MICROFLORA EVALUATION ON AEROBIC TREATMENT OF OLIVE OIL WASTEWATER

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Olive oil industry is one of the most typical and economically important Portuguese agro-industries, having 29900 ton of olive oil been produced in 2002/2003. Nowadays, about 95% of the area occupied by olive trees is centred on the Mediterranean region, being the European Union countries (Spain, Italy, France, Greece and Portugal) responsible for 73% of the production at world level. This industry generates large amounts of olive oil wastewaters (OOWW), being 10 - 30 million m^3 annually produced in the Mediterranean region. The environmental problems and potential hazards caused by these effluents had lead many countries to limit their discharge and to develop new technologies for the reduction of the pollution level.

Jet-loop reactors (JACTO) developed and scaled-up by our group have been successfully used for biological treatment of winery and olive oil wastewaters [1, 2]. The study herein presented aimed to determine the interactions of reactor hydrodynamics with microflora profiles during bio-treatment of OOWW.

Physical and chemical characterisation of crude OOWW has been performed: pH, COD, TSS, VSS, N-Kjeldahl, total phosphorus and total phenol content. For the 20 dm^3-JACTO prototype reactor, a hydraulic retention time (HRT) of 12 d was found to be the best condition tested with an initial loading charge of 35,1 kg/m^3d and a COD reduction yield of about 70%. In the case of the 200 dm^3-JACTO prototype reactor, a HRT of 5 d was found to be the best condition tested with an initial loading charge of 22,9 kg/m^3d. A range of values varying between 3,98 and 2,4 g COD/dm^3 was achieved during the aerobic bio-treatment with a conversion of about 87%. Efficiency between 72 and 84% was reached for phenol removal.

Microflora identification was carried out for both bio-treatment processes and the obtained microbial profiles were compared with the crude effluent microbial profile. These analyses revealed a predominance of *Brevibacillus brevis*, *Bacillus megaterium* and *Bacillus sphaericus* during the OOWW biotreatment.

Correlation of microflora profiling with the reactor optimisation allows feasible and economical control of the bio-treatment in order to support the technological transfer to the Industry.

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References

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