

## TOWARDS SUPER-TOLERANT YEASTS FOR BIOETHANOL FERMENTATIONS

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### **ABSTRACT**

To achieve sustainable lignocellulosic to bioethanol conversion, some key innovations are required in pentose utilisation, redox balance, substrate conversion efficiency and fermentation stress tolerance. The key challenges will be reviewed and this paper will concentrate on the development of super-tolerant bioethanol strains. Efficient bioethanol fermentation requires conditions appropriate for ensuring high productivity whilst maintaining yeast viability and vitality. However, optimal conditions for the former can be sub-optimal for the latter leading to inconsistent and even 'stuck' fermentations. Indeed during industrial fermentation yeast is exposed to fluctuations in oxygen concentration, osmotic potential, pH, ethanol concentration, nutrient availability and temperature. The impact of these stresses on yeast will be discussed with particular reference to ethanol tolerance, genome stability and fermentation performance.

In particular, an approach to improve strain genetic stability and tolerance to product inhibition and process stresses will be discussed. In this paper new data, not previously published, will be presented that will illustrate the benefits of these strategies specifically referencing the impact of osmotic and ethanol stress during laboratory scale bioethanol fermentations using commercial bioethanol strains.