ANALYSIS OF THE EFFECT OF LEMON PEEL CONCENTRATION ON MEDIUM CHARACTERISTICS AND PECTINASES PRODUCTION BY *ASPERGILLUS FLAVIPES* FP-500

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Introduction. Lemon peel is a rich-pectin agroalimentary residue, so it has a complex chemical structure(1). Because of this, it is considered as a good pectinase inductor for several fungi(2). Pectinases production by *Aspergillus flavipes* FP-500 can be improved using high lemon peel concentrations on submerged cultures (3). However, these conditions provoke a significant change on the viscosity of the culture, which can have direct implications on the corresponding mixing processes. The objective of this work was to identify if higher substrate concentrations modifies the mass transfer of the system and this affect the production of endo and exopectinases by *A. flavipes* FP-500 on submerged culture, using lemon peel as the only carbon source.

Methods. Experiments were developed using two substrate concentrations, 1 and 3% (p/v), whose viscosity was measured by an Ostwald viscometer. These started with $1X10^6$ spores/mL of five days old slants of *A. flavipes* FP-500 and were incubated on an Applikon bioreactor at 37°C, 200rpm and 3 vvm during 130 h, sampling each 24 h. Extracellular exo and endopectinases productions(4), fungal growth by acidic hydrolysis(3) and substrate consume after a mass balance of dry weight were quantified along the culture. K_La values were calculated by the oxygen elimination technique directly in the bioreactor before inoculation. Kinetic analysis was developed with unstructured kinetic models(4).

Results. System viscosity was modified by lemon pulp concentration (1.47 ± 0.036 and 1.90 ± 0.035 cp for 1 and 3%, respectively). This modified the corresponding initial K_La values (7.2 and 5.6 h^{-1}, respectively). Even when at higher substrate concentrations seemed to be a lower mass transfer, fungal growth was favored (Fig 1A), although specific growth rate values were similar on both lemon peel concentrations (about 0.07 h^{-1}). Referring to enzyme production, it was observed that lemon peel concentrations modified exopectinases production rate, although the maximum activity reached was the same for both concentrations (Figure 1C). On the other hand, endopectinases production was favored by higher substrate concentrations, mainly at the end of the culture (Figure 1D). Kinetic analysis showed that pectinolytic production is totally growth associated (data not shown), which explains the high pectinase productions on media with the highest substrate concentration. However, when specific productions were calculated, the lowest values of exo and endopectinases (10 and 2.5 $U/g_{biomass}$, respectively) were obtained when the highest lemon peel concentrations were used. This indicated that higher substrate concentrations do not induce enzyme production.

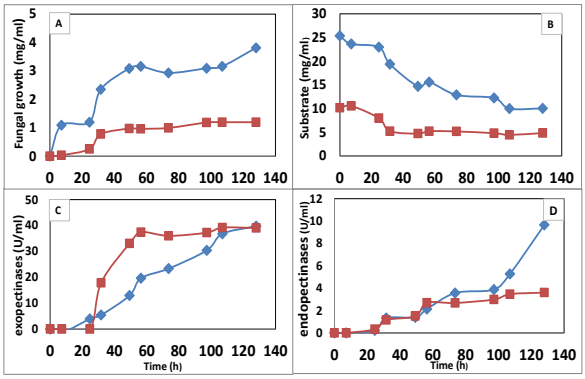

Fig.1 Fungal growth (A), substrate consume (B), exopectinases (C) and endopectinases production (D) by *A. flavipes* FP-500 on submerged culture using lemon peel at 1% (■) and 3% (♦) (p/v).

Conclusions. The increase of substrate concentration modified mass transfer of the system, fungal growth was favored without any repressive effect on pectinases production by *A. flavipes* FP-500.

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