ULST Timisoara
Multidisciplinary Conference on Sustainable Development
21-22 May 2026

2026 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT

QUALITY EVALUATION OF MUFFINS ENRICHED WITH CRANBERRIES AND CINNAMON BISCUITS

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Abstract: The use of plant-based functional ingredients in bakery products has become increasingly popular due to their nutritional benefits and consumer appeal. This study evaluated the physicochemical and sensory properties of muffins enriched with cranberry and cinnamon biscuits compared to a traditional control sample. The enriched muffins showed lower pH values and higher acidity, moisture, antioxidant capacity, and total polyphenol content. Specifically, they reached an antioxidant capacity of 83.20 μM Fe^{2+}/g and 949.0 mg GAE/100 g total polyphenols. Sensory analysis revealed a clear consumer preference for the enriched formulations, which achieved higher acceptability scores than the control sample. Improvements in taste, aroma, and texture highlight the potential of these muffins as functional and health-oriented bakery products.

• Introduction

Bakery products, especially muffins, are widely consumed due to their convenience, taste, and long shelf life. However, traditional muffins are often high in refined carbohydrates and fats and low in fiber and bioactive compounds. Increasing health awareness has encouraged the development of nutritionally improved bakery products. Natural ingredients from fruits and spices are increasingly used in baked goods to enhance antioxidant capacity, flavor, and overall quality. These functional ingredients support current consumer demand for healthier and more sustainable foods.

Although functional bakery products have been widely studied, limited research has examined muffins enriched with cranberry and cinnamon biscuits as combined functional ingredients. Most studies have focused on individual fruit or spice additions, while evaluations integrating physicochemical, antioxidant, and sensory properties remain relatively scarce.

This study aimed to evaluate the physicochemical and sensory characteristics of muffins enriched with cranberry and cinnamon biscuits compared to a control sample. Special attention was given to pH, acidity, moisture, antioxidant capacity, total polyphenol content, and sensory acceptability in order to support the development of healthier and more functional bakery products.

