

## Abstract

*Pediococcus acidilactici* is a facultative anaerobic bacterium that prefers microaerophilic environments with low oxygen. This study aimed to evaluate the ROS inhibition activity of *P. acidilactici* strain TAT1 through Whole Genome Sequencing data and antioxidant bioassays, such as the DPPH assay, superoxide scavenging activity assays, and catalase activity assay. WGS analysis revealed the presence of multiple antioxidant-related genes, though superoxide dismutase (SOD) genes were absent. Despite this, the DPPH assay showed strong antioxidant activity at higher concentrations of the cell-free supernatant (CFS), and the superoxide radical scavenging assay confirmed superoxide scavenging even in the absence of SOD. Additionally, hydrogen peroxide resistance was observed in the catalase activity assay, suggesting possible catalase activity, though the result remains inconclusive due to methodological limitations. Understanding the antioxidant capacity of *P. acidilactici* TAT1 is crucial for exploring its potential applications in probiotic development and industrial fermentation, where oxidative stress tolerance is a key factor for bacterial viability and functionality.

**Keywords:** *Pediococcus acidilactici*, antioxidant, bioassay, reactive oxygen species