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Microbial challenge testing for Aloreña De Málaga table olive brines

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INTRODUCTION

Table olives are considered as a ready-to-eat product that is consumed without prior cooking. The control of the microbiota is essential in the elaboration and before packaging in order to guarantee the stability and safety of the final product, especially Aloreña de Málaga table olives where a heat treatment is not supported. The predominant microorganisms in table olives are lactic acid bacteria and yeast, however the presence of pathogenic bacteria have been found in table olives preparation of several countries (Medina-Pradas & Arroyo-López 2015).

GOALS

The present survey aims to determine the survival of diverse foodborne pathogens (*Escherichia coli*, *Sthaphylococcus aureus*, *Listeria monocytogenes*, and *Salmonella enterica*) in the packaging brines of ready-to-eat Aloreña de Málaga table olives.

MATERIAL AND METHODS

This work was carried out with commercial seasoned cracked *Aloreña de Málaga* olives including the 3 PDO *Aloreña de Málaga* preparations: traditional (Trad), cured (CUR-A and CUR-B), and fresh green (Fresh) (Fig. 1). Four strains of each pathogenic species *L. monocytogenes*, *S. aureus*, *E. coli* and *S. enterica* were inoculated as a cocktail in the brines. The volumes were calculated to obtain ca. 8 log CFU/mL of each strain as initial inoculums brines and the microbial growth was monitored by plating on their appropriate media (Fig. 1).

In parallel, the original olive brine (100%) from cured *Aloreña* olives was then diluted to reach final concentration of 75, 50, 25 and 10 % (Fig. 1). Levels of pH, salt, and sugar concentrations in the different dilutions and control were always kept constant by addition of HCl, NaCl, and reducing sugars respectively. Therefore, the described above media only differed in the levels of phenolic compounds, which were proportional to the dilution factors.

Composition in phenolic, oleosidic compounds and reducing sugars was measured by HPLC according to Medina et al. (2013). Also, salt, pH, titratable and combined acidity were also determined in brines.

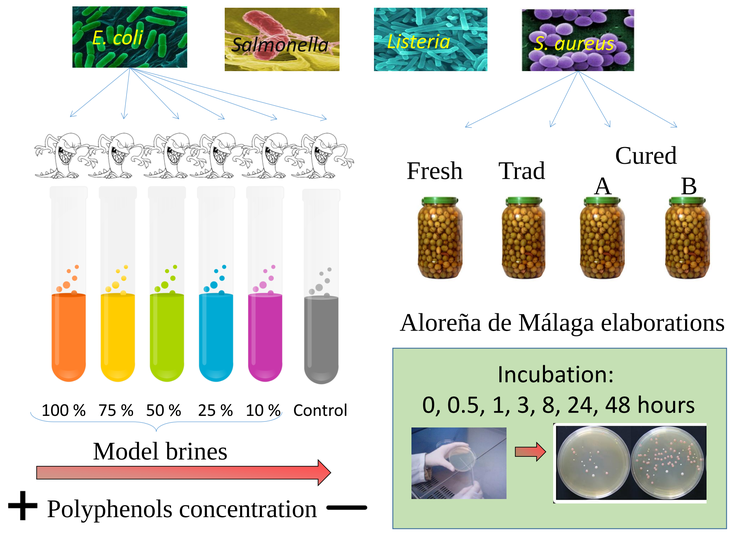

Fig. 1: Work flow schematic for the experimental approach.

RESULTS AND DISCUSSION

The decline of pathogen populations was variable depending on the composition of the olive brines in phenolic compounds, especially the dialdehidic form of elenolic acid free (EDA) or linked to hydroxytyrosol (HyEDA) (Medina et al., 2013). In fact, the brines tested are less inhibitory when brine dilutions are between 75 and 25 %, which correspond to a 0.10 - 0.035 mM concentration rage of HyEDA and the time needed to reach the 4 $\log_{10}$ reduction is longer. Thus, HyEDA concentration found in this olives brine can explain by itself the bactericidal effect exerted against the pathogens tested. The total inhibition of pathogen in the brine model system was obtained in less than 24 h for all species (Medina et al., 2016).

Furthermore, studies carried out in real olive packaging confirmed these results. Initial population of inoculated microorganisms were rapidly inactivated in the first 24 hours and not detected after 48 hours. Partial Least Squares regression showed that the inhibition of microorganisms was related with the concentration of phenolic compounds, especially EDA, HyEDA, hydroxytyrosol 4-glucoside, and oleoside 11-methyl ester.

The response of foodborne pathogens was different in traditional and fresh green *Aloreña de Málaga* packaging. *S. aureus* was the most statistically resistant microorganism in fresh green packaging, while *L. monocytogenes* and *S. aureus* also showed high resistance in the traditional packaging (Fig. 2).

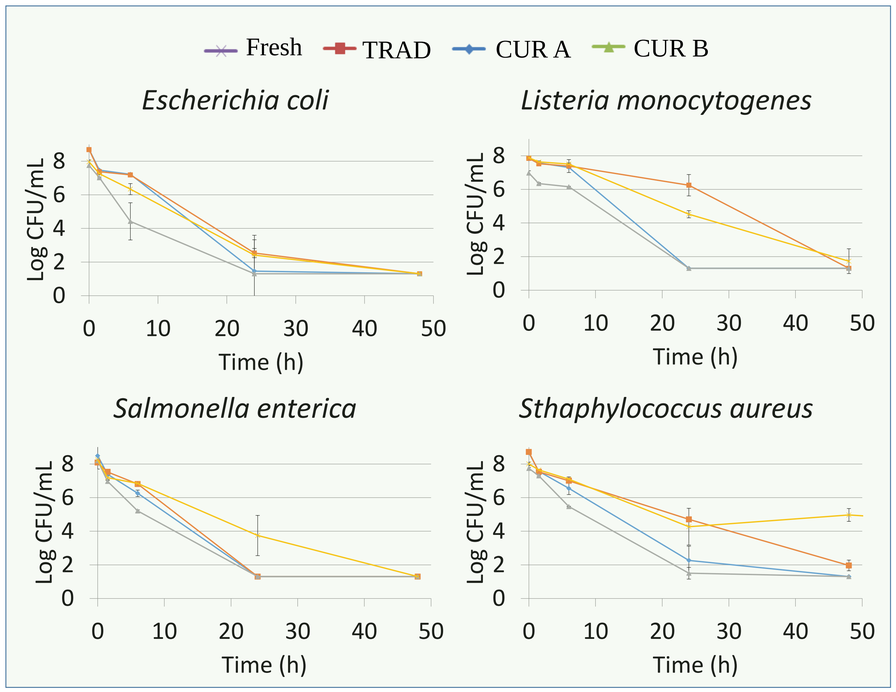

Fig. 2: Pathogens survival in real Aloreña Table Olives packaging

CONCLUSION

Aloreña de Malaga olive brines provide a non-appropriate habitat for the development of foodborne pathogens microorganisms and ensure that table olives are safe for consumer`s health.. The inhibitory power of olive brines was statistically related to the concentration of certain phenolic compounds.

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