



Application of immobilized microorganisms on oak chips for still and sparkling wine production



UNIVERSITAT
DE VALÈNCIA

R+D RESULT

Patent

Knowledge area

- Microbiology
- Oenology
- Biotechnology
- Food

Collaboration

- Technology available to licensing
- Other collaborations may be considered

Ref. OTRI

201415R- Pardo, I.

Wood chips with immobilized microorganisms.

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Background: The winemaking or vinification process includes two steps carried out by microorganisms, the alcoholic fermentation (AF) and the malolactic fermentation (MLF). Yeasts, mainly *Saccharomyces cerevisiae*, perform AF. In this fermentation, sugars are converted into ethanol. MLF is carried out by lactic acid bacteria (LAB) and involves the transformation of L-malic acid present in wine, into L-lactic acid and CO₂. Usually, MLF occurs once AF has ended, but the new trend is to perform both processes simultaneously by co-inoculating yeasts and LAB, which considerably reduces the time of the winemaking process. During the aging process in wooden barrels, wine undergoes major physical and chemical changes of oxidative nature, which improve its organoleptic characteristics. These modifications involve polymerization of polyphenolic compound, mainly tannins, and transfer of oak wood compound to wine. This stage of aging in wooden barrels makes wine production much more expensive due to the price of the barrels and to the time required for aging. In recent years, alternatives to barrel aging have emerged, one of them is the use of oak wood chips which are introduced during or after AF. This new technique allows achieving the benefits of barrel aging but in less time and is less expensive.

On the other hand, during the production of sparkling wines, yeasts perform two successive fermentations, the first takes place in vats and the second in bottle. Yeasts that have finished the second fermentation are removed by disgorging the bottle.

Immobilization of yeasts and/or bacteria on oak wood chips provides many advantages to winemaking of still and sparkling wines: the immobilization support protects microorganisms, mitigating the loss of activity thereof and, consequently, and reduces vinification time. Furthermore, this immobilization allows easy removal of microorganisms once finished the fermentation and improves organoleptic properties of the final product.

The invention: Researchers from the University of Valencia have developed a new method for immobilizing bacteria, yeasts or both types of microorganisms on oak wood chips coated with starch gel. Yeasts and bacteria can be immobilized separate or jointly depending on the winemaker's interest in developing AF and MLF successive or simultaneously. The co-immobilized yeasts and malolactic bacteria allow the simultaneous performance of the AF and MLF, thereby shortening the length of winemaking process. In addition, the oak wood chips provide new flavours and bouquet to wines. Yeasts used for a second fermentation of sparkling wines can be immobilized on these oak chips, facilitating their removal and bringing new organoleptic characteristics to the final product.



Oak wood chips

Applications: The main application of this invention is in the field of enology, particularly in the winemaking process to carry out the following fermentations:

- AF in red or white grape musts, with organoleptic contribution from wood.
- MLF in red or white wines, with organoleptic contribution from wood.
- Simultaneous AF and MLF in vinification of red or white grape musts, with organoleptic contribution from wood.
- Second AF in sparkling wines and champagnes, with organoleptic contribution from wood.

Advantages: The main advantages provided by this technology are:

- Development of guaranteed AF and MLF in still wines more rapidly than using free cells.
- Performing AF and MLF simultaneously in still wines.
- Confer flavour and bouquet of oak wood to wine. The use of oak wood chips reduces the time necessary to achieve this objective, compared to the barrel aging.

OTRI oficina de transferència
de resultats d'investigació

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- Simplification and reduction of time and costs of the winemaking process.
- Oak wood chips, natural immobilizing supports, are already recognised as a safe product for oenology by the International Organization of Wine and the European legislation.
- Facilitate second AF and yeast removal in sparkling wines without necessity of adding adjuvants, such as bentonite.

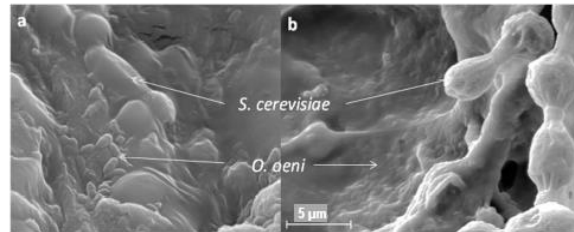


Image of a co-immobilized culture of *S. cerevisiae* and *O. oeni* on oak wood chips