



QUALITY ASSESSMENT OF MUFFINS BASED ON COMPOSITE FLOURS FROM MALTED BARLEY FLOUR AND WHEAT FLOUR

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Abstract: The food industry has always been concerned with the use of non-conventional raw materials as ingredients to improve the functionality of food matrices beyond basic grains. The objective of this study is to assess the nutritional potential of specific types of MBF in developing muffin formulas with improved sensory, nutritional, functional, and technological properties. Two types of MBF, named Amber (A-MBF) and Chocolate (C-MBF), were used to replace WF in percentages of 10%, 20% and 30% (w/w), resulting in six muffin samples. A control sample was also prepared only from WF. Standard methods were used to examine the proximate composition, physical and sensory characteristics, total polyphenol content (TPC), total flavonoid content (TFC), and antioxidant capacity (AA) of the developed muffin formulas.

• Introduction

In the last decades the search for functional foods has been widely encouraged by food companies. Consumers demand of new food products not only to satisfy a physiological need but also to have healthy food with necessary nutrients to prevent nutrition-related diseases and to improve physical and mental health. In this regard, a close relation between nutrition and health has been established and functional foods containing ingredients with a specific health benefit were technologically developed.

• Material and method

Raw material and ingredients: Wheat flour (WF), Malted barley flour (MBF) and the other ingredients used in this study were purchased from local market in Timisoara town, Romania.

Production of the composite muffins: Muffin samples (control and with different substitution levels of WF with MBF) were prepared according to the AACC International Method 10-50.05 with minor modifications.

Sensory evaluation of muffins with WF and MBF. A panel of 30 panelists have evaluated muffins using a 9-point hedonic scale. The colour, aroma, taste and overall acceptability, were evaluated.

The proximate composition, physical and the total polyphenol content (TPC), total flavonoid content (TFC) and antioxidant capacity (AA) of the muffin samples using standard laboratory procedures, were evaluated.

• Results and discussions:

The results showed that the muffin sample with 20% C-MBF was the best rated in terms of sensory attributes, with the following scores: colour - 8.20, aroma - 8.44, taste - 8.25 and overall acceptability - 8.46. Data obtained from proximate composition analysis reveals the superior nutritional profile of all six MBF-added muffin samples compared to the control sample, reflected by higher ash, fibre, protein and fat content, as well as lower carbohydrate level. It was also observed that the addition of C-MBF up to 20% in the muffin recipe resulted in significantly higher levels of TPC, TFC and AA compared to the control. The results provide strong evidence for the use of BMF as a partial replacement for WF to obtain fortified muffin formulations, and these findings are useful in the development of new food products with improved functionality.



Figure 1. The assortments of muffins

Table 1. Quality attributes scored in sensory assessment of muffin samples

| Muffin samples | Sensory evaluation | | | | |
|----------------|--------------------|-------------|-------------|-------------|-----------------------|
| | Appearance | Taste | Aroma | Texture | Overall acceptability |
| CM | 7.084±0.029 | 7.061±0.065 | 7.038±0.022 | 7.301±0.139 | 7.101±0.019 |
| M10A-MBF | 8.123±0.035 | 8.120±0.077 | 8.073±0.080 | 8.201±0.118 | 8.165±0.035 |
| M20A-MBF | 8.269±0.047 | 8.256±0.087 | 8.199±0.068 | 8.139±0.165 | 8.198±0.026 |
| M30A-MBF | 8.153±0.034 | 8.129±0.057 | 8.319±0.064 | 8.116±0.105 | 8.123±0.020 |
| M10C-MBF | 8.267±0.031 | 8.367±0.031 | 8.167±0.072 | 8.214±0.143 | 8.162±0.043 |
| M20C-MBF | 8.329±0.035 | 8.506±0.044 | 8.373±0.088 | 8.176±0.101 | 8.259±0.040 |
| M30C-MBF | 8.162±0.031 | 8.329±0.063 | 8.467±0.046 | 8.143±0.121 | 8.192±0.025 |

CM - Control muffins (100% wheat flour (WF); 0% malted barley flour (MBF); M10A-MBF - Muffin samples with 90% wheat flour (WF): 10% malted barley flour Amber (A-MBF); M20A-MBF - Muffin samples with 80% wheat flour (WF): 20% malted barley flour Amber (A-MBF); M30A-MBF - Muffin samples with 70% wheat flour (WF): 30% malted barley flour Amber (A-MBF); M10C-MBF - Muffin samples with 90% wheat flour (WF): 10% malted barley flour Chocolate (C-MBF); M20C-MBF - Muffin samples with 80% wheat flour (WF): 20% malted barley flour Chocolate (C-MBF); M30C-MBF - Muffin samples with 70% wheat flour (WF): 30% malted barley flour Chocolate (C-MBF)

• Conclusions

MBF investigated in this study can be considered as suitable ingredients for muffins supplementation, due to their high nutritional value. Results from this study clearly showed that C-MBF and A-MBF can be used up to 20% to enhance nutritional value of biscuits without remarkable effect on its rheological properties and quality parameters without any effects on the other sensory attributes. This standardized recipe therefore is a step towards the further scope of experimentation and trials for a nutritious snacking option with apart from above target audience to also children, elderly, women, convalescent patients and even adults.