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## Bread with stoned table olives – the union of two traditional products of excellence of Trás-os-Montes region, Portugal: preliminary results

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### ABSTRACT

The aim of the present work was to conduct a preliminary study on characterization of wheat bread with stoned green table olives, also called "alcaparras", in order to obtain a produce that join two traditional products of excellence from Trás-os-Montes region, Northeast of Portugal. "Alcaparras" are processed from healthy green or yellow-green olives, which are broken using a wooden hammer separating the pulp of the core. The pulp is sliced into two approximately equal parts perpendicularly to the major axis of the fruit and placed on water, which is changed three to four times during a week. This treatment has the purpose of removing olive bitterness. Afterwards the product is stored in brine until consumption.

Wheat breads were prepared with different percentages of "alcaparras": 0, 3, 5 and 7% and stored at 25 °C for 4 days, being analysed every two days, regarding pH, ash, fat and salt contents, as well as mesophiles, moulds and yeasts. The physicochemical determinations were only made at 0 and 2 days because after the fourth day the bread had developed moulds. The breads presented pH values between 5.85-5.96, salt 0.51-1.01% (d.w.–dry weight), ash 2.13-2.77% (d.w.) and fat 2.00-3.78% (d.w.) contents. The breads with the highest "alcaparras" percentage presented the lowest pH value and the highest salt and ash contents. As expected the breads with the lowest fat content were those without "alcaparras". The mesophiles varied between 1.3-7.4 log UFC/g (f.w.), and moulds and yeasts between <1 to 5 log UFC/g (f.w.), being the highest values obtained at the end of storage. In conclusion, bread with "alcaparras" is a promising product to be sold in gourmet shops; however, more studies are needed to increase its shelf-life. The inclusion of "alcaparras" in traditional breads is also an innovative strategy to valorise two different food products at once.

*Keywords: "alcaparras"; bread; chemical analysis; microbiological analysis.*

### INTRODUCTION

Bakery products are fundamental to the worldwide diet, being flour, drinking water and yeast the main ingredients. Wheat is the cereal most used in baking. According to the Portuguese Ordinance No. 52/2015 of 26<sup>th</sup> February, which describes the characteristics that different types of bread and bread products have to follow and regulates marketing aspects, "bread" is "the product obtained from wheat, rye, triticale or corn flours, singly or mixed, in accordance with the legal established types, drinking water and yeast, after kneading, fermentation and baking, under suitable conditions, being possible to use salt and other ingredients, including additives, as well as processing aids".

Due to the demand of new flavors by consumers, who are also more aware and concerned about their health, the production of new types of bread with other ingredients has increased. Thus, the main objective of this study was to develop and characterize in chemical terms wheat bread with "alcaparras", following the traditional recipe of the "Transmontano" bread, associating in this way two products of excellence of Trás-os-Montes region, Northeast of Portugal.

## MATERIALS & METHODS

In the present work, breads with 0, 3, 5 and 7% (m/m) of "alcaparras" were produced, using only wheat flour in their formulation and following the recipe of "Pão de Gimonde" bakery. The breads were produced in this enterprise's plant. At 0, 2 and 4 days several parameters were determined as described below.

The pH values were determined with a pH electrode connected to a potentiometer, calibrated with buffer solutions of pH 4.01 and pH 7.01. The ash content was determined after incineration of the sample in a muffle furnace at a temperature of 550-600 °C until obtaining white ashes. The fat content of the bread was determined by the acid hydrolysis method, in which solvents (diethyl ether and petroleum ether) were used to extract the fat. After removing the solvents by evaporation, the extracted fat was quantified by weighing. The salt content was determined by titration with silver nitrate and potassium thiocyanate. Simultaneously, the mesophiles, yeasts and molds counts were determined. Mesophiles were determined by the ISO 4833: 2003. The molds and yeasts were determined by ISO 7954: 1998.

## RESULTS & DISCUSSION

Figure 1 shows the pH values, salt, ash and fat contents (expressed in dry weight) of the bread formulations with 0, 3, 5 and 7% of "alcaparras", right after the end of baking and after 2 days of storage. The chemical data of the fourth day were not determined because the bread showed mold growth on the surface, not being suitable for consumption.

