

Poster

Olive oil mill wastewater treatment and algal biomass production by combined process based on flocculation, UV light and *Scenedesmus obliquus* growth



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ABSTRACT

Motivation:

Olive mill industry uses different techniques to extract olive oil and the most common processes are traditional pressing (mainly employed by small producers) and centrifugation continuous processes which using 'Decanter' with two or three exits. The two-exits system is mainly used in Spain. Spain is the first producer of olive oil in the world with 1.40 million tonnes in the 2015/2016 campaign (AICA, 2015). Olive oil mill wastewater (OMW) generated has a huge organic load, phenolic compounds and long-chain fatty acids which makes it phytotoxic and microbial inhibitor, becoming an important pollutant of both terrestrial and aquatic ecosystems (Hachicha et al., 2009).

Methods:

OMW used was obtained from an olive oil extraction plant, which uses the centrifugation method with two-phase separation. Two different experimental series were carried out with OMW. For the first one flocculated water was used and for the second one we used an UV lamp after flocculation. For both of them OMW was centrifuged, filtered and sterilized by through a membrane of 0.2- μm pore size. In the first experimental series, culture media were prepared by mixing OMW and ultrapure water for a 5%, 10%, 25%, 50%, 75% and 100% (v/v) OMW final concentration. Undiluted urban wastewater (UWW) was used for a third experiment just filtered and sterilized, as shown in Hodaifa et. al (2012). *S. obliquus* was inoculated into a batch photobioreactor. Conductivity, turbidity, COD, total phenolic compounds, TOC, TC, IC, TN, ammonium, chloride, phosphates, iron and others were determined after each pretreatment and at the end of each experiment. Microalgal growth during culture was calculated indirectly by measurement of the absorbance. Protein and lipid contents in biomass was measured at the end of the experiments.

Results and Conclusions:

Reductions in the concentrations of total phenols, COD, TOC and TN and the other chemical parameters have been found after the experiments. The variation of the maximum specific growth rate values with the initial concentration of OMW may indicate an inhibitory effect of wastewater, but the highest volumetric biomass productivity is reached in 100% OMW (v/v). The protein concentration of the biomass increased over the course of the experiments.

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