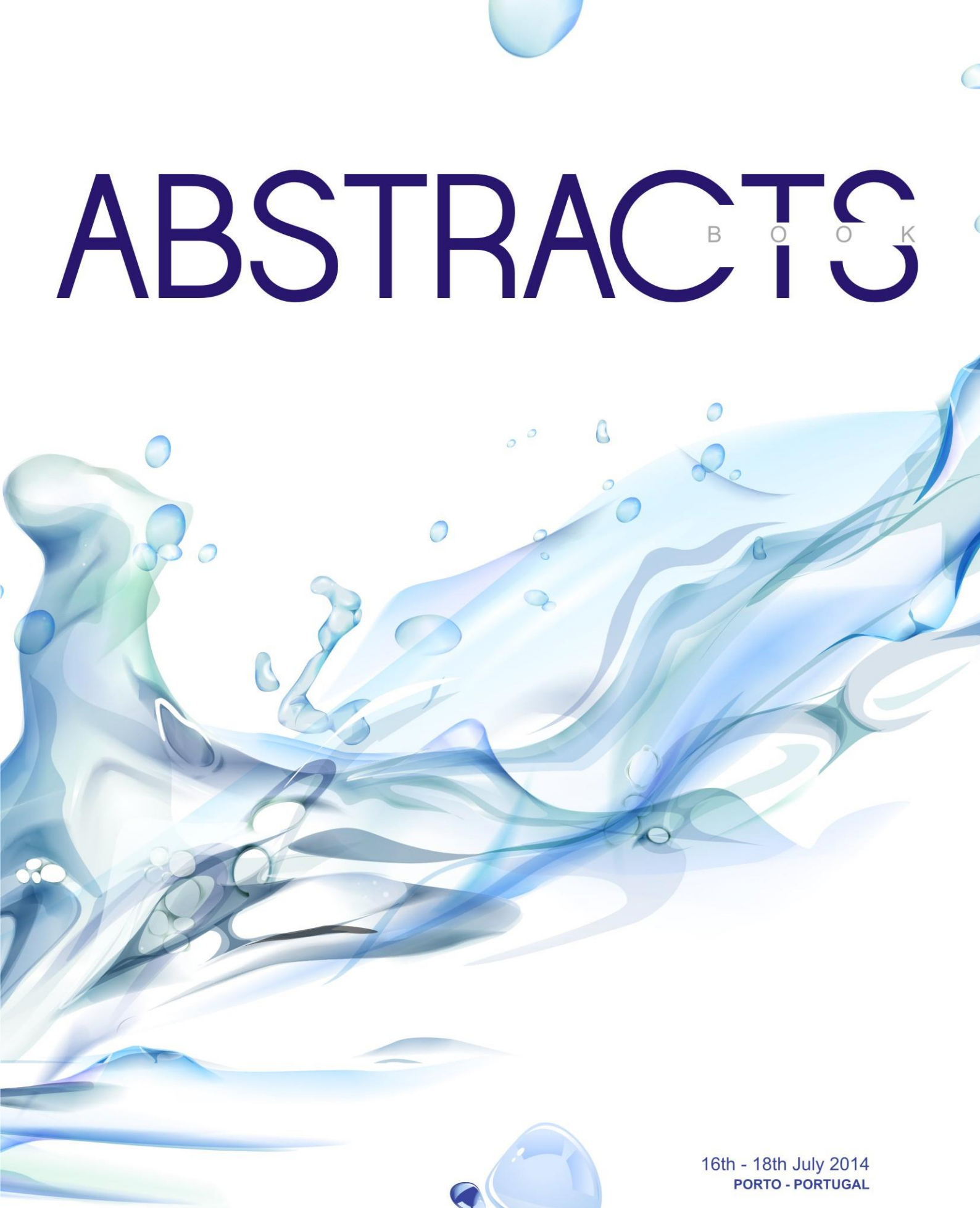
ABSTRACTS BOOK



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Investigation of olive mill wastewaters treatment by immobilized microalgae.

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1. Introduction – Olive mill wastewater (OMW) is characterized by minimum levels of nitrogen compounds and low pH, as well as very high organic load, due to high levels of phenolic compounds and sugars [1,2]. OMW direct disposal may pollute both, land and aquatic environments [1], therefore is one of the most serious environmental problems in producers countries. Although the two-phase method is a most innovative technique, in Portugal still exist the three-phase process. In this work, immobilized microalgae were tested to treat OMW, in order to reduce phyto-toxicity. From our knowledge it appears that OMW treatment methods with microalgae is a pioneering technique.

2. Experimental – Two-phase olive mill wastewaters (TPOMW) and three-phase olive mill wastewaters (OMW) were collected in north-eastern Portugal. The treatments were performed with wastewaters diluted from 20% to 60% (v/v), for each effluent. Essays were done in batch cultures with immobilized *Chlorella vulgaris* (CBSC 15-2075) and incubated with aeration in a controlled chamber, as in image 1. Polyphenols content was measured by Folin-Ciocalteau method, after a liquid-liquid extraction with methanol. Germination assays were performed with lettuce (*Lactuca sativa*) seeds, incubated in a growing chamber at 26°C, for 7days. Results were expressed as germination index (GI%) and mean root growth (cm/day)

3. Results and Discussion – After 20 days of fermentation a reduction in polyphenols levels up to 50% was observed, with the higher performance obtained for TPOMW, considered the lower polluting wastewater. Others biological processes have been showed a greatly variation on phenolic compounds reduction [3-8]. Treated wastewaters showed highest germination percentage and an increase in root growth, than untreated ones, suggesting a decrease in toxicity. In fact, several authors attribute OMWW toxicity to their phenolic compounds which inhibits germination of seeds of different plant species [9].

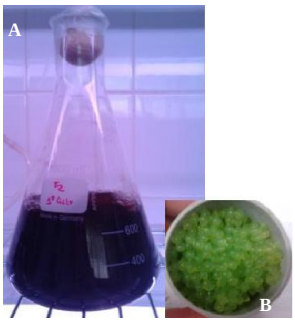

Image 1. (a) Imobilized C. vulgaris used in biotreatments; (b) Aspect of batch cultures.

4. Conclusions – The biotreatments tested in this work showed a potential reduction in phenols content, which are responsible for toxicity. Also, an increase in germination percentage and in the root growth of lettuce was achieved, confirming a phyto-toxicity decrease. Incorporation of microalgae processes on OMWW can be a viable option for effluent treatment.

5. References: [1] McNamara, et al. *International Biodeterioration & Biodegradation*, 61, (2008) p. 127. [2] Ruiz-Rodriguez, et al. *International Biodeterioration & Biodegradation* , 64, (2010) p. 638. [3] Di Gioia, et al. *Research Microbiology*, 152, (2001) p. 83. [4] Marques, I.P. *Desalination*, 137, (2001) p. 233. [5] Ettayebi, et al. *FEMS-Microbiology Letters*, 223(2), (2003) p. 215. [6] Chtourou, et al. *J. Chemical Technol. and Biotechnology*, 79, (2004) p. 869.[7] Aggelis, et al. *Water Research*, 37(16), (2003) p. 3897. [8] Matos, et al. *Letters in Applied Microbiology*, 45(3), (2007) p. 270. [9] Niaounakis and Halvadakis. Olive Processing Waste Management: Literature review and patent survey. Elsevier, UK, 2006.