

SPECIMEN FORMAT FOR THESES OF MONTH

Faculty	:	Dr.S. Uma Mageshwari, Professor and Head
Department	:	Food Service Management and Dietetics
Branch/ Area:	:	Food Service Management and Dietetics
Sub Subject Heading:	:	Food Product Development
Candidate's Name	:	Haripriya A
Candidate's Address with email	:	14/16 B-3 Kailash Flats, Mangadu Swamy Street, Nungambakkam, Chennai-34
Title of the thesis	:	Starch Characterization, Functional Properties, Prebiotic Potential of Unripe Banana Flours and Development of Ready-to-Eat and Ready-to-Cook Products
(i) In Roman Script	=	
(ii) In roman Script	=	
Nomenclature of Degree:	:	PhD
Month & Year of Enrolment:	:	January, 2019
Month & Year of Registration:	:	January, 2019
Month & Year of Submission:	:	April,2025
Month & Year of Award	:	November, 2025
Name of Supervisor	:	Dr. S. Uma Mageshwari
Designation of Supervisor	:	Professor and Head
Centre/department/school in which research was conducted	:	Food Service Management and Dietetics, School of Home Science
University's Name & Address	:	Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore

Abstract within 300 words:

The growing preference for ready-to-eat (RTE) and ready-to-cook (RTC) foods reflects consumers' demand for convenience and health-oriented options. Incorporating functional ingredients such as dietary fiber, prebiotics, and antioxidants enhances their nutritional value. Unripe banana flour (UBF), rich in resistant starch and dietary fiber, is a promising functional ingredient for developing health-focused RTE and RTC products. This study evaluated UBFs from *Musa paradisiaca* cultivars Peyan (PUBF) and Monthan (MUBF) for their nutritional, physicochemical, antioxidant, and prebiotic properties, as well as their potential application in RTE and RTC formulations.

A baseline KAP survey among 500 respondents revealed 76% awareness of functional foods and 52% preference for functional RTE and RTC products, indicating strong consumer interest. Unripe bananas of cultivars Peyan and Monthan were processed into flours using standardized procedures. The PUBF and MUBF showed high total starch (83–86%), amylose (23%), resistant starch (44%), and dietary fiber (13%). Both exhibited distinct starch morphology, good hydration and gelling properties, and moderate crystallinity (8.9–13%). Antioxidant assays confirmed their bioactive potential, while prebiotic assays demonstrated positive growth of selected probiotics.

RTE and RTC products developed with 30% UBF incorporation were well accepted for sensory quality and had improved dietary fiber and resistant starch contents compared to wheat-based controls. PUBF and MUBF products also showed favorable shelf-life stability. Fermentation of 30% PUBF-based cookies and noodles with selected probiotics resulted in a decrease in pH and an increase in optical density and colony count, with prebiotic index values exceeding one, indicating positive effects on probiotic growth. PUBF-based cookies and noodles exhibited medium eGI values of 62.85 and 63.28, respectively, compared to higher eGI values for their control counterparts.

Overall, the study establishes unripe banana flours from *Musa paradisiaca* (Peyan and Monthan) as valuable functional ingredients for developing low-glycemic, fiber-rich RTE and RTC foods that meet the dual consumer demand for convenience and health-promoting nutrition.

i) Major objectives :

- Explore the suitability of unripe banana flour of *Musa paradisiaca* cultivars Peyan and Monthan as adjuncts for Ready-to-Eat (RTE) and Ready-to-Cook (RTC) products.
- Assess the physicochemical properties, prebiotic, and antioxidant potential of unripe banana flours.
- Develop and evaluate unripe banana flours based Ready-to-Eat (RTE) and Ready-to-Cook (RTC) products.

ii) Hypothesis: Nil

iii) Methodology :

Phase 1	•Exploring Consumers' Knowledge, Attitude, and Practice of Ready-to-Eat and Ready-to-Cook Products
Phase 2	•Identification and Authentication of Banana Cultivars and Preparation of Unripe Banana Flours of <i>Musa paradisiaca</i> , Peyan (PUBF) and Monthan (MUBF)
Phase 3	•Determination of Starch Morphology, Characteristics, and Functional Properties of Unripe Banana Flours- PUBF and MUBF
Phase 4	•Estimation of Nutrient Composition, Phytonutrients, Antimicrobial Activity, Antioxidant Potential, Prebiotic Potential, and Predicted GI of Unripe Banana Flours- PUBF and MUBF
Phase 5	•Development and Evaluation of Ready-to-Eat and Ready-to-Cook Products Incorporated with Unripe Banana Flours- PUBF and MUBF
Phase 6	•Assessment of Prebiotic Potential, Predicted GI, and Purchase Intent of Developed Ready-to-Eat and Ready-to-Cook Products

iv) Findings:

Phase 1

Seventy-six percent of the participants were aware of functional foods/nutraceuticals. Among the respondents, 29 % considered raw banana and sweet potato as functional foods. 52 % of the respondents preferred dietary fiber-rich foods in the RTE/ RTC category.

Phase 2

Given their high resistant starch and dietary fiber content, unripe bananas (*Musa paradisiaca*) were selected for incorporation due to their year-round availability, versatility, nutrient density, gut-friendly properties, and cost-effectiveness. The vast diversity of banana cultivars emphasizes the need for selective exploration. Thus, *Musa paradisiaca*, Peyan (ABB), and Monthan (ABB) were chosen for this study due to their indigenous presence in Southern India, widespread availability, underutilization, and limited research. The flour recovery was 30.45 % for Peyan flour (PUBF) and 23.25 % for Monthan flour (MUBF).

Phase 3

PUBF and MUBF exhibited B-type crystallinity, indicating their resistance to enzymatic digestion. The unripe banana flours (UBFs) contained 44% resistant starch and showed comparatively higher gelatinization temperatures. In addition, the UBFs demonstrated desirable hydration and gelling capacities, highlighting their potential functionality in various food applications.

Phase 4

The unripe banana flours (PUBF and MUBF) possessed a noteworthy dietary fiber content of 13% along with appreciable levels of polyphenolics, flavonoids, and tannins, contributing to an antioxidant capacity of 60–65%. Both flours exhibited antibacterial activity against the Gram-negative bacterium *Escherichia coli*, highlighting their potential functional benefits. The estimated glycemic index (eGI) values classified PUBF as a low-GI food and MUBF as a medium-GI food, indicating their suitability for the development of health-oriented food products with improved glycemic response.

Phase 5

The products incorporating 30% unripe banana flour (UBF) were found to be the most acceptable based on sensory evaluation. These UBF-incorporated formulations also contained appreciable amounts of resistant starch (RS), enhancing their functional and nutritional value compared to the control products.

Phase 6

The PUBF-incorporated cookies and noodles exhibited a higher prebiotic index compared to the control, indicating enhanced probiotic-supporting potential. PUBF also demonstrated strong support for the proliferation of *Lactobacillus acidophilus*, confirming its prebiotic functionality. Both PUBF cookies and noodles were categorized as medium-GI foods, making them suitable for balanced dietary applications. Furthermore, the consumer purchase intent survey indicated favorable responses toward the 30% PUBF cookies and noodles, reflecting their acceptance and market potential.

Examiners

Internal Examiner :

Dr. Neerja Singla
Professor
Department of Food and Nutrition
College of Community Science
Punjab Agricultural University
Ludhiana

External Examiner :

Dr. Siti Narsito Wulan
Assistant Professor in Food Science
Department of Food Science and Biotechnology
Brawijaya University
Malang, Indonesia