Streszczenie i słowa kluczowe w języku angielskim

Terpenes are the most numerous class of natural compounds on Earth. They have long been eagerly used by humans as flavour and medicinal compounds. Among them, terpene alcohols show broad therapeutic potential for treating many diseases. Modification of the structure of terpene alcohols using safe, selective and sustainable biocatalytic methods can lead to development of new products with potentially enhanced therapeutic activity.

In the present study, terpene alcohols were esterified using mycelium with lipolytic activity and photocatalytic transformation was carried out using porphyrins as enzyme biomimetics. The study proved that the lyophilized mycelium of the psychrophilic fungus *Chrysosporium pannorum* A-1 is an efficient catalyst for the esterification of primary terpene alcohols and carboxylic acids. The conditions for obtaining the biocatalyst were optimized, which significantly increased the biocatalytic activity of the fungus and the yield of the obtained biomass. The esterification process was also optimized; it exhibited the highest efficiency in hexane containing 3% w/v of the biocatalyst with a twofold excess of alcohol to acid at 30-40°C. It has been proved that freeze-dried mycelium of *C. pannorum* A-1 can be used in a minimum of 7 catalytic cycles and retains more than 80% of activity after one-year storage at -20°C. In contrast, among the terpene alcohols studied, only myrtenol undergoes biomimetic oxidation using porphyrins in a photocatalytic system. Transformation of myrtenol to myrtenal oxide occurs with the highest efficiency in chloroform at the 0.1 M substrate concentration and the 0.1-0.2 mM tetraphenylporphyrin (H_2TPP) concentration at 25°C. It was also proposed that the mechanism of photooxidation of myrtenol is closely related to the formation of porphyrin dication and is based on the competitive participation of the reactive oxygen species: singlet oxygen ($^1O_2$) and oxygen radicals. Studies of the biological activity of biocatalysis products of terpene alcohols on human glioma cell lines and in antimicrobial assays indicate that some biocatalysis products show higher biological activity than their alcoholic precursors.

Key words: Biocatalysis; terpenes; terpene alcohols; *Chrysosporium pannorum*; optimization; esterification; porphyrins; 5,10,15,20-tetraphenylporphyrin (H_2TPP); biomimetic catalysis; biological activity.

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