

Enzymatic Synthesis of Multifunctional Chlorogenic Acid Derivatives

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Chlorogenic acid (CQA), a polyphenol compound, is widely distributed in the plant kingdom and has received much attention due to its biological and antioxidant activities. It could be a promising natural antioxidant for lipids in food, cosmetics or pharmaceuticals, however, its antioxidant properties decrease in oil-based products because of its high hydrophilic/lipophilic balance. Therefore, the grafting of a lipophilic moiety (for example aliphatic long chains) to a hydrophilic one, is one means to improve its lipophilicity and thus its antioxidant activity. Moreover, it could lead to a multifunctional compound with both emulsifying, antibacterial and antioxidant properties. Chlorogenic acid possesses hydroxyl and carboxyl groups allowing production of new compounds. Thus, lipase-catalysed alkylation of the carboxylic group of CQA by fatty alcohols (reaction 1) have led to monoesterified chlorogenic acids, whereas there is no report on enzymatic acylation with fatty acids as acyl donors (reaction 2).

The aim of this work is to demonstrate the feasibility of reaction 2 catalysed by lipases to synthesis new multifunctional chlorogenic acid derivatives. It appears that the reaction can lead to one or/and two isomers. A study on various physico-chemical parameters that may affect the acylation of CQA will be discussed. The biological and antioxidant properties of both alkylated and acylated CQA derivatives will also be evaluated.