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APPLICATION OF IMMOBILIZED MICROORGANISMS ON OAK CHIPS FOR STILL AND SPARKLING WINE PRODUCTION

INVENTION DESCRIPTION

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, mainly *Oenococcus oeni*, and involves the transformation of L-malic acid present in wine, into L-lactic acid and CO₂. To ensure that these fermentations take place in the proper form, commonly previously selected starter cultures are used. Usually, MLF occurs once AF has ended, but the new trend is to perform both processes simultaneously by co-inoculating yeasts and lactic acid bacteria for AF and MLF occur simultaneously, 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 bottles. 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.

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.

BUSINESS APPLICATION SECTORS

The invention has a wide application in the field of oenology in general, both in winemaking processes on an industrial scale of still wines (red and white) and sparkling wines (cavas and champagnes).

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

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.



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- 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.
- 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

DEVELOPMENT STATUS OF TECHNOLOGY

The technology has been validated in the laboratory and also in semi-industrial scale in wine cellars, and currently still working on the several applications of it.

INTELLECTUAL PROPERTY RIGHTS

The technology is protected through the following patent:

Spanish patent application P201531943, titled "Virutas de madera con microorganismos inmovilizados".

COLLABORATION SOUGHT

- License agreement, manufacturing or marketing.
- R & D project to complete the development or apply to other sectors.
- Subcontracting agreement with another company.

RELATED IMAGES



Oak wood chips

CONTACT

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