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NATURAL FOOD PRESERVATIVES: APPLICATION OF ROSEMARY, LEMON BALM AND OREGANO EXTRACTS IN CHOCOLATE MUFFINS

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Muffins are defined as pastry products, based on wheat flour, with sweet flavor, highly caloric, considered as a “snack” and consumed all over the world [1]. The use of preservatives in food aims to decrease or inhibit microbial deterioration, reducing the food loss [2]. However, consumption of synthetic additives is decreasing due to the increasing demand for natural alternatives, in which plants play an important role [3]. Thus, the main objective of this work was the exploitation of rosemary (*Rosmarinus officinalis* L.), lemon balm (*Melissa officinalis* L.) and oregano (*Origanum vulgare* L.) as sources of natural preservatives molecules for chocolate muffins. The work included an extraction optimization of the three plants by means of ultrasound assisted extraction; evaluation of the antioxidant and antimicrobial activities; incorporation of the optimized extracts in chocolate muffins and evaluation of the ingredients’ stability over a shelf-life of 8 days through texture and external color analysis as well as a nutritional and chemical profile (fatty acids, organic acids and soluble sugars). The preservatives were incorporated at different concentrations in different lots of muffins and compared to a commercially used synthetic preservative (potassium sorbate) as well as control samples, with no preservative. All the extracts showed high antioxidant activity, with rosemary being the most antioxidant of all three extracts. The extracts also showed stronger activity against fungal food contaminants than against bacterial, even rating better than the synthetic preservatives against *Penicillium* and *Trichoderma* species. Concerning the incorporated muffins, slight changes were found in the physical parameters and nutritional profile, while no toxicity was found for the extracts against primary cell lines, even at the highest concentration tested. This is expected, as food additives are not intended to alter food parameters beyond their intended function. A Linear Discriminant Analysis allowed to recognize the rosemary extract as the one most similar to potassium sorbate, showing close to no changes in the analyzed parameters of the muffins, thus ruling it as the best natural preservative for chocolate muffins. Still, all the three extracts showed good preservative capacity without significantly changing the muffin’s characteristics.

References

- [1] Rosentrater, K. A.; Evers, A. D. *Kent’s Technology of Cereals*, 5th ed.; Woodhead Publishing: Cambridge, UK, 2008.
- [2] Grumezescu, A. M.; Holban, A. M. *Trends in Food Science & Technology*; Grumezescu, A. M., Holban, A. M., Eds.; Academic Press: Cambridge, MA, USA, 2018; Volume 9.
- [3] Carochó, M.; Morales, P.; Ferreira, I. C. F. R. *Trends Food Sci. Technol.* 2015, 45, 284-295.

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