Physicochemical changes in bamboo shoot of Assam during processing and its quality study by application of antimicrobial-antibrowning edible coating

ABSTRACT

The thesis includes the nutritional status of some edible bamboo shoot species of Assam and their comparison. The current investigation deals with the effect of various processing treatments viz., blanching, osmotic dehydration and fermentation on physicochemical properties of bamboo shoot of Assam. The study also includes the extraction of antibrowning and antimicrobial agents from different biological sources for their application in edible coating. The thesis describes the process of composite edible film preparation using different polysaccharides. In addition, the study highlights the application of antibrowning and antimicrobial agents in edible coating and its effect on bamboo shoot quality.

The thesis is divided into seven chapters which are briefly discussed below:

Chapter 1 deals with the general introduction about present work. It highlights the gap of study and background behind the selection and planning of current work plan. The application and justification of current work is also highlighted. Finally the scope and objectives of the present investigation are included.

Chapter 2 presents the review of literature for present study. The general introduction about bamboo shoot, its nutritional status and its consumption pattern are included. The effect of different processing parameters on bamboo shoot quality and shelf life is also discussed. Blanching effect on physicochemical properties on fruits and vegetables is highlighted. Application of osmotic dehydration process, its mass transfer kinetics and effect of centrifugal force and vacuum pressure on osmotic dehydration are discussed. This chapter also includes the methods and microbiology of fermentation and its effect on quality of bamboo shoot of different regions/ country. Antimicrobial potential of lactic acid bacteria, its metabolites and their activity on different pathogenic
microorganisms are included. However, the applications of microwave assisted extraction for extraction of different active components from various biological sources are also included. Edible coating and film and its application on different fruits and vegetables are also discussed.

Chapter 3 includes the nutritional analysis of four different species of bamboo shoot of Assam. Further the effects of blanching temperature (75, 85 and 95 °C) and time (5, 10, 15, 20, 25 and 30 min) on proximate composition, vitamin C, total phenols, antioxidant activity, colour and texture of bamboo shoot (Bambusa balcooa) are also investigated. All the blanching treatments are compared for their deteriorative effect on bamboo shoot.

Chapter 4 reports the effect of the process time, solution temperature and salt concentration on osmotic dehydration of bamboo shoot and their optimization using response surface methodology (RSM). The mass transfer kinetics as well as water and solute diffusivity during osmotic dehydration of bamboo shoot are also included. The chapter also reports the effects of centrifugal force and pulsed vacuum on the osmotic dehydration process. The changes in hardness, colour and microstructure during osmotic dehydration are included.

Chapter 5 investigates the influence of fermentation on physicochemical and microbial change in bamboo shoot. The changes during fermentation of bamboo shoot with and without addition of Garcinia pedunculata Roxb. fruit are also reported. It also includes the organic acids and carbohydrate profile of fresh and fermented bamboo shoots analyzed by HPLC.

Chapter 6 presents the extraction method of biometabolites from Lactobacillus plantarum isolated from fermented bamboo shoot. Antimicrobial activity of biometabolites against Escherichia coli, Streptococcus aureus and Bacillus cereus is reported. The organic acid composition of biometabolites and its effect on minimum lethal dose concentration (LD_{min}) and death rate kinetics of test bacterial strains are
included. It also deals with the optimization of microwave assisted extraction process of antioxidant extract using RSM on the basis of maximum DPPH and ABTS radical scavenging activity.

**Chapter 7** deals with the method development of composite films with varying composition of alginate, starch and carboxymethyl cellulose. The mechanical, thermal and barrier properties of these films are discussed. The process of incorporation of antibrowning and antimicrobial agents in edible coating and its application on bamboo shoot are included. The effect of coating on weight loss, surface colour and microbial count is discussed.

**Chapter 8** presents the conclusion, salient findings and future scope of the present investigation. It is concluded that the processing e.g. blanching, osmotic dehydration and fermentation have significant influence on bamboo shoot quality. Low temperature blanching could be better option for retention of micro nutrients. Enhancement of osmotic dehydration process resulted, with application of vacuum pressure and centrifugal force. Addition of *Garcinia pedunculata* Roxb. in bamboo shoot enhanced the fermentation and quality of fermented product (*khorisa*). The application of antimicrobial biometabolites and antioxidant extract in edible coating evinced better retention of bamboo shoot quality.