

Development and Evaluation of Pea Protein-Boosted Hazelnut Granola Bar

SAMBASIVA RAO BANDLA, KIRAN MANE, VENKAT RAMANA AMBADI, HARSHA PASHIKA, CHAITHANYA PIDIKITI.

Advisor: Pranabendu Mitra, Food science and technology program, Department of Kinesiology, Health, Food and Nutritional Sciences, University of Wisconsin-Stout, Menomonie, WI, 54751, USA

ABSTRACT

This project developed pea protein-boosted hazelnut granola bars to meet consumer demand for convenient, protein-rich, plant-based snacks. Three variations with 10%, 15%, and 20% pea protein isolate underwent analytical testing, resulting in an optimized formulation with 15% pea protein. Nutritional profiling confirmed high protein content and sustainability. The final product fills a market gap for mainstream snack bars with superior nutritional value. Results show the feasibility of incorporating pea protein while overcoming textural challenges. This contributes to the field of high-protein, functional snack foods and guides manufacturers in utilizing pea protein for healthy, plant-based snacking options. Future research will assess sensory attributes through consumer testing.

INTRODUCTION

The choice of developing pea protein-boosted hazelnut granola bars stems from a growing consumer demand for convenient, protein-rich, plant-based snacks. With an increasing awareness of health and sustainability, consumers are seeking alternatives to traditional snacks that offer both nutritional benefits and align with their ethical values. Granola bars are a popular snack choice due to their portability and versatility, but many existing options lack sufficient protein content, particularly from plant-based sources. Pea protein, being a high-quality and sustainable plant-based protein, presents an excellent opportunity to address this gap in the market.

The necessity of this project lies in meeting consumer demand for healthier and more sustainable snack options. With rising concerns about health and environmental sustainability, there is a clear need for innovative food products that offer superior nutritional value while minimizing their ecological footprint. By incorporating pea protein into granola bars, we aim to offer a mainstream snack that not only provides essential nutrients but also contributes to sustainability goals by reducing reliance on animal-based proteins.

OBJECTIVE

Developed pea protein-boosted hazelnut granola bars to meet the consumer demand of plant-based protein-rich snack. Evaluate textural and physicochemical properties of developed granola bars to determine suitable granola bar formulations. Calculate the nutritional values of optimized granola bar using USDA Food data Central.

