Exploiting the buttery attribute of wine through diacetyl management

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Poster Abstract

Malolactic fermentation (MLF) is not only the simple decarboxylation of malic acid to lactic acid and CO₂. Malolactic fermentation has been shown to improve organoleptic characteristics and to provide biological stability in the final product. Diacetyl is a major flavour metabolite produced by lactic acid bacteria. Diacetyl, acetoin and 2,3-butanediol originate from the bacterial consumption of mainly citric acid and are of considerable significance to the flavour profile of wine. In concentrations less than 2 mg/L these compounds are felt to add complexity to the wine flavour. At concentrations in excess of 5 mg/l, diacetyl can be overpowering, giving the wine a distinct buttery/nutty flavour.

Different factors can affect the formation and concentration of diacetyl in wine. These include malolactic (ML) bacterial strain, wine chemical and physical parameters (pH, temperature, citric acid, sulphur dioxide, contact with air and the presence of yeast lees. Finally, inoculation dosage and timing of the inoculation with malolactic starter cultures affects the final perception of “butteryness” in a wine. Simultaneous inoculation of yeast and ML bacteria, so-called co-inoculation strategies, allow an acclimatization of the ML bacteria during alcoholic fermentation and an early start of malic acid degradation towards the end or immediately after alcoholic fermentation, when yeast cells are still alive. Under the reductive conditions generated by active yeast cells, diacetyl is reduced to acetoin then 2,3-butandiol. Compared to diacetyl, 2,3-butandiol has a much higher taste threshold and consequently, results in a wine with less lactic and buttery flavours. Our studies have shown that simultaneous fermentations often result in more fruit-driven wine styles as opposed to lactic, buttery, nutty styles that result when MLF occurs on completion of alcoholic fermentation. Various factors are involved; our studies show combinations that are favourable to achieve diacetyl levels with positive stylistic implications.

Keywords: malolactic fermentation, diacetyl, buttery flavour, co-inoculation

Topic area: Wine Technology