**Vinifera master thesis abstract**

**Thesis title:**
**Modeling fermentation behavior of *Candida zemplinina***

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**Abstract**

**Background:** Since the 1980s the alcohol content in the wine increased about 1% per decade. *C. zemplinina* is an osmotolerant, psychrotolerant and highly fructophilic yeast that exhibits a low ethanol yield as compared with *Saccharomyces* species. This is also one of the most abundant species found during the early phase of spontaneous fermentation. Its enological use is limited due to the strong competition imposed by *Saccharomyces*. Concomitant or sequential inoculation of *C. zemplinina* and *S. cerevisiae* could be applied in order to reduce ethanol content The aim of this study was to better understand *C. zemplinina* fermentation behaviour regarding the sugar concentration present in the must.

**Methods:**
A central composite design (CCD) was used to estimate the significant effect of sugars concentration and time on main chemical components such as glucose, fructose, malic acid, ethanol, acetic acid and glycerol. Experiments were conduced in a pasteurized *Barbera* cv must in sterile condition with six selected strains. The sugar concentrations were comprised between 200 and 330 g.L-1 and the maximal incubation time was 21 days.

**Results:**
All the strains showed a good and similar capability to grow independently of the sugar concentration. The high fructophilic character of *C. zemplinina* and its ability to produce low ethanol and high glycerol contents was confirmed. The production of ethanol, glycerol and acetic acid were mainly dependent on time regardless of the initial sugar concentration. Interestingly we observed the aptitude of *C. zemplinina* to metabolise malic acid with an average reduction of 40%. Furthermore we showed for the first time that high sugar concentration was associated with an inhibition of glucose and malic acid metabolisation.

**Main conclusions:**
The utilisation of a CCD associated with a response-surface modeling is a powerful tool that demonstrated the potentials enological application of *Candida zemplinina* in the future.



**Keywords (5):**
**Carbon flow, Fructophilic, Ethanol reduction, Malic acid metabolisation, surface-curves**