

# CULTIVATION OF MICROALGAE IN TILAPIA EFFLUENTS FOR THE PRODUCTION OF LIPIDS TO TWO LIGHTING CONDITIONS

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**Introduction.** Microalgae are photosynthetic unicellular organisms with higher photosynthetic efficiency higher plants for the production of biomass [1, 2]. The use of microalgae in the treatment of effluents represents one uses biotechnology environmental, being a viable alternative, due to its efficient bioconversion of solar energy, and efficiency in the use and removal of nutrients to produce biomass with high content of lipids for biodiesel production. This study evaluated lipid production from microalgae *Nannochloropsis oculata* and *Chlorella vulgaris* grown in tilapia effluent, using photobioreactors to two lighting conditions.

**Methodology.** Used species of microalgae *N. oculata* and *C. vulgaris* grown in Bold's Basal medium [3], an aliquot was taken of each species in its logarithmic phase as inoculum for each photobioreactor for an initial concentration of  $1 \times 10^6$  cel/ml for a total volume of 6 L. It was considered a photobioreactor with Bold's Basal medium (control) and the other with tilapia effluent (treatment) for the cultivation of each microalgae in duplicate (Table 1). Previously the physicochemical parameters of the effluent were analyzed ( $\text{N-NH}_4^+$ ,  $\text{N-NO}_2^-$  y  $\text{N-NO}_3^-$ ). The photobioreactors were exposed to a light intensity of 4 Kluxes lamps with multi-LEDs or white light at a temperature of  $25 \pm 2$  ° C (Fig.1). It was recorded every 24 h cell density of each species using a Neubauer Chamber, until the death of the growing phase (about 10 days). Extracted the lipid fraction by Soxhlet method [4] with chloroform/methanol (2:1), was determined the percentage and production of lipids (mg/L/d) and determined the production biomass (g/L/d).

**Results.** *N. oculata*, cultivated in tilapia effluent with lighting LEDs presented the highest cell density ( $1.19 \times 10^8$  cel/ml) over a period of 10 days, also presented the highest production of biomass, lipid and lipid percentage (0.0410 g/L/d, 21.52 mg/L/d and 51%, respectively). *C. vulgaris*, presents a better growth in Bold's Basal medium (control) with LEDs lighting in comparison to other treatments. However, there is less production of lipids than in cultivated in tilapia effluent (Table 1).

**Table 1.** Average results of cell density, production of biomass, production and percentage of lipids of *N. Oculata* and *C. vulgaris* in tilapia effluent, and Bold's Basal medium (control).

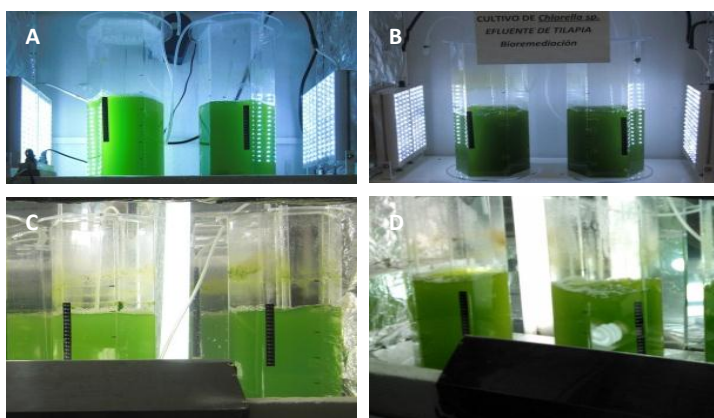
Microalgae	Treatments		Cell density (Cel/ml)	% of Lipids	Production of biomass (g/L/d)	Production of lipids (mg/L/d)
	Lighting conditions	Culture medium				
<i>Nannochloropsis oculata</i>	LEDs	Tilapia effluent	$1.19 \times 10^8 \pm 2.97 \times 10^7$	$51.04 \pm 5.83$	$0.0410 \pm 0.0204$	$21.52 \pm 12.75$
		Bold's Basal	$8.07 \times 10^7 \pm 2.55 \times 10^6$	$29.27 \pm 0.33$	$0.0200 \pm 0.0049$	$5.82 \pm 1.42$
	White Light	Tilapia effluent	$6.46 \times 10^7 \pm 1.63 \times 10^7$	$39.64 \pm 4.70$	$0.0268 \pm 0.0055$	$9.70 \pm 0.12$
		Bold's Basal	$2.76 \times 10^7 \pm 8.13 \times 10^6$	$39.64 \pm 4.70$	$0.0151 \pm 0.0042$	$5.89 \pm 0.97$
<i>Chlorella vulgaris</i>	LEDs	Tilapia effluent	$5.64 \times 10^7 \pm 2.76 \times 10^6$	$34.76 \pm 2.31$	$0.0317 \pm 0.0033$	$10.94 \pm 0.43$
		Bold's Basal	$8.83 \times 10^7 \pm 2.83 \times 10^5$	$27.72 \pm 5.65$	$0.0459 \pm 0.0028$	$12.62 \pm 1.85$
	White Light	Tilapia effluent	$3.44 \times 10^7 \pm 1.20 \times 10^6$	$39.38 \pm 6.63$	$0.0446 \pm 0.0079$	$17.29 \pm 0.17$
		Bold's Basal	$6.54 \times 10^7 \pm 7.07 \times 10^5$	$34.94 \pm 2.73$	$0.0384 \pm 0.0016$	$13.40 \pm 0.38$

**Conclusions.** *N. oculata* presented higher cell density when it is cultivated with LEDs lighting and tilapia effluent. *C. vulgaris* and *N. oculata* showed increased lipid production in cultures with tilapia effluent. The use of tilapia effluent as culture medium for microalgae is more efficient in the production of lipids and biomass to the own Bold's Basal medium for both species of microalgae with LEDs lighting.

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**Fig. 1.** Microalgal cultures in photobioreactors: A) *N. oculata*/LEDs; B) *C. vulgaris*/LEDs; C) *N. oculata*/white light; D) *C. vulgaris*/ white light.