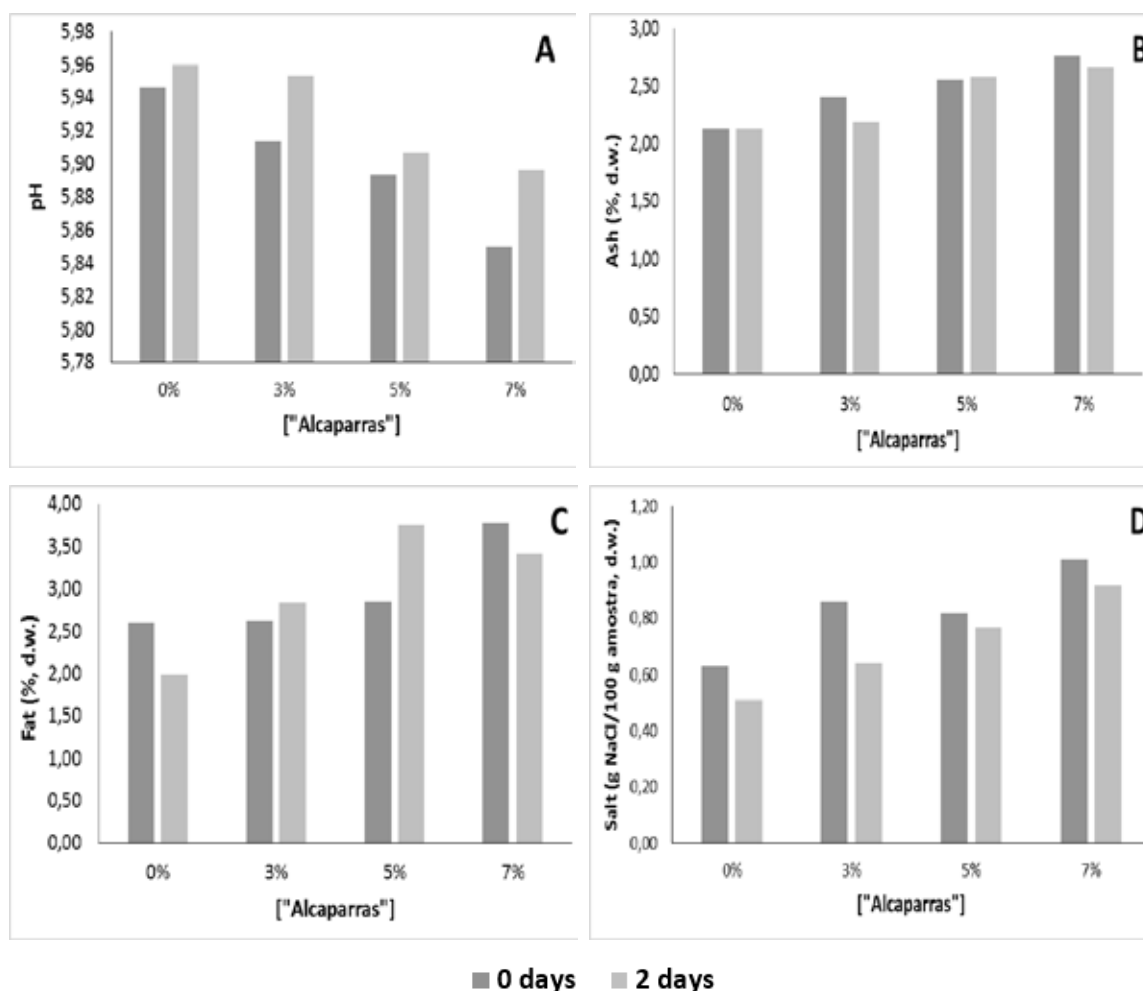


Figure 1: Chemical parameters determined in the bread with "alcaparras" for 0 and 2 days of storage: A) pH; B) Ash; C) Fat; and D) Salt.

