Characterization of muffins obtained with oleogels based on candelilla wax as a solid fat substitute

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ABSTRACT: In this study, oleogels were produced by adding organic candelilla wax in percentages of 3% w/w (DW-3), 5% w/w (DW-5) and 7% w/w (DW-7) in five vegetable oils: grape seed oil (GO), hemp oil (HO); olive oil (OO), sunflower oil (SO) and walnut oil (WO). The oleogels were then characterized physiochemically, rheological, texturally and sensorially. Organic candelilla wax influenced the oleogel formulations, giving higher values of color (L* and b*), texture, acidity index and low percentage of oil expelled from the oleogel mass. In the 5% and 7% oleogels, the brightness values decreased when the oleogel percentage was increased. The obtained oleogels were used inserted into the fluid dough to obtain muffins.

• Introduction

Oleogelation has recently received a great deal of attention in the food industry as a novel alternative technology that physically converts liquid oil into semi-solid gel. This study demonstrates the effectiveness of using oleogels from different vegetable oils and candelilla wax as solid fat substitutes in a sweet bakery product. The food industry is demanding new ways to reduce the use of saturated and trans fats in food formulations. To contribute to this search, oleogels were prepared from oil of: grape seed, sunflower, hemp, olive and walnut under optimized conditions to obtain a product with similar functionality to margarine and its potential application as semisolid fat ingredient in muffins. Muffins formulated with oleogels showed improved quality compared to those made using a commercial margarine, with the added benefit of a healthier nutritional profile.
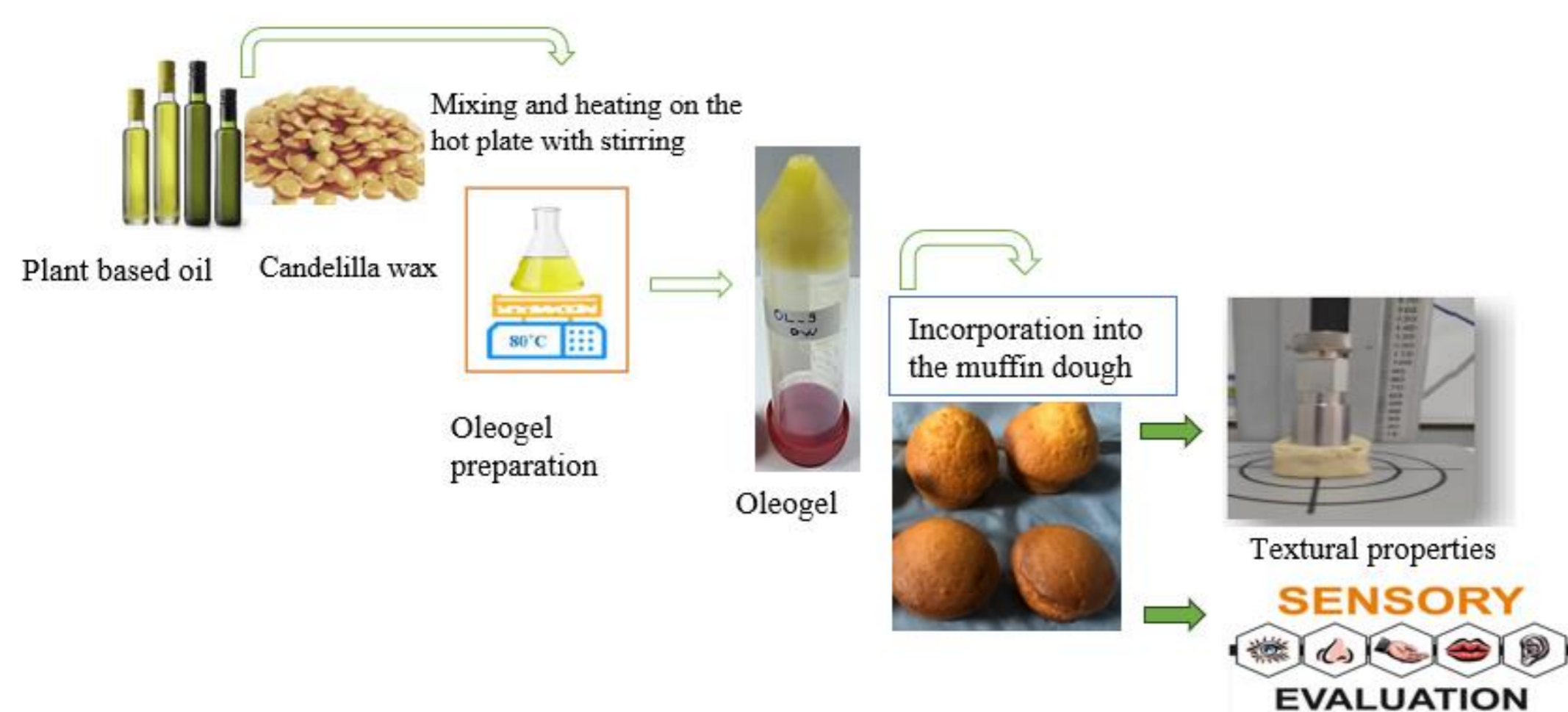
The muffins formulation was composed of 100 g hard wheat flour, 20g butter/oleogel blend, 15 g sugar, 7 g whole egg, 6 g whole milk powder, 2.0 g baking soda, 1.5 g salt, and 44 g water. The optimum mixing time and water absorption were determined from the Mixolab experiments. KitchenAid mixer (National Mfg. Co. Lincoln, NE, USA) was used to prepare dough, was dosage into 100 g pieces. The dough samples were baked in an oven (top 160 °C/bottom 180 °C) for 30 min, followed by cooling at room temperature for 60 min.

