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The use of co-immobilized *Saccharomyces cerevisiae* and *Oenococcus oeni* cells for wine fermentation

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Malolactic fermentation (MLF) usually takes place after the end of alcoholic fermentation (AF), but winemakers has shown great interest about co-inoculation of yeast and malolactic bacteria at the beginning of AF. In recent years, the use of immobilized cell systems has been investigated in some fermented foods. In this study we have produced a mixed starter co-immobilization of *Saccharomyces cerevisiae* and *Oenococcus oeni* in alginate beads and used it in microvinifications tests.

O. oeni and *S. cerevisiae* strains were immobilized in alginate beads and used to ferment Negroamaro must. Molecular approaches were used to check the dominance of starters and cell leaking from beads. The process was monitored by chemical and sensorial analyses.

Co-immolization of *S. cerevisiae* and *O. oeni* allowed to perform a efficient fermentation process, producing low volatile acidity levels and ethanol and glycerol concentrations comparable with tjhose obtained by cell sequential inoculum and co-inoculum in free form. Co-immobilization strategy allowed to obtain a wine with organoleptic features improved in comparison with that produced with the co-inoculation and the sequential inoculation strategies in free form. Co-immobilization of yeast and bacteria produced a significant decrease of the time requested to complete AF and MLF. The immobilized cells could be efficiently reused for the wine fermentation three times without any apparent loss of cell metabolic activites.

Co-immobilization strategy allows to produce an integrated biocatalytic system able to perform simultaneously alcoholic and malolactic fermentation. The use of immobilized-cell systems offers many advantages over conventional free cell fermentations, including: (i) prolonged activity and stability of the biocatalyst; (ii) elimination of non-productive cell growth phases; (iii) feasibility of continuous processing; (iv) regeneration and re-use of the biocatalyst.

KEYWORDS: Wine fermentation, *Saccharomyces cerevisiae*, *Oenococcus oeni*, Co-immobilization, biocatalyst

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