just to name a few. Its popularity and use in the U.S. has been chiefly limited to ornamental use but has been gaining attention for its use as a fabric, textile (eg. bamboo flooring) and its potential use as a biomass crop.



Growth Characteristics

The growth of bamboo is phenomenal. It has been reported to grow up to 47 inches within a 24 hour period. Bamboo spreads by the growth of underground rhizomes. Once a culm emerges from the ground, it will reach its maximum height in just one growing season. For a large bamboo species such as *Phyllostachys edulis*, this can be up to 75 feet. As the culm matures in subsequent growing seasons, the culm will develop more branches and will increase in culm wall thickness. Because of its extensive system of underground rhizomes, bamboo can easily recover after being clear cut as long as it is managed properly. Bamboo is being promoted as an "green alternative" crop due to the fact that bamboo doesn't require pesticides/herbicides and high fertilizer inputs in order to be productive. Unlike typical forest trees which take over a decade to reach maturity, bamboo can be harvested in just five to six years and will grow back without having to be replanted. With the focus on environmentally friendly products, bamboo is destined to becoming an increasingly popular crop that could one day out compete traditional crops.



PI 24761

The USDA Collection

The USDA Temperate Bamboo Collection was first established in Savannah, Georgia in 1919. Its humble beginnings began as a small one acre grove of Japanese Timber Bamboo (*Phyllostachys bambusoides*). The station was then known as the Barbour Lathrop Plant Introduction Station. The collection grew over the next few decades into a valuable collection increasing in number of genera and species. The bamboo was moved to the Southeastern Fruit and Tree Nut Station in Byron, Georgia between 1976 and 1980.

The collection in Byron is maintained by the USDA Plant Genetic Resources Conservation Unit which is a part of the National Plant Germplasm System (NPGS). The mission of the NPGS is to preserve the genetic diversity in plants that are of value to the world's agriculture. The purpose of the collection is to maintain a diverse set of bamboo species for use by researchers and commercial businesses (nurseries, craft work, industrial use, bamboo shoot production). The USDA provides bamboo plants and culms to researchers, commercial growers, and hobbyists at no cost with priority given to researchers and commercial propagators.

There are ten genera and 46 species of bamboo contained in the collection including the following:

- Arundinaria
- Bambusa
- Brachystachyum
- Hibanobambusa
- Indocalamus
- Phyllostachys
- Pseudosasa
- Sasa
- Shibataea
- Sinobambusa



Uses of Bamboo

- Bioenergy crop
- Textiles (eg. flooring, veneers, plywood, etc)
- Fabric (comparable to silk)
- Forage
- Ornamental
- Edible shoots
- Musical instruments
- Bows and arrows
- Common household items (eg. steamer, utensils, tableware)
- High end furniture
- Fencing
- Garden poles
- Many, many other uses



Research Considerations

- Optimal harvesting intervals need to be determined to ensure sustainability of groves
- Harvesting equipment engineered to handle bamboo is needed.
- Optimal establishment methods need to be determined - whether from rhizome plantings or tissue culture.
- Not all bamboo products are "green". Regulation on the field production and processing of the crop is needed to ensure only environmentally sound products can claim to be environmentally superior.
- Market and economic analysis is needed to determine the cost/benefits to growers in order for the crop to become feasible to growers.
- Basic research is needed to better understand the control of flowering and genetics of the crop to assist plant breeders.

