BIOREMEDIATION OF PIGGERY EFFLUENTS USING *Scenedesmus obliquus* MICROALGA

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Effluents from intensive pig farms present high nutrient concentration, mainly ammonium, contributing to water eutrophication and pollution. Microalgae ability to deplete inorganic nutrients makes them an efficient effluent bioremediation tool. *Scenedesmus obliquus* was grown in piggery effluent (without any pretreatment) diluted with tap water at 5%v/v (187±25mg/L $N\text{-}NH4^{+}$) and compared with growth in synthetic Bristol media. A 21-days trial was performed in 1L bubble-column reactors illuminated by fluorescent and LED lamps(3klux). Microalgae growth was monitored through OD_{540nm}, dry weight and Chlorophyll content and also by flow cytometry in terms of autofluorescence read in FL3 channel (>670 nm), cell size (FSC), internal complexity (SSC) and cell membrane integrity (PI). *S. obliquus* cells have grown slower in pig effluent (m_{max}=0.13-19d^{-1}) than in Bristol media (m_{max}=0.46-0.50d^{-1}) although after 15 days the biomass productivity observed for the pig waste cultivation, operated under LED (0.127g$L^{-1}d^{-1}$) was similar to those attained for the Bristol media after 8 and 12 days (0.130 and 0.129 g$L^{-1}d^{-1}$ using Fluorescent and LED lights, respectively). The Chlorophyll content was correlated to FL3 autofluorescence, with R^2>0.97 for Bristol and R^2>0.92 for pig waste cultures. Regarding cell size and complexity, Bristol cultures did not show significant differences along time, while cells grown on pig waste increased, attaining FSC and SSC values similar to those observed for Bristol cultures. However, pig waste led to higher percentage of cells with permeabilised membrane (up to 18%) than Bristol cultures (<7%). For pig waste experiments, ammonium removal rates were >95% with final values within legal limits. *S. obliquus* cultivations proved to be an efficient system for direct piggery effluent bioremediation, attaining biomass productivities similar to those obtained in synthetic media. Using LED lighting enables to reduce the energy consumption while maintaining microalgae growth and bioremediation performance. Scale-up to an outdoor 150L photobioreactor is underway.

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