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Effect of the support material and storage conditions of immobilized lactic acid bacteria on malolactic fermentation of white wine

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In this work, the lactic acid bacterium *Oenococcus oeni* was immobilized on three different natural materials (namely corn cobs, grape skins and grape stems) and used to induce malolactic fermentation in white wine. Additionally, the biocatalyst reuse after different periods of storage in cold or in hot environments was also evaluated. The resistance of the immobilized lactic acid bacterium against inhibitors was determined by performing the MLF in presence of high SO_2 concentration. Immobilization occurred in situ during the fermentation, which was performed in 500 mL Erlenmeyer flasks containing 6 g of support material, 1 g/L cells of *O. oeni* and 200 mL of complex medium. Fermentations were carried out in duplicate, and samples were taken periodically for the estimation of glucose, fructose and malic acid consumption, and lactic acid production. At the end of the fermentation (16 h), since all the assays presented similar results, different strategies were adopted. One of them consisted on the recovery of the corn cobs with immobilized cells, and subsequent storage of this biocatalyst at 5 ºC during 31 d. The flasks containing grape skins and stems were directly stored at 25 ºC during 27 d and 37 d, respectively. After these periods, the support materials with immobilized cells were recovered, washed with sterilized distilled water and added to 200 mL of white wine for conducting MLF, which was performed during 18 d. Subsequently, the biocatalysts were recovered, washed and added to 200 mL of white wine for conducting MLF in presence of 32 mg/L of free SO_2, which was maintained during 17 d. Malic acid consumption and lactic acid production was observed during all the MLF, independently of the used support material. However, fermentation runs with cells immobilized on grape skins gave the best results, providing the highest lactic acid concentration and also high conversion of malic acid. The presence of high SO_2 concentration (32 mg/L) did not affect the conversion of malic acid for cells immobilized in grape skins and stems, and gave similar results of produced lactic acid (3.60 g/L and 2.90 g/L, for grape skins and stems, respectively). The presence of high SO_2 concentration strongly affected the conversion of malic acid by cells immobilized on corn cobs. *Oenococcus oeni* immobilized on grape skins and grape stems can be successfully used on MLF even after long periods of storage at 25 oC, and in the presence of high SO_2 concentration.