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Lypolytic potential of licuri fruit (Syagrus coronata (Mart.) Becc.) as self-immobilized biocatalyst source

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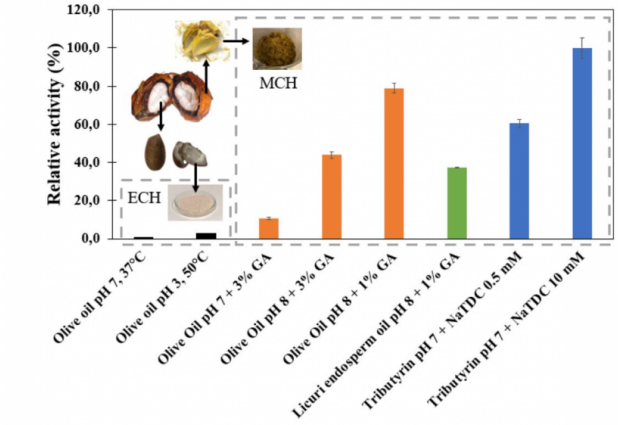
PURPOSE OF THE ABSTRACT

Despite the extensive range of microbial lipolytic enzymes being applied in oils and fats biotransformation, it is important to search alternatives with lower cost, easier market acceptance and direct application as a biocatalyst with partial purification, being naturally immobilized, designated as self-immobilized biocatalyst, such as enzymes obtained from oilseeds delipidation [1]. Although the oil application as product itself, it becomes also interesting to evaluate the lipolytic potential of its proteins, since the presence of oil also suggest the presence of endogenous enzymes, as part of the metabolic path on oil seed germination [2-4]. This kind of evaluation can be interesting to add value to oil production sector, giving potential use for its residues. Licuri fruit (Syagrus coronata (Mart.) Becc.) is good candidate for such application since it has a high amount of oil (49%) on its endosperm, being well used as food supply in Brazil Northeast [5]. In this context, the aim of this work is to evaluate the potential of the delipidated majoritarian parts of licuri fruit as self-immobilized biocatalyst. Licuri fruit parts were delipidated using cold hexane to delipidate the endosperm or mesocarp (ECH and MCH). The catalytic activity of the potential self-immobilized biocatalysts obtained in this work was evaluated in the hydrolysis reaction of olive oil, tributyrin and commercial licuri endosperm oil using pHStat and represented by means of relative activity. As result, summarized in Fig 1, in one hand MCH obtained an initial hydrolytic activity in olive oil of 10.5% (pH 7, 3% gum arabic) being optimized for 78.9 % (pH 8, 1% gum arabic) and 37.2 % (pH 8, 1% gum arabic) in the hydrolysis of licuri endosperm oil. In another hand, ECH showed an initial hydrolytic activity in olive oil of 0.8 % (pH 7, 37°C), with an optimal value of 2.8 U/g (pH 3, 50°C). MCH also could performed well on tributyrin hydrolytic activity, with an initial hydrolytic activity of 60.5 % (pH 7, 0.5 mM NaTDC), optimized for 100 U/g (pH 7, 10 mM of NaTDC) while ECH displayed no activity. After a storage of 1-year MCH maintained 75.43% of its initial hydrolytic activity. When comparing those results with the hydrolytic activity of others vegetable lipolytic enzymes, we can see that castor bean and palm oil lipases (CBL and POL, respectively) also have a higher hydrolytic activity using tributyrin as substrate when compared to olive oil [6], [7]. However, MCH showed a higher potential to hydrolyze olive oil (Fig. 2), since the drop of activity among tributyrin and olive oil was only 21.1% while CBL had a drop of 96.5 and POL of 64.6 % according to EBONGUE et al., (2006)[7] and CAVALCANTI et al., (2007) [6], respectively. Thus, we conclude that MCH presents better potential to catalyze reactions with TAGs with a longer carbon chain, commonly present in human digestion, representing great biotechnological value. The authors are grateful for the financial support by the Coordenaçao de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES), specially for the PhD scholarship provided for Milena Chagas Lisboa (PROSUP - 88882.365551/2019e01, PDSE 41/2018e88881.3 61582/2019e01).

FIGURES



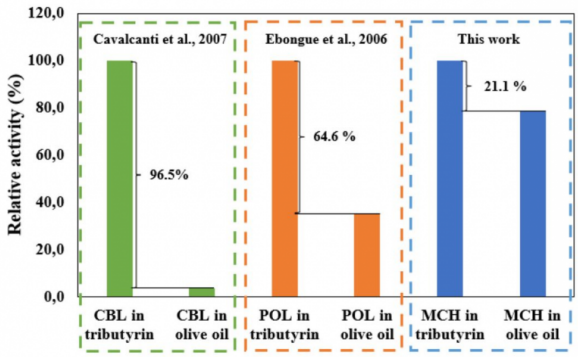


FIGURE 1

Fig.1

Optimization and comparison among ECH and MCH in hydrolysis activity against different substrates with different carbon chain sizes.

FIGURE 2

Fig 2.

MCH potential to catalyze long-chain oils (olive oil) compared to other self-immobilized vegetable lipases from castor bean (Cavalcanti et al., 2007 [6]) and palm oil (Ebongue et al., 2006 [7])

KEYWORDS

Licuri | Delipidation | Self-immobilized | Biocatalyst

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