ABILITY OF *Acinetobacer bouvetii* TO ASSIMILATE HYDROFOBIC RENEWABLE SUBSTRATES.

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Introduction. Industrial activities and agriculture, among others, generate polluting hydrophobic products and residues difficult to be degraded (1). Substances such as non-edible vegetable oils or used cooking oils can result in low-cost substrates to produce biosurfactants (1). A previous study showed that *Acinetobacter bouvetii* produces a biosurfactant (BS) with n-hexadecane as substrate (2).

The objective was to determine the ability of *A. bouvetii* to assimilate renewable hydrophobic substrates and estimate kinetic parameters that allow selecting the best substrate.

Methods. For growth kinetics reported methods (2) were used with the following modifications: serological bottles (50 mL) with dilute mineral medium (1:10); castor oil (CO), used cooking oil (UCO) and n-hexadecane (HXD) (control) were used as carbon and energy source at the same initial carbon concentration (1.1 gC/L) (72 h; 200 rpm; 30 °C). BS production was determined with HXD (3). Statistical analysis and fiting Gompertz model (GOM) for viable counts (VC) were performed using the SPSS software v. 18.0.

$$A(t) = De^{-e^{\left(\frac{\mu max e}{D}(\lambda - t)+1\right)}} \text{ where } D = ln\left(\frac{VC}{VC_{t=0}}\right)$$

Results. Fig. 1 shows the growth kinetics of *A. bouvetii* and growth curve fitted with the GOM model. *A. bouvetii* was able to assimilate both CO and UCO as sole source of carbon.

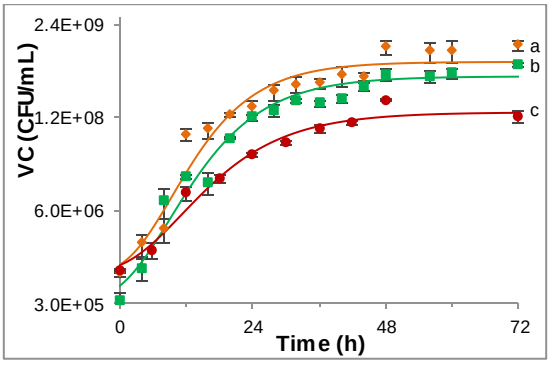

Fig.1 Growth kinetics of *A. bouvetii* and growth curve fitted with the GOM model. CO (■), UCO (♦), HXD (●). Each point represents the average value of three replicates and the SE (Error Bars). Different letters indicate significant differences (α=0.05, Tukey test).

The best growing substrate was UCO ($1.24\pm0.20 \times 10^9$ CFU/mL), followed by CO ($0.66\pm0.05 \times 10^9$ CFU/mL), and finally HXD ($0.13\pm0.02 \times 10^9$ CFU/mL). Growth of *A. bouvetii* with UCO was similar to reported with HXD in less culture time and an initial concentration of mineral medium 10 times lower, this could be explained by natural enriching compounds present in vegetable oils (1).

Table 1 presents the estimated kinetic parameters from GOM model for different substrates. Adjusted models represented 99% (R^2) variation of the experimental data. With UCO and CO the best maximum growth rates (μ_{max}) 0.29 h^{-1} and 0.30 h^{-1}, respectively were observed. The lag phase (λ) in all of the 3 substrates were not significantly different ($p<0.05$) and changes in population density (D) with renewable substrates were higher than the observed in our control.

Table 1. Estimated kinetic parameters with GOM model. Different letters indicate significant differences (α=0.05, t test).

Renewable hydrophobic substrates	μ_{max} (h^{-1})	λ (h)	D
Castor oil	0.29[a]	0.00[a]	7.23[a]
Used cooking oil	0.30[a]	1.28[a]	6.82[a]
n-hexadecane	0.19[b]	1.12[a]	5.17[b]

A kinetic study of *A. bouvetii* is important because the production of BS may be linked to cell growth. In our work, with a dilute culture medium (1:10), the BS production was 86 mg/L equivalent of Tween 20, which halves to that early reported (2) with the same strain.

Conclusions. *A. bouvetii* assimilated renewable hydrophobic substrates. The kinetic study showed that *A. bouvetii* assimilated CO and UCO more efficiently than the control.

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References.

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