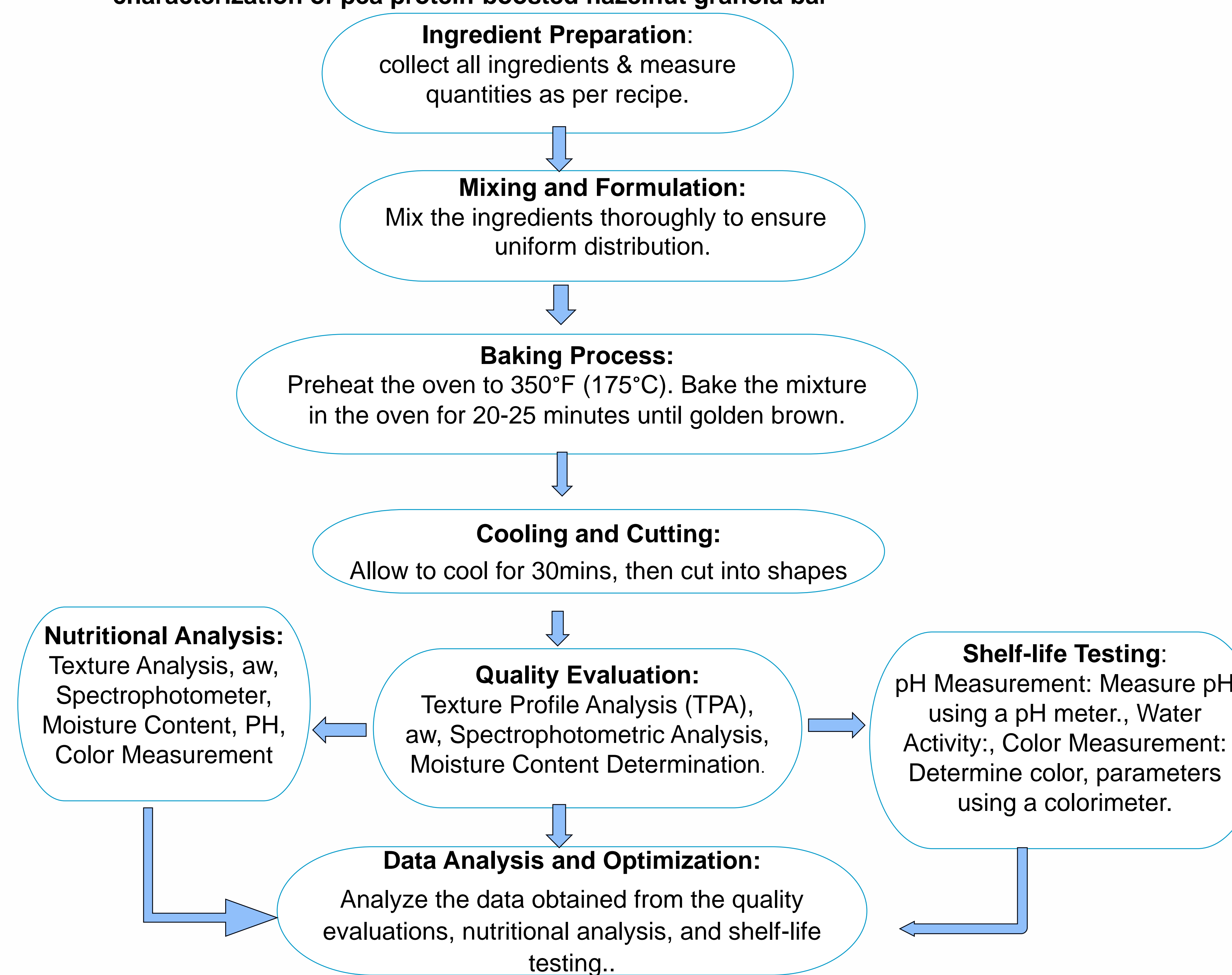
MATERIALS & METHODS

Three granola bar formulations with the variation of 10, 15, and 20% pea protein isolate in the formulation were used to develop the granola bars. The bars were manufactured as per the outlined in the Figure1. The physicochemical (L- value, a-value and b-value, water activity) and textural profile analysis (TPA) were determined using standard protocols. Nutritional values of the developed granola bars were calculated using the USDA Food data central (<https://fdc.nal.usda.gov/>).

Table 1: Three different formulations of pea protein-boosted hazelnut granola bar

Ingredients (%)	Formula 1	Formula 2	Formula3
Pea protein isolate	10%	15%	20%
Rolled Oats	41%	38.75%	36%
Hazelnuts	8.2%	7.625%	7%
Cinnamon powder	0.155%	0.14.25%	0.13%
Sunflower seeds	8.2%	7.625%	7%
Pumpkin Seeds	8.2%	7.625%	7%
Honey	4.1%	3.875%	3.5%
Almonds	8.2%	7.625%	7%
Cocoa solids	2.7%	2.625%	2.5%
Flax seeds	4.1%	3.875%	3.5%
Edible vegetable oil	4.1%	3.875%	3.5%
Rock salt	1.4%	1.375%	1.25%
Vanilla flavor	1.4%	1.375%	1.25%

Figure 1: A schematic of experimental design and manufacturing process and characterization of pea protein-boosted hazelnut granola bar



RESULTS & DISCUSSION:

This study successfully developed pea protein-boosted hazelnut granola bars that offer a balance of nutritional value and sensory qualities. The inclusion of pea protein powder significantly increased the protein content compared to traditional granola bars, potentially appealing to health-conscious consumers. Analytical testing revealed that the granola bars were a good source of protein and fiber. Texture analysis showed that higher pea protein levels (15% and 20%) resulted in increased hardness, cohesiveness, and chewiness. However, the 10% pea protein formulation exhibited a favorable balance of textural attributes and potentially improved shelf-life stability due to its lower water activity. Further sensory testing with consumers is recommended to optimize the taste, texture, and overall acceptability of the pea protein-boosted granola bars for successful market introduction.

Table 2: Nutritional Analysis of pea protein-boosted hazelnut granola bar.

