Bacteria and fungi associated with fruits of *Elaeis guineensis* Jacq. and their potential to produce lipase

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Background

Lipase-based enzymatic routes toward biodiesel production hold advantages over chemical methods using alkaline and/or acid catalysts. However, biodiesel derived from chemical transformations still dominates the current market, mainly due to its lower cost compared to the biocatalytic processes (VIEIRA et al., 2006; SHARMA et al., 2001). Therefore, strain/genes discovery is central to warranty the economic viability of enzymatic biodiesel production. The aim of this study was to identify novel lipolytic strains among a large collection of microorganisms sampled from *Elaeis guineensis* Jacq. fruits.

Methods

Fruits were collected from four varieties of palm oil grown in a experimental field (Embrapa Cerrados), with three repetitions of each variety, with a total of 12 samples. Samples were immediately transported to Embrapa Agroenergia for isolation of filamentous fungi, yeasts, and bacteria. Five similar fruits per sample were transferred to 50 mL of PBS buffer (pH 7.4) and incubated at 28ºC for two hours under agitation (200 rpm). After incubation, serial dilutions were prepared, and aliquots of these dilutions were plated in several culture media (Tryptic Soy Agar, Actinomycete Isolation Agar, YPD Agar; Potato Dextrose Agar and Oat Meal Agar) and incubated for 2-10 days at 28ºC. After this period, the microorganisms were counted, purified and preserved. The lipolytic activity was evaluated in solid media containing triolein, olive oil and Tween 20 as a carbon source (HANKIN et al., 1975). The enzymatic index was estimated in triplicate. Selected bacteria and fungi were identified using the 16S rDNA and ITS1-5.8S-ITS2 sequences, respectively.

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Results and Conclusions

From 664 bacterial isolates, 9.1% showed lipolytic activity in at least one of the substrates evaluated. Twenty-two presented high enzymatic index and were identified as *Burkholderia* sp., *Erwinia* sp., *Falsibacillus* sp., *Gibbsiella* sp., *Kluivera* sp., *Leclercia* sp., and *Stenotrophomonas* sp. Among the 427 filamentous fungi isolated, 45% and 96% degraded olive oil and triolein, respectively. Four selected isolates were identified as *Fusarium* sp., *Trichoderma* sp., *Diaporthe* sp., and *Penicillium* sp. Among the 384 isolated yeasts, 53%, 23%, and 9% degraded Tween 20, triolein, and olive oil, respectively. Overall, it was possible to identify distinct strains/species of bacteria and fungi able to produce lipases. The lipase production of selected isolates will be further evaluated using quantitative tests before their application in the synthesis of biodiesel from palm oil.

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