Chapter 1

Introduction

1.1 Background

The discovery of new sources of prebiotics is an exciting and innovative area for the food industry, particularly in the current era of health and well-being. Prebiotics, defined as non-digestible food ingredients that promote the growth of beneficial gut bacteria, have gained significant attention due to their numerous health benefits, including improved digestion, enhanced immunity, and reduced risk of chronic diseases. From 2022 to 2030, the global prebiotics market is projected to expand at a compound annual growth rate (CAGR) of 14.9%, from its 2021 valuation of USD 6.05 billion, driven by increasing consumer awareness of gut health and demand for functional foods (Grand View Research, 2024).

Utilizing less valuable or underutilized materials, such as insects or agricultural byproducts, to develop high-value functional ingredients is one of the most promising trends in prebiotic research. Often regarded as a problem in agricultural systems, the Bombay locust (*Patanga succincta*) has become a new source for the extraction of prebiotics. In addition to addressing sustainability by minimizing waste, this strategy gives farmers financial opportunity by turning a low-value resource into a high-value product (Bamigbade et al., 2022). Farmers can profit significantly from the extraction of prebiotics from Bombay locusts. During swarming events, locusts are frequently available and economical to harvest. Farmers may contribute to sustainable farming practices and diversify their revenue streams by turning these insects into important prebiotic components. This supports international initiatives to cut waste and advance circular economies in the food chain (Grand View Research, 2024).

Chitin, a polymer that can be transformed into chitosan or oligosaccharides with possible prebiotic qualities, is abundant in Bombay Locust. To preserve gastrointestinal health, these substances promote the growth of beneficial gut bacteria, including *Lactobacilli* and *Bifidobacteria* (Gonçalves et al., 2023). Novel prebiotic source research has shown that these materials can enhance environmental sustainability and effectively address the growing demand for functional foods (Bamigbade et al., 2022).

The food industry is putting more and more effort into developing foods that satisfy consumer needs for wellness and health. One of its significant advancements in the food sector, especially in response to the growing consumer demand for health and wellness goods, is exploring the possibility of valuable materials, made from the extraction of prebiotics from the Bombay locust (*Patanga succincta*) (Puechkamutr & Arsa, 2023). This innovative approach supports economic value preservation by addressing nutritional needs while maximizing the use of underutilized resources (Bamigbade et al., 2022). Hence, the potential of a new source of prebiotics and its properties from chemical extraction of Bombay Locust will be explored in this research to support the trend in both food industry and agriculture innovations.

1.2 Objective

- To quantify the concentration of the prebiotic compounds extracted from the Bombay locust through the analysis of moisture content and total solid content.
- To evaluate the surface morphology of the prebiotics extracted from the Bombay locust through the analysis of Scanning Electron Microscopy.
- To evaluate the prebiotic properties of chitooligosaccharides extracted from the Bombay locust through the analysis of probiotic activity of different prebiotic concentrations and probiotic strains.

1.3 Hypothesis

H0: Prebiotics extracted from Bombay locusts do not show a significant change in biological properties through probiotic activity compared to different prebiotic concentrations.

H1: Prebiotics extracted from Bombay locusts show a significant change in biological properties through probiotic activity compared to different prebiotic concentrations.