Dealing with Spontaneous Fermentation: Wild Yeast Behaviour

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Introduction

‘Spontaneous’ fermentations, in which the micro-flora present on the grapes/in the winery is responsible for alcoholic fermentation, are favoured for their added complexity in the final wine. However they show higher risk of incomplete sugar consumption and the yeast behaviour is poorly characterized. This project seeks to define the physiological and transcriptional response of indigenous yeast to high sugar fermentation.

Methods

The isolates from spontaneous fermentation at Yalumba Winery (Angaston, South Australia) were genetically identified by sequencing of the 5.8R-ITS region. Stress resistance was tested in a chemically defined grape juice medium (CDGJM) under two conditions: different concentrations of sugar (200,250 or 300 g/L) and ethanol (3.6 or 9% (v/v)). Cell growth was measured by optical density (OD) at 600 nm, sugar consumption was estimated by an enzymatic method and fitness advantage obtained mathematically.

Results & Discussion

Twenty different single colonies were randomly selected and genetically identified to reveal five different yeast genera (Fig.1). In micro-fermentation growth experiments, osmotic stress influenced growth (reduction in relative OD and increase in lag phase). Sugar consumption increased for all the wild strains (Fig. 2D), and interestingly Hanseniaspora sp. was the fittest (Fig. 2E). This was not the case for ethanol tolerance. With higher ethanol concentration growth and sugar consumption decreased significantly (Fig 2C-D). Saccharomyces sp. was the fittest with increasing ethanol concentration (Fig. 2E).

Transcriptome and metabolome analyses will be performed in order to understand the correlation between stress response, fermentation ability and metabolite production (Fig. 3).

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