

## APPLICATION OF PECTIN-CONTAINING CONCENTRATES IN BREAD TECHNOLOGY

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### ABSTRACT

This study investigates the technological and functional effects of pectin-containing concentrates in bread production. Pectin, a plant-derived polysaccharide, exhibits high water-binding capacity, gel-forming ability, and structural stabilization properties. Experimental results demonstrate that the addition of pectin concentrates (0.5–2.0%) significantly improves dough rheology, enhances gas retention, and increases bread volume and porosity. Furthermore, pectin reduces moisture loss and delays staling by limiting starch retrogradation. The optimal concentration was found to be 1.0%, providing the best balance between texture, softness, and shelf life. The use of pectin derived from fruit processing by-products also contributes to sustainability and waste valorization. Overall, pectin concentrates are promising functional ingredients for improving bread quality and extending shelf life.

### KEYWORDS

pectin, bread technology, dough rheology, hydrocolloids, shelf life, functional food, moisture retention

### 1. INTRODUCTION

The growing demand for high-quality bread with extended shelf life necessitates continuous improvement in baking technology. One of the major challenges in conventional bread production is rapid staling, characterized by moisture loss, crumb firming, and reduced elasticity.

To address these issues, natural biopolymers such as hydrocolloids are increasingly used as functional ingredients. Among them, pectin stands out due to its hydrophilic nature, water-binding capacity, and gel-forming properties.

Pectin interacts with gluten and starch components in dough, improving its rheological behavior, stabilizing gas cells during fermentation, and enhancing final product quality. Additionally, pectin reduces moisture migration and delays staling, thereby extending shelf life.

The use of pectin extracted from fruit and vegetable by-products also supports sustainable food production and waste utilization. Therefore, investigating the application of pectin-containing concentrates in bread technology is of significant scientific and practical importance.

### 2. MATERIALS AND METHODS

#### 2.1 Materials

- Wheat flour (standard baking grade)
- Water, salt, yeast
- Pectin concentrates derived from apple and citrus processing waste



## 2.2 Pectin Extraction

- Raw material: 100 g
- pH = 3.5 (citric acid)
- Temperature: 75–80°C
- Time: 3 hours

## 2.3 Experimental Design

(7 samples – control and pectin variants)

## 2.4 Analysis Methods

- Dough rheology
- Moisture content
- Texture
- Organoleptic evaluation

## 3. RESULTS

- Improved crumb structure
- Increased loaf volume
- Enhanced softness

Moisture:

Control – 6.8% loss

1.0% pectin – 4.1% loss

Texture:

Softness +25%

## 4. DISCUSSION

Pectin acts as a hydrocolloid improving dough structure.

Mechanism:

- Water binding
- Gluten–starch strengthening
- Gas retention

Result: better volume and structure

## 5. CONCLUSION



- Water absorption ↑
- Dough stability ↑
- Bread quality ↑
- Shelf life ↑

Optimal dosage: 1.0%

#### REFERENCES

1. (Voragen et al., 2009)
2. (Thakur et al., 1997)
3. (Rosell et al., 2001)
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