CHARACTERISATION OF A MICROBIAL CONSORTIUM INVOLVED IN THE WINERY EFFLUENT BIO-TREATMENT

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The wine sector has a significant role on the economy of Portugal, having 7.3 millions hl of wine been produced in 2003/2004. This value represents 4.5% of wine produced by the main wine-producing countries at the Europe Union (France, Italy, Spain, Germany and Portugal). The winery industry generates large amounts of winery effluents (0.70 litres effluent / litre wine produced) that are mainly concentrated in the harvest grape season. The high polluting charge of these effluents and its specific composition represents a negative environmental impact, which force to a suitable pre-treatment before discharge to the municipal wastewater treatment plants or into watercourses.

INETI team developed efficient bio-treatments of winery effluents using a jet-loop type bio-reactor (JACTO) inoculated with the respective native microbial consortia [1]. Effluent microbial characterisation was carried out at the start-up, throughout and at the end of bio-reactor operations, using the traditional approach. The obtained results indicate that bio-reactor performance could be linked to the microorganisms present but further clarification is indispensable for a complete profiling of the microbial communities involved.

The aim of this work was to characterise and evaluate the microbial consortium involved in this bio-treatment in order to infer its biodegradation ability. Winery effluent microflora was collected, counted, isolated and typed. The most predominant microorganisms were identified by the Analytical Profile Index (API) identification system and used to carry out bio-treatment experiments. Each selected isolate was inoculated in 2 L-flasks specially designed to simulate the JACTO bioreactor format using sterilised crude effluent as culture medium. Cultures were incubated under the identical and optimal conditions determined during the previous bio-treatments performed at pilot scale and the efficiency of each culture evaluated in terms of COD reduction.

Physical and chemical characterisation of crude winery effluent and during the bio-treatment experiments was performed. The following parameters have been monitored: pH, COD, TSS, VSS and total phenol content.

Profile of microbial consortium structure present in the crude effluent was determined by TGGE analysis PCR amplified rRNA genes and correlated with COD removal to tentatively attribute functions to a determined type of microorganism present. Molecular profiling was compared and/or complemented with traditional microbiological methods.

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References