



# DEVELOPMENT OF FORTIFIED WHEAT CHIPS USING PAPAIN AND BROMELAIN ENZYME POWDER

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**Abstract:** The protein deficiency is common among people who live in developed countries. The deficiency in protein leads to marasmus, kwashikor, oedema, and sometimes it even lead to organ failure. So daily intake of protein in required level is advisable. About 60% of world's population suffers from protein deficiency. In order to overcome this, protein supplements are taken as a medicine. Our project aims to develop a protein based snack food which is the best alternative. Our research incorporated the fortification technique to increase the protein content. The usage of papain and bromelain which is rich in protein is fortified with wheat flour. Normally the wheat flour contains about 8-12% of protein and essential amino acids. After fortification it is resulted that the fortified wheat flour contain protein which is increased from 22.0 to 27.3 µg/ml for raw to finished product. And the resulted product's shelf life is consistent for 2 weeks. The overall acceptability is based on the sensory analysis which had a good response in taste, smell, crunchiness and flavor.

**Keywords - Fortification, papain enzyme, bromelain enzyme, wheat flour, wheat chips**

## I. INTRODUCTION

Food fortification involves the addition of nutrients to the food during the time of processing or manufacturing in order to improve the nutritional content of the product. Some foods contain certain nutrients naturally but it gets lost during the time of processing or storage. By adding nutrients to the certain foods, people can get adequate amount of nutrients to their diet. Fortified foods help to reduce nutritional deficiency rates. It boosts children's nutrition and provides protection to the elder people by proper digestion. These fortified foods help to maintain balanced diet for all group of people. Wheat flour is the second staple food in the Indian subcontinent providing more than fifty percent of total energy intake. The whole wheat flour includes bran, germ and the endosperm. It also contains fiber and other nutrients. Papain is a proteolytic enzyme extracted from the raw papaya fruit. Papain is usually produced from the latex of the papaya fruit. It contains several enzymes and which is also used as a meat tenderizer in meat cuts. The papain enzyme helps in digestion and it effectively treats trauma, allergies and sports injuries. The bromelain enzyme is a proteolytic enzyme extracted from pineapple fruit and it is used as a supplement for various health benefits including relieving sinus problems and helps in improving digestion. The active ingredients in bromelain include proteinases and proteases which are enzymes that breakdown proteins in the body. Proteins are essential for life because of its specific actions. They are made of hundreds of amino acids. In order to acquire a snack food (wheat chips) with rich protein content is done by fortification of wheat flour with papain and bromelain enzymes.

## II. MATERIALS AND METHODS

### PREPARATION OF WHEAT FLOUR

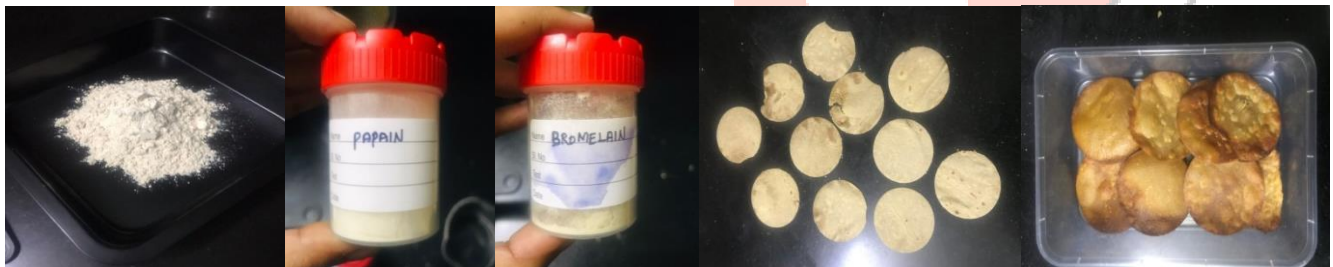
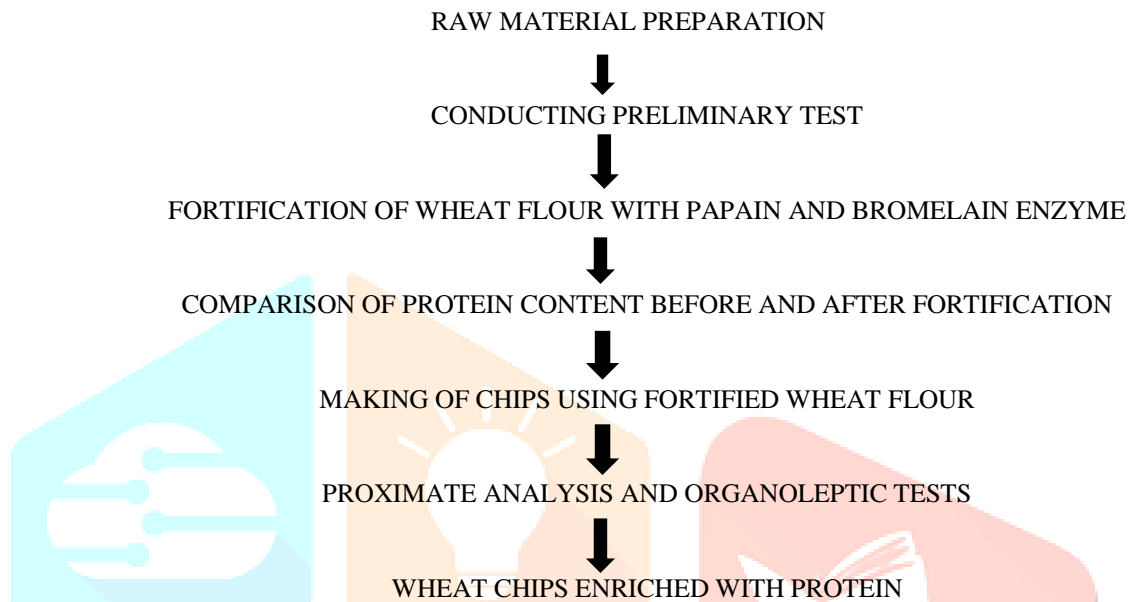
Wheat flour is a brown, soft with a smooth texture, achieved by milling or dry grinding of wheat. As wheat is a staple food, it is considered as the base of all staple food recipes. The wheat flour is obtained by subjecting the wheat grains for the removal of foreign particles followed by rinsing it with water, then drying using traditional or conventional drying methods and finally allowed for grinding process to obtain coarse texture.