• Analysis of oleogels - acidity index, color, texture and rheology
• Analysis of muffins - texture and sensory

• Results and discussions

A. Obtaining oleogels - oleogels were obtained from the vegetable oils used: GO, HO, OO, SO, WO and candelilla wax (DW) in doses of 3, 5 and 7%, according to figure 1.
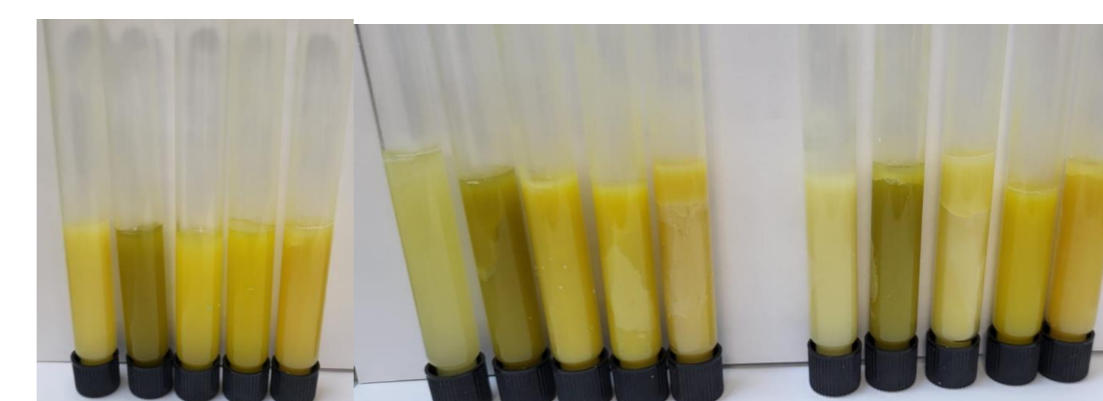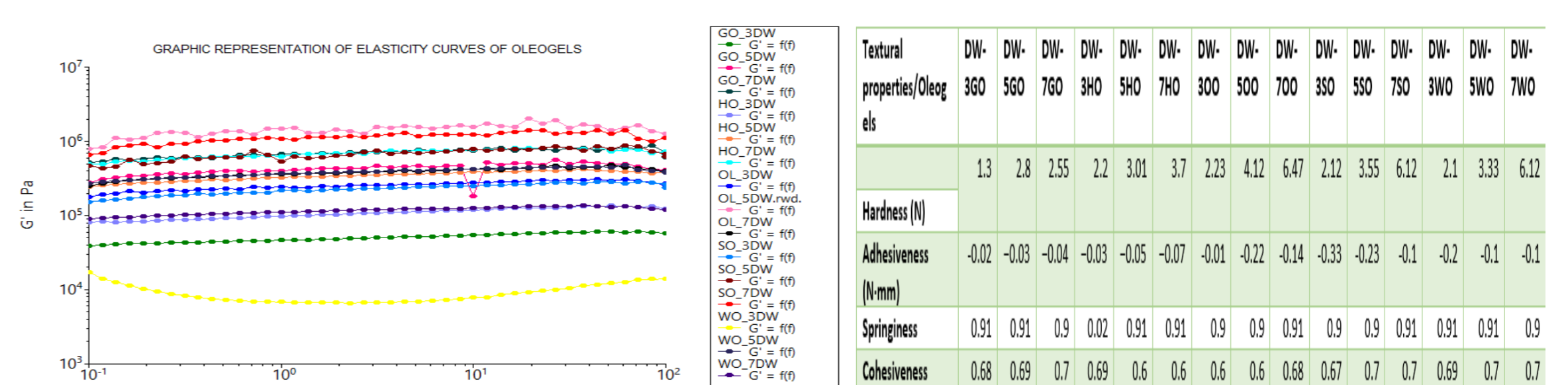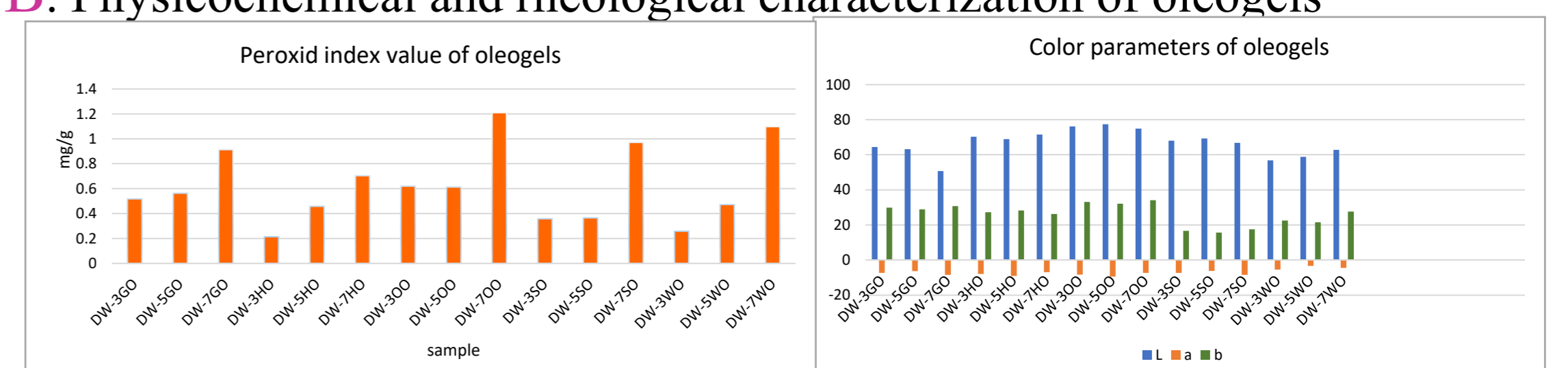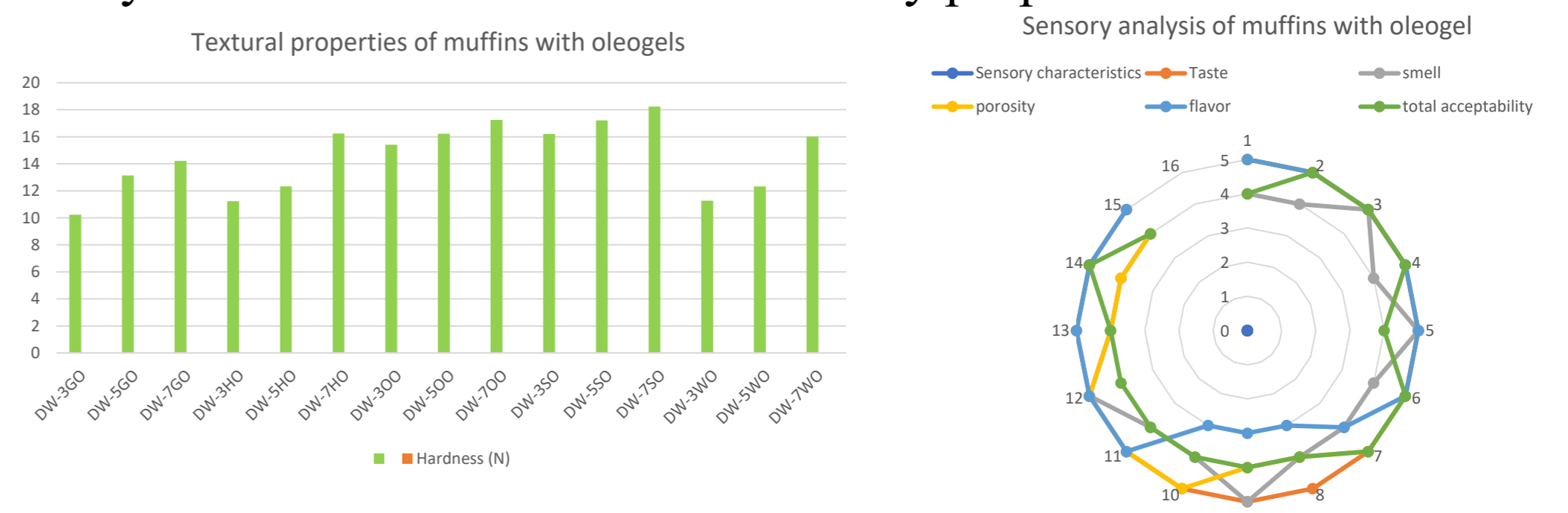

Figure 1. Oleogels samples

B. Physicochemical and rheological characterization of oleogels

C. Analysis of muffins - texture and sensory properties

• Conclusions

• The use of oleogels to obtain muffins contributes to the nutritional superiority by reducing the saturated fat content. Since oleogel has received considerable attention from the scientific and industrial communities, the application of oleogel to sweet pastry products could offer the possibility of replacing margarine because oleogelation is a simple method and the finished product presents textural and sensory properties appreciated by evaluators. The processing of oleogel in pastry products is encouraging because oleogel has a structure similar to solid fats and in the future the food industry will probably extend the application of oleogels to a greater variety of pastry products.