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## **ABSTRACTS**

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## Evaluation of different disruption processes efficiency on encysted *Haematococcus pluvialis* cells for astaxanthin recovery and bioavailability

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The microalga *Haematococcus pluvialis* is one of the most important sources of astaxanthin. Astaxanthin is a reddish pigment with antioxidant activity, being an important component in the aquaculture industry. However, due to the very hard cell wall of this microalga, astaxanthin extraction is difficult and its bioavailability in intact encysted cells is low.

The purpose of this work was to evaluate different physical and chemical processes which allow the disruption of encysted cells of *H. pluvialis*, in terms of astaxanthin recovery and the facility of its extraction from the cells. The microalgae were grown in modified BBM medium and the biomass obtained at the end of the carotenogenesis was submitted to the following processes: autoclave 30 min, 121°C, 1 atm; HCl 0.1 M, 15 min and 30 min; NaOH 0.1 M, 15 and 30 min; enzymatic treatment with a mixture of 0.1% protease K and 0.5% driselase in a 0.2 M phosphate buffer, pH of 5.8, at 30°C during one hour; spray-drying inlet 180°C, outlet 115°C; and mechanical disruption with a cell homogeniser developed for this purpose. All the treatments were carried out in triplicate.

After the treatments, all samples including the control were submitted to the same extraction procedure, using a solvent mixture of ethanol/diethyl ether/*n*-hexane 1:1:1 (v/v/v) and, after the addition of some glass beads, to a combination of vigorous vortex for 1 min and ultra-sound for 15 min, followed by centrifugation and evaporation of the solvent under a stream of nitrogen.

The quantification of astaxanthin was used as an indirect method to evaluate the efficiency of each process. In order to compare the bioavailability between samples, after the different treatments the biomass was left overnight (16h) in acetone, at room temperature, under nitrogen and protected from light, with subsequent determination of astaxanthin in the supernatant. The effect of these treatments were analysed by spectrophotometry, TLC, HPLC and by optical and scanning electron microscopy (SEM). Compared to the control, the best results were obtained with the mechanical disruption processing and enzymatically treated biomass. These results are supported by SEM photography, which show the effect of the different treatments on the cell wall.

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