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Application of SuSy-GT cascade in the production of terpenoid glycosides

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PURPOSE OF THE ABSTRACT
The essential oils of thyme and oregano, members of the Liamiaceae family, contain bioactive isomers known as thymol and carvacrol [1]. These isomers have been found to possess powerful antibacterial properties against both gram-positive and gram-negative bacteria. Their mechanism of action involves destabilizing and disrupting the bacterial cell membrane, which leads to cell lysis and inhibits the activity of membrane pumps, including ATPases. This results in a reduction in bacterial motility and biofilm formation [2].

Animal studies have demonstrated the potential use of these monoterpene and its glycoconjugates as an alternative to antibiotics in animal production. Glucosylation reduces the volatility and pungent taste of the aglycone, making it easier to incorporate into animal feed. However, thymol is rapidly absorbed in the upper gastrointestinal tract, which means that it is challenging to achieve sufficient concentrations of the terpenes in the distal parts of the digestive tract. Additionally, glucosides alter the solubility of secondary plant metabolites, thereby modifying their biological activity. For glucosides to be effective, the active aglycone must be released at the target site by hydrolyzing enzymes [3].

Thymol and carvacrol glucosides are expensive, with a market price of > 1000 EUR per gram of compound. To overcome this challenge, this study aims to use a genetic cascade consisting of YjiC glucosyltransferase from Bacillus licheniformis and sucrose synthase from Glycine max to catalyze the glucosylation reactions of thymol and carvacrol in vitro. Furthermore, this method can reconstitute expensive nucleotide sugars as glucose donors during the reaction, allowing the desired glucosides to be obtained on a preparative scale.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
cascade | terpenes | glycosylation

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