EFFECTS OF ETHANOL, SUGAR AND POTASSIUM SORBATE ON *SACCHAROMYCES CEREVISIAE* GROWTH IN WHITE WINE USING RESPONSE SURFACE METHODOLOGY

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Abstract

Due to their optimal fermentation capacity, *Saccharomyces cerevisiae* yeasts are traditionally regarded as valuable contributors to wine formation. However, in some cases, these yeasts may act as a causative infectious agent and thus, be responsible for undesirable changes and depreciation of overall quality of wine. Reported spoilage activities of Saccharomyces cerevisiae concern their negative impact primarily on sweet and semi-sweet wines causing re-fermentation related to unacceptable turbidity and gassiness formation and sometimes explosion of packages. Aim of current study was to determine single and simultaneous effect of practical concentrations of invert sugar, ethanol, potassium sorbate and sulfur dioxide on *Saccharomyces cerevisiae* growth in white wine and to establish a mathematical model describing adequately the individual strain behavior as function of milieu variables.

Spoilage yeast strain *Saccharomyces cerevisiae* strain Dimyat isolated from white wine was maintained in peptone yeast extract agar medium. Single facture experiments were conducted to study individual influence of factors - invert sugar, ethanol, potassium sorbate and SO_2 concentrations on *Saccharomyces cerevisiae* growth. Optimal composite design (OCD) was designed to describe simultaneous influence of variables: sugar, ethanol and potassium sorbate on *Saccharomyces cerevisiae* growth.

In studied conditions, single facture experiments showed that *Saccharomyces cerevisiae* strain manifested a strong ability to tolerate very high sugar concentrations (20 - 50 g/L) and simultaneously to keep growing even in low wine sugar concentrations (3 g/L). On the whole the ethanol concentrations 10-14% (v/v) did not inhibit the stress recovery of *Saccharomyces* yeasts. In study of single influence of preservatives, an effective weapon to counteract the yeast spoilage was the addition of 200 mg/L potassium sorbate.

Applied response surface methodology (RSM) methodology revealed that between factors, potassium sorbate had the most significant impact on *Saccharomyces cerevisiae* yeast growth. When added 200 mg/L, potassium sorbate in combination with sulfur dioxide 100 mg/L, a strong suppressive effect was observed and no augmentation in initial cells concentration was registered regardless the ethanol and the invert sugar concentrations. This gives ground to conclude that wines with parameters within the limits we use, can be protected from *Saccharomyces cerevisiae* spoilage by the addition of preservatives, respectively 200 mg/L potassium sorbate and 100 mg/L total sulfur dioxide applied in combination.

Key words: *Saccharomyces cerevisiae, Wine, RSM, Medium conditions.*