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ANTIFUNGAL ACTIVITIES OF NANO-CRYSTALLINE AND MICROMETRIC CAO, MGO AND ZNO

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ABSTRACT Nano-crystalline metal oxides (CaO, MgO and ZnO) and micrometric metal oxides were evaluated for their lethal effect on yeasts (S. cerevisiae and C. tropicalis) and fungal spores (A. niger, P. variotii and Byssochlamys sp.) and growth inhibitory effect on yeasts and fungi, which are involved in the spoilage of fruit juices and drinks. The effect of exposure time, pH, concentration and particle size of metal oxides were examined. The lethal effect was determined by exposing yeast cells or fungal spores to specific concentrations of metal oxides in isotonic water for 48h or 96h. Growth inhibition was carried out in PDB. The viable cells were counted on culture media. Fungal growth was assessed by dry weight of the mycelium. The results showed that CaO, MgO and ZnO have the ability to kill and inhibit the growth of yeasts to various degrees. Although they did not exhibit any significant lethal effect on fungal spores or ascospores of Byssochlamys sp., they inhibited fungal growth. While CaO was effective against yeasts, due in part to its high alkalinity, but it was also less effective in inhibiting the growth of fungi, particularly A. niger. ZnO was effective in inhibiting completely the growth of fungi even at 100 ppm. Overall, there was only a small effect of concentration or particle size of metal oxides on their antifungal effect, but exposure time had an impact. This suggests that the contact of the oxide particles with the microbial cell appears to be a key factor on their antifungal efficacy.

Keywords: Nano-crystalline metal oxides; Micrometric metal oxides ; Yeasts ; Fungal spores; Lethal effect.