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Biochemical characterization of a new unspecific peroxygenases from Botryobasidium botryosum

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PURPOSE OF THE ABSTRACT
Unspecific peroxygenases (UPOs; EC 1.11.2.1) represent a recently discovered subfamily of predominantly fungal heme-thiolate enzymes. They catalyze a broad range of oxidative transformations including the selective oxyfunctionalization of unactivated hydrocarbons by transferring peroxide-borne oxygen. The reaction mechanism of UPOs is similar to the peroxide shunt pathway of cytochrome P450 monooxogenases but without the requirement of complex cofactors such as NAD(P)H or electron-transport systems [1]. Additionally, hydrogen peroxide-driven biocatalysis combines the high oxidation power of H2O2 and its environmentally friendly properties with the high efficiency and selectivity of enzymatic reactions, making UPOs of high interest for biotechnological applications [2].

One major bottleneck so far remains the lack of recombinant functional expression of UPO genes with satisfactory expression levels [3]. Only recently, it has become possible to produce small amounts of active UPOs using an Escherichia coli expression system, although this does not work in the case of all UPO constructs and always occurs without glycosylation [4].

In this study, we report one new peroxygenases from the Basidiomycete Botryobasidium botryosum (BboUPO), which was successfully obtained, purified, and initially characterized with respect to its basic biochemical features, utilizing E. coli as expression host. BboUPO displays oxidation activity in presence of 10% acetonitrile, acetone, and methanol without exceedingly large decreases in the enzymatic activities.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Unspecific peroxygenases | Enzyme characterization

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