• Material and method

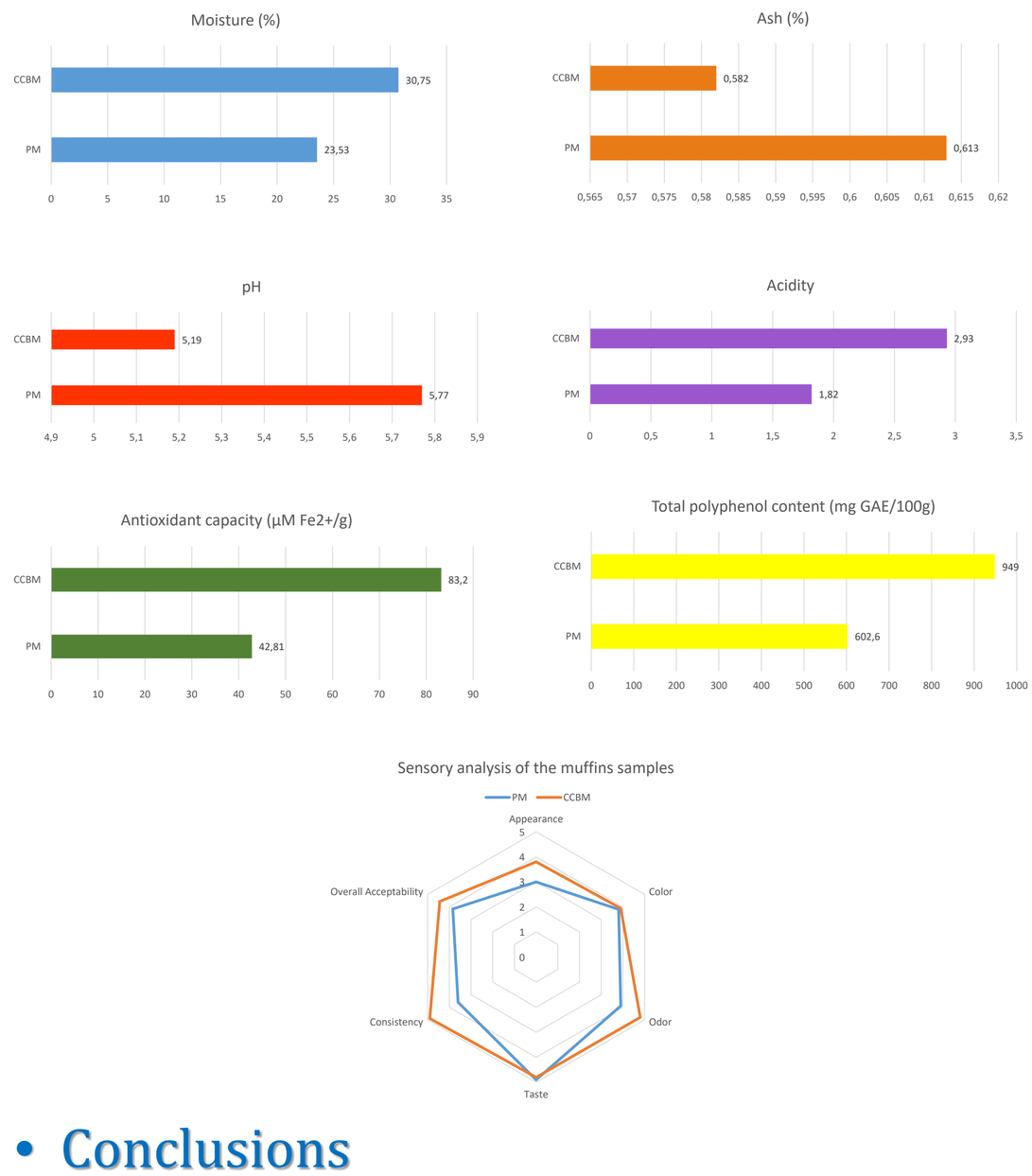
The raw and auxiliary materials used to obtain the muffins were: wheat flour type 000 (Boromir, Romania), cinnamon biscuits (Tastino, Lidl, Romania), brown sugar (Solaris, Romania), candied cranberries (Sano Vita, Romania), eggs, milk, oil, salt, baking powder, vanilla essence and powdered sugar. Some of these ingredients were purchased from supermarkets, and some came from the farms of local producers.

The recipes used to make the two types of muffins are presented below.

Ingredients	Plain muffins (PM)	Muffins enriched with cranberies and cinnamon biscuits (CCBM)
Wheat flour type 000 (g)	450	250
Cinnamon biscuits (g)	-	200
Brown sugar (g)	300	300
Candied cranberries (g)	-	100
Milk (mL)	140	140
Oil (mL)	100	100
Baking powder (g)	10	10
Salt (g)	2	2
Eggs (pieces)	6	6
Vanilla essenc (mL)	4	4
Powdered sugar (g)	10	10

• Results and discussions

The figures below show the results obtained from the physicochemical and sensory analysis of the two types of muffins: PM and CCBM.



• Conclusions

The obtained results highlight the superiority of muffins enriched with cinnamon and cranberry biscuits compared to plain muffins, both from sensory and nutritional perspectives. The enriched muffins achieved higher scores for all evaluated criteria, demonstrating increased consumer acceptability and better overall quality. They exhibited a balanced physicochemical profile, with an optimal moisture level favorable for product freshness and stability. In addition, the incorporation of cinnamon and cranberries significantly contributed to the increase in antioxidant capacity and polyphenol content, which was approximately 57% higher than in the control sample. Although the ash content was slightly lower, the enriched product stood out due to its superior functional and nutritional value, representing an attractive and healthier alternative for consumers.

Acknowledgement: This work was supported by proving the equipment's of the Faculty of Food Engineering Timișoara – "*Food Science*"- Research Center.