

Chapter 1

Introduction

This chapter introduces the background of resistant starch (RS) and the significance of bananas, specifically the "Kluai Hom Thong" variety from Udon Thani, as a rich source of RS. It also highlights the impact of the autoclave method on the resistant starch content and characteristics of unpeeled green banana powder. The following sections will outline the background, objectives, and hypothesis of this research.

1.1 Background

Resistant starch (RS) is a type of starch that functions as dietary fiber (DF), as it resists digestion and absorption in the mouth, stomach, and small intestine but is fermented and utilized by microorganisms in the large intestine (Hu et al., 2024). The benefits of resistant starch include its effects on glucose and lipid metabolism, its prebiotic properties, its positive impact on gut health, and its beneficial influence on satiety and body weight (Bojarczuk et al., 2022). Bananas are one of the many sources of resistant starch.

Bananas (*Musa* sp.) are one of the most tropical fruits and are usually consumed by people of all age groups worldwide. Bananas, in general, are a rich source of carbohydrates, vitamins, and minerals, making them an essential part of the human diet (Ranjha et al., 2020). Thailand is considered as one of the major banana producers in Asia. In this research, the variety of banana used was *Musa acuminata* from Udon Thani Province. *Musa acuminata* itself contains higher content of protein and fiber was found in this variety compared to the other varieties of banana. All parts of the plant including fruits, peel, pseudostem, corm, flowers, leaves, sap and roots have found their use in the treatment of many diseases in traditional medicine (Mathew & Negi, 2017).

Udon Thani Province (Northeastern Region of Thailand) is recognized as a significant cultivation area for the "Kluai Hom Thong" banana variety in Thailand. The group has implemented a management system that facilitates year-round production, with the peak demand for fresh "Kluai Hom Thong" bananas occurring during festive seasons, where only "Extra" Class bananas are marketed. However, approximately 30% of the harvested bananas are either under-sized or oversized, which do not meet market standards.

To tackle the problems, the community enterprise in Sang Khom District, Udon Thani Province, which produces products from the Kluai Hom Thong banana has realized and emphasized the reduction of losses and increasing the value of the product. Therefore, the project is done to develop healthier products by utilizing the bananas that do not meet the market standard through the development of banana powder and increasing its resistant starch and physicochemical properties. High resistant starch properties in bananas is important since resistant starch itself can act as a prebiotic, promoting the growth of beneficial gut bacteria which can improve digestion and overall gut health (Baek et al., 2023). Several methods can be used to increase the resistant starch content of banana powder, including autoclave, freeze-thaw, and chemical processes (Raungrusmee & Anal, 2019). Among these, the autoclave method holds the greatest potential for commercialization due to its efficiency and feasibility. Unlike other methods, which are often costly, inefficient, or involve complex procedures, the autoclave process utilizes high temperature and pressure to modify starch without the need for chemicals (Zheng et al., 2020). As a widely used starch modification technique, it effectively enhances the resistant starch (RS) content while eliminating the risk of by-product formation due to the absence of chemical additives, making it a promising approach for improving resistant starch content (Faridah et al., 2022). Therefore, the usage of autoclave is expected to increase the resistant starch, physical and chemical properties of the unpeeled green banana powder.

1.2 Objective

The objective of the project is to evaluate the effect of peel types and autoclaving on the resistant starch content and physicochemical properties of green banana powder from Udon Thani Province, Thailand.

1.3 Hypothesis

The hypothesis used to assess how peel types effect and autoclaving effect affects the resistant starch content and physicochemical properties of the green banana powder. In order to test these hypotheses, systematic methods will be used, including physical and chemical analysis.

1.3.1 Peel Type Effect

H_0 : There is no significant difference in the resistant starch content and physicochemical properties between peeled and unpeeled green banana powder.

H_1 : There is a significant difference in the resistant starch content and physicochemical properties between peeled and unpeeled green banana powder.

1.3.2 Autoclaving Effect

H_0 : There is no significant difference in the resistant starch content and physicochemical properties between autoclaved and non autoclaved green banana powder.

H_1 : There is a significant difference in the resistant starch content and physicochemical properties between autoclaved and non autoclaved green banana powder.