BIOCONVERSION OF (+)-VALENCENE TO (+)-NOOTKATONE USING A MEMBRANE-AERATED BIOFILM REACTOR.

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Introduction. The sesquiterpene (+)-nootkatone is a compound of high added value. However, allylic oxidation of (+)-valencene provides an attractive route for obtaining this coveted aroma [1]. The use of biofilm reactors has been described by Qureshi *et al.* [2] not only for the production of various chemicals by fermentation, but also for aroma compounds.
The aim of this work was to test a membrane-aerated biofilm reactor for bioconversion of (+)-valencene to (+)-nootkatone using *B. theobromae*.

Methods. *B. theobromae* growth was performed by inoculating ($1x10^6$ spores/mL) in 500 mL of a liquid medium (140 mL) containing 50 g/L sucrose (30°C, pH 5.5) in a membrane-aerated biofilm reactor (Figure 1). After 10 days of growth, orange essential oil was added (1 g L^{-1} of valencene, system biphasic). Kinetics of sucrose concentration [3], nootkaton and valencene concentration [1] in the organic phase, and cell viability [4], during the bioconversion were obtained.

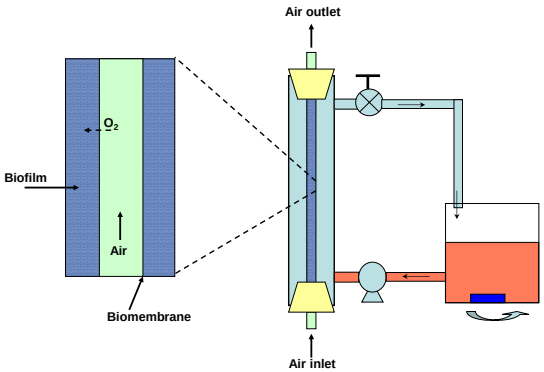

Figure1. Scheme of a membrane-aerated biofilm reactor.

Results. It was observed that sucrose is totally consumed after 10 days of growth with a maximal biomass production of 24.2 g L^{-1} (Figure 2). Cell death was observed after the addition of orange essential oil, and reached a bioconversion of 30% after 12 days of process. Cell death was probably due to the exhaustion of the carbon source.

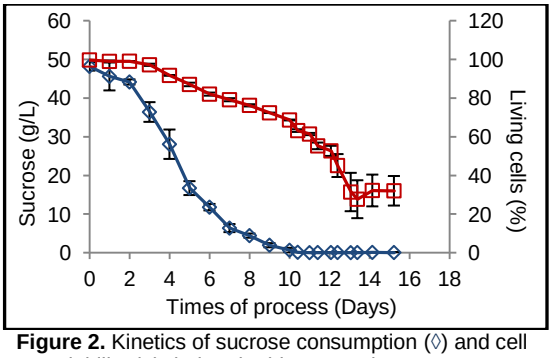

Figure 2. Kinetics of sucrose consumption (◊) and cell viability (□) during the bioconversion process.

After 120 h of bioconversion process, a (+)-nootkatone concentration of 396.13 mg L^{-1} was obtained (Figure 3), reaching a 69% of bioconversion in the membrane-aerated biofilm reactor.

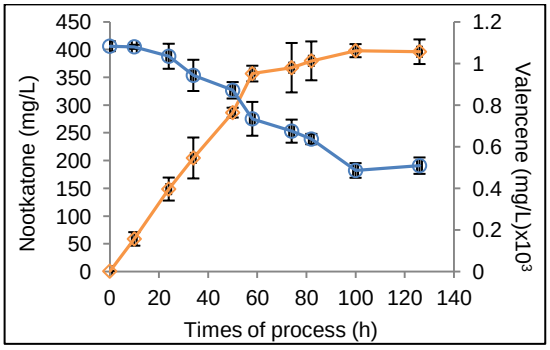

Figure 3. Bioconversion of (+)-valencene (○) to (+)-nootkatone (◊) in a biphasic system by *B. theobromae*.

Conclusions. Results demonstrate the potential application of a biphasic system for the bioconversion and *in situ* recovery of (+)-nootkatone in a membrane-aerated biofilm reactor.

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