Nutrient	Amount	Saturated Fat
Calories	166 kcal	8%
Total Fat	10g	13%
Saturated Fat	1g	5%
Cholesterol	0mg	0%
Sodium	69mg	3%
Total Carbohydrate	16g	5%
Dietary Fiber	3g	12%
Total Sugars	5g	10%
Protein	4.5g	9%

Figure 2: Water activity of pea protein-boosted hazelnut granola bar & Figure 3: Color profile (L-value, a-value and b-value) of the pea protein-boosted hazelnut granola bar

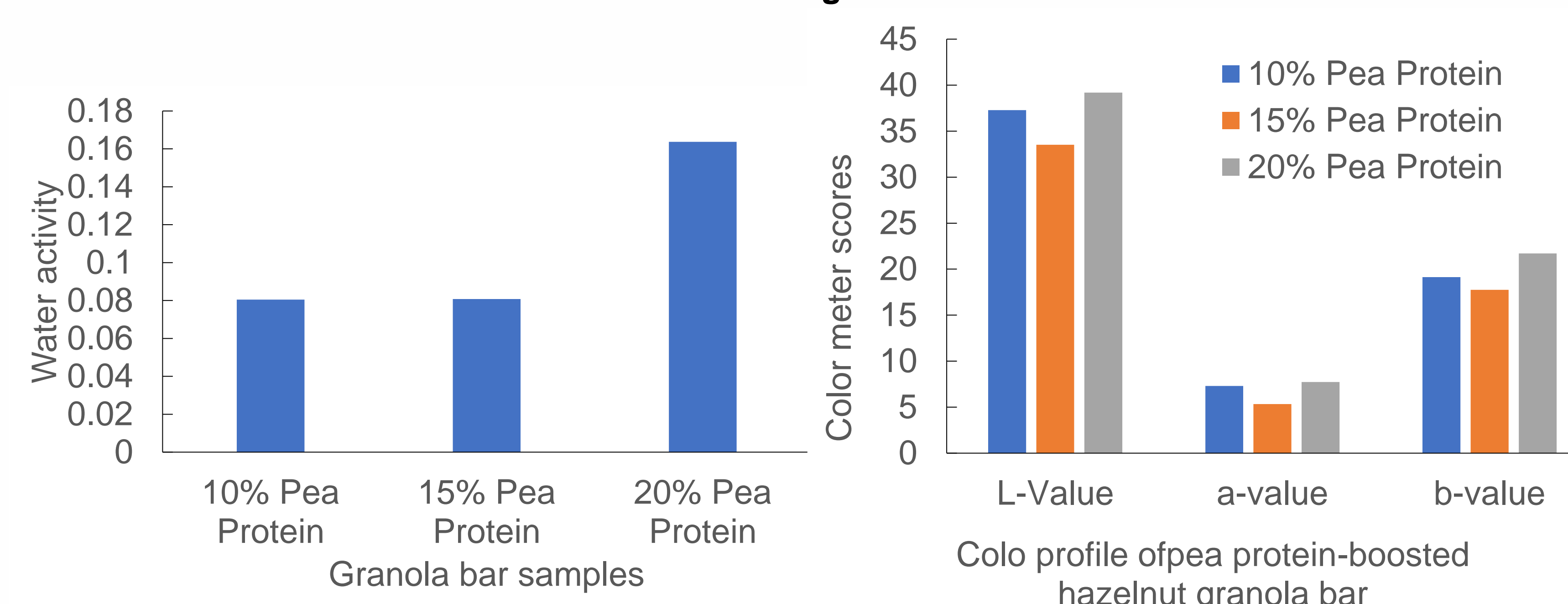


Table 3: Textural properties of pea protein-boosted hazelnut granola bar

Pea Protein percentage	Hardness	Cohesiveness	Springiness	Gumminess	Chewiness
10%	43.718	1.358	3.058	59.369	181.55
15%	88.355	1.186	1.3802	104.789	144.629
20%	25.639	4.412	1.42	113.12	160.634

CONCLUSIONS:

This study successfully developed pea protein-boosted hazelnut granola bars that offer a promising balance of protein content, texture, and shelf life. By incorporating pea protein, the researchers significantly increased the protein content compared to traditional granola bars, addressing the growing consumer demand for convenient, protein-rich, and plant-based snacks. Evaluating formulations with 10%, 15%, and 20% pea protein, the 10% variant emerged as a particularly promising option. It provided a substantial protein boost while exhibiting manageable textural changes and lower water activity, suggesting improved shelf-life stability. Further sensory testing with consumers is crucial to optimize taste, texture, and overall acceptability for successful market introduction. The findings contribute to the development of innovative, protein-rich, and sustainable snacking solutions.



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