Identification of the *Dekkera bruxellensis* phenolic acid decarboxylase (*PAD*) gene responsible for wine spoilage

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Abstract:

The species of the genus *Dekkera* have been described as the main spoilage yeast in wine and are associated with the occurrence of phenolic off flavor compounds.

In this work, we describe the gene encoding phenolic acid decarboxylase enzyme of *Dekkera* bruxellensis (DbPAD gene). The gene has 43% identity with PAD nucleotide sequences from different ascomycetes species, and 34% of identity with bacterial sequences. The open reading frame shows an average of 8% identity with the Pad1 protein of Giberella zeae, Candida albicans and Saccharomyces cerevisiae, and 34.9% with Pad1 from Candida quilliermondii. The heterologous expression of the DbPAD gene in S. cerevisiae resulted in production, reaching levels similar to those high 4-vinylphenol obtained in D. bruxellensis cultures. The enzymatic reaction showed that the PAD activity in the transformed yeast was higher than in the wild type and similar to that detected in D. bruxellensis. These results demonstrate that the DbPAD gene encodes a phenolic acid decarboxylase.