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Start-up and feeding strategy of an anaerobic sequencing batch reactor for olive mill wastewater treatment

JC Costa^{*1}, MR Gonçalves¹, IP Marques², MM Alves¹

¹*Institute for Biotechnology and Bioengineering (IBB), Centre of Biological Engineering, University of Minho, Braga, Portugal,* ²*LNEG - National Laboratory of Energy and Geology, I.P., Lisbon, Portugal*

Olive mill wastewater (OMW) is the effluent generated by olive oil industries, mainly produced in the Mediterranean areas. The production of olive oil generates huge amounts of wastewater. Anaerobic wastewater treatment processes appears as a promising technology for the treatment and energetic potential recovery of these high strength wastewaters since a renewable energy source (biogas) is generated. However, due to the high organic contents and presence of lipidic and phenolic compounds the treatment of OMW is sometimes toxic to the anaerobic microorganisms.

Aiming at define the best strategy for the anaerobic sequencing batch reactor start-up, two reactors were operated with an hydraulic retention time of 10 days, fed with OMW at 5gCOD/L. In batch assays it was previously observed that when using an adapted microbial consortium to lipids, OMW was more efficiently converted to biogas and the overall methane production was higher. On the other hand an intermittent feeding start-up was proven to promote the degradation of long chain fatty acids to methane. Therefore, two reactors, R1 and R2 were inoculated with a biomass acclimated to oleate (BAO) and a biomass non-acclimated (BNA), respectively. The inoculum type effect on start-up efficiency and the benefits of an intermittent feeding were studied.

In both reactors, the COD removal efficiency reached more than 80% after 50 days of operation. The reactor with BAO was more stable during the operation period than in the reactor with BNA. The inoculums effect was determinant in the initial phase of feeding, but, as expected, its effect was diluted after 30 days. The intermittent feeding was tested in R1. Promoting the degradation of the accumulated substrate was beneficial to increase the specific methanogenic activity of the sludge inside the reactor.

Keywords: olive mill wastewater, anaerobic digestion, Sequencing Batch Reactor, Intermittent Feeding