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Glucosylation of flavonoids by glucosyltransferase from Beauveria bassiana AM278 expressed in E. coli

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PURPOSE OF THE ABSTRACT

Flavonoids are a large group of polyphenolic compounds that are present in plants. They exert numerous important physiological functions in plants, having considerable influence on growth and development of plants, protect them from UV radiation, bacterial and fungal infections and provide color to fruits and flowers.

Flavonoids found in food have beneficial effects on human health. They exhibit a diverse spectrum of biological activities such as: antioxidant, anticancer, antidiabetic, antibacterial, antiviral and estrogenic [1]. However, many flavonoid compounds very often present a low water solubility and bioavailability.

Glycosylation can improve water solubility of natural products, enhance their bioactivity, stability, bioavailability and decrease their toxicity [2]. From the reasons, a lot of effort was put into development of efficient production methods of the glycosylated natural products.

Extraction from plants seems to be the easiest method of obtaining natural glycosides, but this approach has many limitations, e.g. low yield as a reason of low concentration in a biomass and strict dependence on seasonal vegetation conditions. The use of organic synthesis for the production of flavonoid glycosides also has many limitations. Disadvantages of chemical glycosylation is use of toxic reagents and the necessity of protection of these hydroxyl groups that are not meant to conjugate with saccharide [3].

Biocatalysts can be utilized to perform eficient glycosylation reaction, additionally resulting in specific products and operating under mild conditions [4].

In our previous studies fungal strains Beauveria bassiana AM278 have been proven to be a useful glycosylation catalysts toward different class of flavonoids. This strain is able to selective introduction of glucose or 4'-O-methylglucose molecule to a hydroxyl group in the flavonoid substrates [5].

Herein, we would like to present that we cloned the dedicated glucosyltransferase from B. bassiana AM278 and heterologously expressed it in E. coli. Sequence identification was based on homology to already described enzymes. The purified enzymatic protein was characterized through in vitro enzymatic reactions as a UDP-glucosyltransferase. In this study we also evaluated biochemical characterisation of this novel flavonoid glucosyltransferase. Basic biochemical parameters, e.g. temp, pH and cofactors were evaluated.

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FIGURES

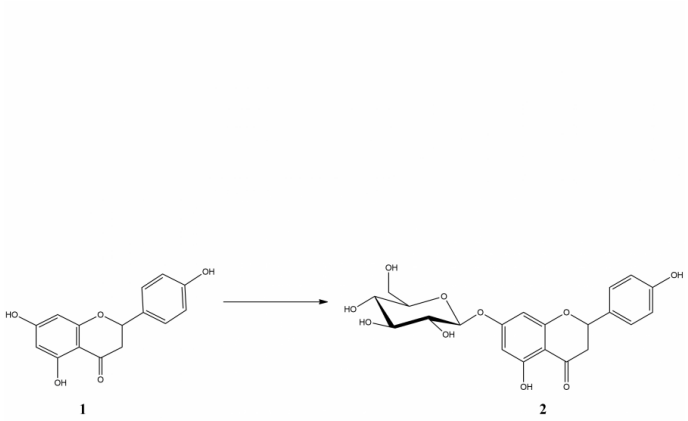

FIGURE 1
Glucosylation of Naringenin

FIGURE 2

KEYWORDS
flavonoids | glucosyltransferase | Beauveria bassiana | heterologous expression

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