## PREPARATION OF PAPAIN AND BROMELAIN ENZYME POWDER

The crude papain and bromelain enzyme powder was used in this Research. The crude enzyme powder was purchased from Phytozymes Biotech, Pollachi -Coimbatore, Tamil Nadu, India. The papain is mainly present in the milk of premature papaya fruit. And the bromelain is present in fruit and stem of the pineapple. It is extracted by various techniques.

## FORTIFICATION OF WHEAT FLOUR USING PAPAIN AND BROMELAIN ENZYME

The addition of micro-nutrient to the food helps in reducing deficiencies. At first, the whole wheat flour is analyzed to determine its protein content. The process involves blending of crude papain and bromelain enzyme powder with raw wheat flour to increase the protein content in the wheat flour. The fortified wheat flour undergoes various analysis to estimate its overall protein content.

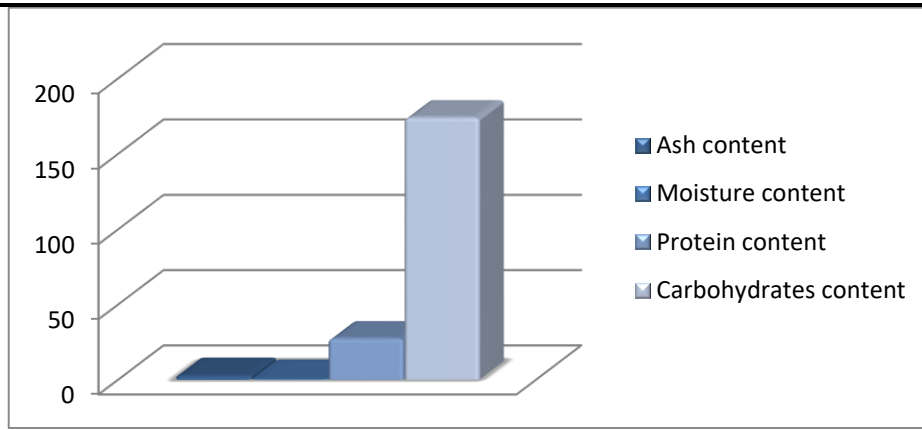


## III. RESULTS AND DISCUSSION

### PROXIMATE ANALYSIS OF THE PRODUCT

The product is analysed for protein content, moisture content, ash content, carbohydrate content.

Based on the various trials conducted, it was noted that the best results were obtained for the ratio of 20:20:80 for dough formulation. The ash content was determined by direct heating method contain in AOAC(2005). The ash content of chips is determined to be 2.6g. The protein content of chips is determined to be 27.3g. The carbohydrate content present in the chips is determined to be 174g.

