Chapter 1
Introduction
1.1 Introduction

India is one of the rich genetic resources of bamboo with 136 indigenous exotic species and 23 genera under cultivation. Assam is one of the richest biodiversity zones in the world and consists of tropical rainforests, deciduous forest, riverine grasslands and bamboo orchards. Bamboos play an important role in daily life of rural people especially tribals in numerous ways, from house construction, agricultural implements to provide food, fodder etc. The edible parts of bamboo, i.e. shoots are highly nutritious and potentially rich sources of dietary fibers, antioxidants\(^1\), amino acids, minerals, vitamins and low in calories. The protein content of the shoots is also high, and contains fewer amounts of fats; however, it is rich in essential fatty acids\(^2-4\). Presence of high quality vitamins, carbohydrates, proteins and minerals in bamboo shoot and their easy availability to common man may help in solving nutritional deficiency of rural poor\(^5\). All this indicate vast potential of bamboo shoot as food resource.

In Assam and other states of Northeast India, bamboo shoot is consumed either raw or processed because of its exotic taste, flavour and medicinal value. The major edible species that are suitable for processing in Assam are *Dendrocalamus hamiltonii*, *Bambusa balcooa*, *B. tulda*, and *B. pallid*\(^6\). At present bamboo shoots are largely sold in the unprocessed form. They are harvested from homestead in clumps and brought to the local market for sale. The shelf life of bamboo shoot is limited and they have to be sold immediately after harvest.

In regular practices bamboo shoot are boiled before consumption for a particular time. The boiling time depends on locality, traditional practices and use for removal of bitterness of shoot. Heat processing is applied to various vegetables to increase its shelf life, to stop various enzymatic reactions, reduce microbial load in food, soften tissues, eliminate intracellular air to prevent oxidation and reduce the antinutritional components\(^7-8\). With regards to removal of antinutritional components some valuable nutrients may get loss and the effect of boiling/ blanching on nutritional components is imperative to consider during processing of bamboo shoot.
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Potential use of bamboo shoot as nutritionally rich food has created the importance of preserving it to overcome its seasonality. Various drying processes have adverse effect on the nutritional and physical quality of bamboo shoot; however, osmotic dehydration could be the best options for preserving its nutrients. Osmotic dehydration is a semi-drying process applied to high moisture fruits and vegetables to reduce the moisture content to an optimum level so that the shelf life of the product is increased without much deterioration in sensorial and nutritional status. It is a useful treatment of dehydration compared to the other dehydration processes, as it does not bring adverse and irreversible changes in physical and nutritional status of food material like other dehydration processes. Bamboo shoots are tested with different drying methods viz., hot air drying, vacuum drying, freeze drying and microwave drying etc. But study of osmotic dehydration of bamboo shoot is not yet reported in any literature or seldom available.

Fermented bamboo shoot is an important part of the traditional foods in the Northeastern states of India. Fermentation of bamboo shoots not only helps to extend storage life but also enhances safety of foods using the natural microflora and their antibacterial compounds. Such traditional fermented food will be a potential source of lactic acid bacteria. *Khorisa* is a traditional fermented bamboo shoot product of Assam, India and it is important part of diet of both rural and urban people and is extensively used as a main ingredient in preparation of different food items like meat, fish, pickles etc. Sometime, during *khorisa* fermentation small quantities of dried fruit of *Garcinia pedunculata* Roxb. (Local name: Bortheke ra) are added along with the shoot as a possible acidifier to enhance fermentation. Fermentation adds specific flavour, aroma and taste to the bamboo shoot. These indigenous traditional knowledge of tribal community needs to be scientifically validated which would provide guidelines for evolving a simple, efficient system for bamboo shoot utilization and preservation for better shelf life of bamboo shoot.

Bamboo shoots deteriorate very rapidly during storage and transportation which is a serious post harvest problem for traders. Enzymatic browning also poses a serious problem during the storage of post harvest bamboo shoots. Edible coatings might have
the potential to stop or inhibit the rapid quality degradation of harvested bamboo shoots. Edible film and coatings could be used to preserve fresh cut fruits and vegetables, providing a selective barrier to moisture, oxygen and carbon dioxide, improving mechanical and textural properties. Further addition of antioxidants and antimicrobial compounds impart microbial barriers, avoiding volatile loss, etc\textsuperscript{16}.

In the light of the above backgrounds the present study was undertaken to investigate the nutritional potential of edible bamboo shoots of Assam and further determine the effect of blanching temperature and time on physicochemical properties of bamboo shoot. The optimization of osmotic dehydration process of bamboo shoot and its mass transfer kinetics has been studied. In addition, the physicochemical and microbial changes during the fermentation of bamboo shoots were examined in the process of making \textit{khorisa}. The effect of edible coating coupled with antimicrobial and antibrowning agents on bamboo shoot quality was also investigated.

**Objectives of the present investigation**

- To study the effect of blanching temperature and time on physicochemical properties of bamboo shoot
- To optimize the osmotic dehydration process of bamboo shoot
- To investigate the influence of fermentation on bamboo shoot quality with \textit{Garcinia pedunculata} Roxb.
- To extract antimicrobial biometabolites and antioxidant extract from different biological sources
- To develop antimicrobial and antibrowning coating and its effect on bamboo shoot quality
References