The pH of the samples varied significantly between 0 and 2 days, increasing the pH value with time. By increasing the "alcaparras" percentage, a decrease in the pH value was observed due to the lower value determined in "alcaparras" (4.97). For ashes, the values ranged between 2.13 and 2.77% (d.w.), being observed an increase for the higher "alcaparras" percentages (5 and 7%), due to the greater percentage of ash on "alcaparras" (6.36%, d.w.). In terms of fat, the contents ranged between 2.00 and 3.78% (d.w.), increasing with the addition of "alcaparras" that have a high fat content (8.97%, d.w.). The salt contents were different among the samples, being the highest value (1.01 g NaCl / 100 g sample, d.w.) determined in the bread with 7% "alcaparras" and the lowest (0.51 g NaCl / 100 g sample, d.w.) in the bread without "alcaparras". These results can be explained by the high salt content of "alcaparras" (5.45 g NaCl / 100 g sample, d.w.).

Regarding microbiological results (Figures 2 and 3), at 0 days the microbial counts were identical in all analyzed breads. However, from 0 days to the fourth day, a significant increase in mesophiles counts were observed, being determined unsatisfactory values in the fourth day for all microorganisms analyzed. However, on the second day the results were still acceptable according to Santos et al. (2005), taking into account the limits for ready-to-eat products.

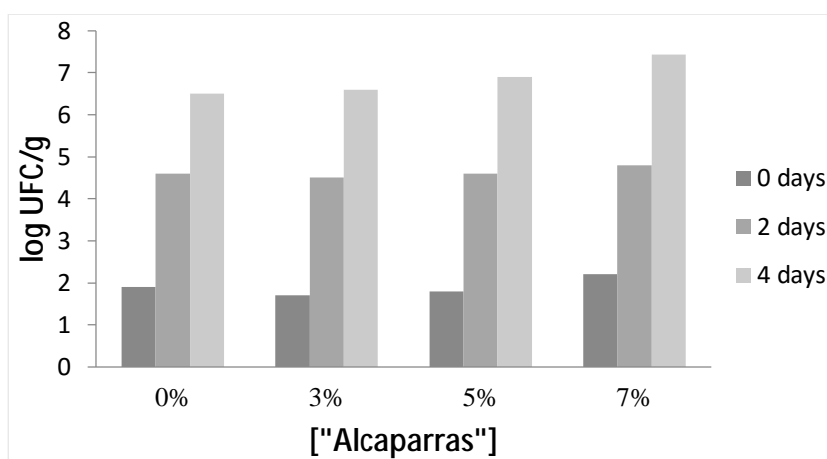


Figure 2: Evolution of total microorganism counts at 30 °C (log UFC/g) in the breads produced in the present work.

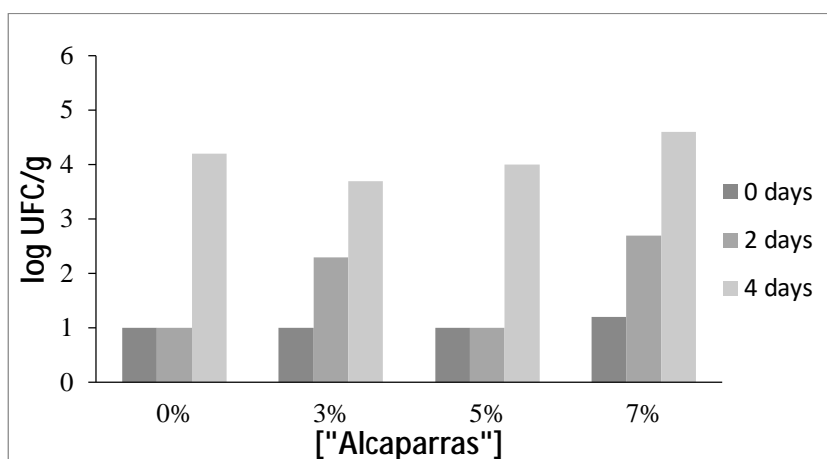


Figure 3: Evolution of yeasts and molds (log UFC/g) in the breads produced in the present work.

## CONCLUSION

In general terms, a higher percentage of "alcaparras" (7%) produced breads with lower pH values and higher ash, fat and salt contents compared to the control (0% "alcaparras"). With regard to shelf life, after 2 days of storage the bread was still acceptable; however, after this period it was observed microbial growth, making the product unsatisfactory.

## ACKNOWLEDGEMENTS

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