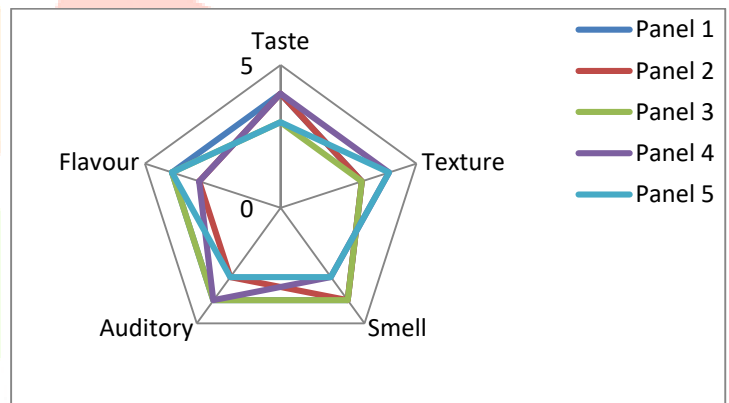


**SENSORY ANALYSIS OF THE PRODUCT**

The sensory evaluation is done for a scale of 5. The various sensory attributes were taste, texture, smell, auditory and flavor. The scales along with the parameters are given below. The results obtained are as follows:

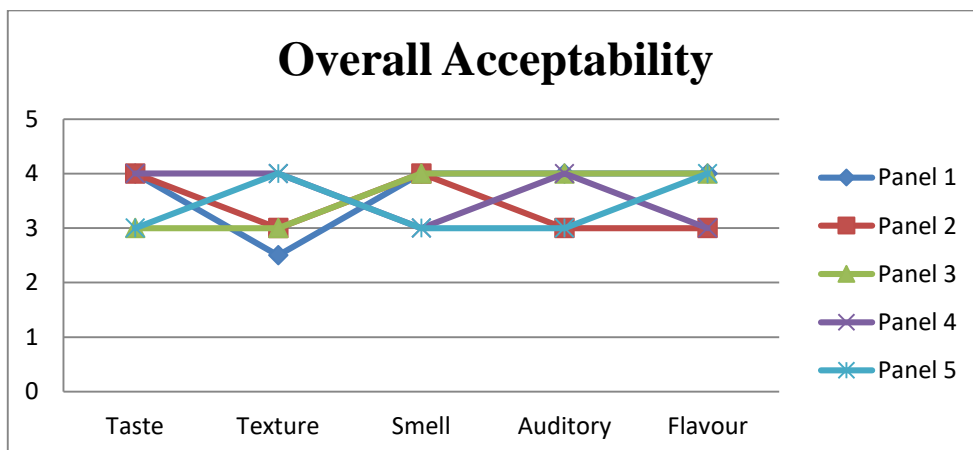
1 - Average, 2- Acceptable, 3- Good, 4- Satisfactory, 5- Exceptionally good

Parameters	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5
Taste	4	4	3	4	3
Texture	3	3	3	4	4
Smell	4	4	4	3	3
Auditory	4	3	4	4	3
Flavour	4	3	4	3	4



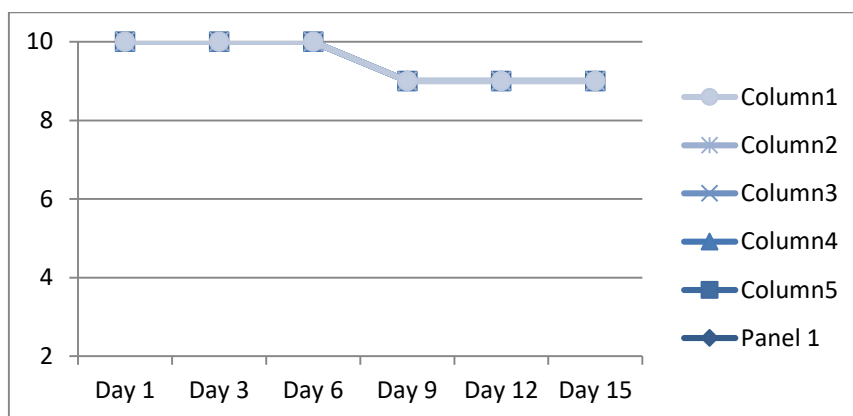
**OVERALL ACCEPTIBILITY OF THE PRODUCT**

The overall acceptability is based on the sensory analysis that the product had good response for taste, smell, crunchiness and flavor. The texture is concluded as acceptable.



## SHELF- LIFE ANALYSIS OF THE PRODUCT

The product was stored in an air tight container. It was observed that the products crispiness was consistent for 2 weeks.



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