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Carboxylic Acid Transporters and Their Functions

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Abstract

In aqueous structures, such as wine, carboxylic acids partly dissociate, forming equilibrium between uncharged molecules (undissociated form) and their anionic form, depending on the medium pH and pKa. This property has an impact on yeast cell behaviour, particularly the mechanisms that allow molecules to cross biological membranes. Wines can contain an unhealthy amount of organic acids on occasion. They can seem unbalanced in the mouth, and unnecessary sourness will detract from their consistency. Furthermore, these acids, which come from grapes or the fermentation process, have a detrimental effect on wine yeasts, the yeast fermentation process, and the consistency of the final wine. L-malic acid and acetic acid are two of these acids. The first affects the wine's taste predominantly, rendering it overly sour; the second, being a volatile compound, affects the wine's taste primarily, making it excessively sour; and the third, being a volatile compound, affects the wine's taste in addition to the excessive sourness. It also imparts an unwanted vinegar taste to the wine. Biological deacidification by Saccharomyces and non-Saccharomyces wine yeasts is one solution to this problem. Wine bio-demalication (malic acid bio-degradation) and wine biodeacetification are terms used to describe these biological mechanisms of wine acidity bio-reduction (acetic acid consumption by yeasts).

Introduction

The chemical composition of the grape, especially in organic acids, has an impact on the final wine's quality and flavour. While certain acids are produced during wine fermentation, it is during this biological phase that winemakers must intervene in order to produce a wine with the proper acidic balance. When present above his detection threshold, acetic acid, which is produced during yeast metabolism (fermentation) and also, among other things, during the metabolism of acetic and lactic acids, has a negative effect on yeast fermentation production and affects wine quality. Biological deacidification by yeast and bacteria is considered the most natural strategy for lowering high acidity in dry wines. Since lactic acid bacteria (LAB) may absorb malic acid and convert it to lactic acid, malolactic fermentation (MLF) is the most popular form of biological deacidification or demalication. In contrast to malic acid, it is smoother in the teeth. Malic acid can also be degraded by non-Saccharomyces yeasts including Schizosaccharomyces pombe and Lachancea thermotolerans. The first converts it to ethanol through malo-ethanolicdeacidification , while L. thermotolerans produces lactic acid, allowing the wine to reach its maximum acidity and flavour potential. All bio-demalication methods stop using LAB strains, resulting in fruitier wines with lower levels of acetic acid and biogenic amines. Non-Saccharomyces yeasts, on the other side, have a limited alcohol threshold, so it's better to use them in conjunction with Saccharomyces cerevisiae strains to end wine fermentation [1-3].

Conclusion

Malolactic fermentation by Lactic Acid Bacteria strains has become the standard method of biological demalication used by winemakers. Subproducts such as acetic acid and biogenic amines, on the other hand, may be produced during malolactic fermentation, imprinting the wines with undesirable and even harmful characteristics. One of the promising enological steps in enhancing wine quality is the use of wine yeast strains in the demalication process. Biological deacetification is the same way. The efficiency of the deacetification process is dictated by the yeast strains used, which contributes to higher-quality wine. Studying the pathways involved in yeast carboxylic acids transporters, and how they act in response to environmental changes such as carbon source supply, is one step toward enhancing biological demalication deacetification extracellular pH and acid stress conditions.

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