

## Ability to scavenge free radicals by apple pulp reversed the stress profile induced by vanadium in *Saccharomyces cerevisiae*

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### Abstract

Functional value and the antioxidant properties of food are considered nowadays a very important feature for human consumption. In the literature apple (*Malus domestica* Borkh.) is considered to have prophylactic and therapeutic properties in several human pathologies in part due to its content in phenols. So, the aim of this work was to determine how aqueous extract of apple pulp, collected at different times of the harvest period, affect the antioxidant response of *Saccharomyces cerevisiae* BY4741 exposed to vanadium pentoxide (2 mM). The results reveal a stabilization of the redox status by glutathione that seems strongly consolidated by the presence of the fruity extract and deficit in glutathione peroxidase and catalase T activities induced by the presence of vanadium in culture medium contributed to the increase of ROS and loss of cell viability. However, the presence of apple extract rich in polyphenols and with great antioxidant reversed the response profile of *S. cerevisiae* to vanadium pentoxide.

**Keywords:** apple; phenols; yeast

### 1. Introduction

The determination of functional value of a particular food includes the discovery and characterization of their antioxidant properties, as its phenols contents, its ability to scavenge reactive oxygen species (ROS) or its biological activity to reverse oxidative stress markers, as triggered by vanadium in eukaryotic models as *Saccharomyces cerevisiae*, which exhibit high homology between their enzyme antioxidant response and of the humans [1].

Beira Alta region, Portugal, is a favourable area for apple growing that includes, among others, a national variety named *Bravo de Esmolfe* with unique and peculiar flavours that possess a protected denomination of origin [2].

In the literature, phenolic compounds of apples are described as potential inhibitors of oxidative processes, involving reactive oxygen species (ROS), implicated in chronic disorders such as cancer and cardiovascular disease [3]. Phenols stand out among the main non-enzymatic antioxidants found in apple juice, recognized in literature by its prophylactic and therapeutic properties in several human pathologies [4].

Eukaryotic cells such as *S. cerevisiae* have antioxidant enzyme systems, strongly regulated as the glutathione cycle provided by the Se-dependent glutathione peroxidase enzyme (GPx) that reduces peroxides to water using GSH as co-substrate and glutathione reductase enzyme (GR) which recycles GSSG to GSH and catalases (CAT) that are involved in the irreversible decomposition of hydrogen peroxide in dioxygen and water. *S. cerevisiae* is a eukaryotic organism, GRAS widely used in studies of oxidative stress, and coupled with the fact that this yeast contain ORF's homologous to human does this body a good biological model for the investigation of specific mechanisms of the response to stress [5].

So, the aim of this work was to determine how aqueous extract of apple pulp, collected at different times of the harvest period, affect the antioxidant response of *S. cerevisiae* BY4741 treated with vanadium pentoxide (2 mM).