



## High rate anaerobic filter with floating supports for the treatment of effluents from small-scale agro-food industries

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### ABSTRACT

The performance of four laboratory-scale upflow anaerobic filters (UAFs) of about 10 L effective volume packed with small buoying polyethylene media was investigated for the treatment of wastewater discharged from various small-scale agro-food industries with different composition and concentrations viz. synthetically prepared low strength (~1.9 g COD/L), fruit canning (~10 g COD/L), winery (~20 g COD/L) and cheese-dairy (~30 g COD/L) wastewaters. For the low strength wastewater, HRT was the limiting parameter with a minimum of 4 h corresponding to a maximum OLR of 12 g COD/L.d. For the high concentrated substrates, OLR was the limiting parameter, which was influenced by the nature of the substrates treated and not by the concentration of the substrates. Indeed, the UAF treating winery wastewater (20 g COD/L) had reached the highest OLR of 27 g COD/L.d with 80% COD removal efficiency, while that of the other two reactors treating fruit canning and cheese-dairy wastewaters were comparatively lower (19 and 17 g COD/L.d respectively). At the end of the experiments, the total quantities of VSS inside the reactors were high (200–342 g), indicating that the low-density polyethylene support used in this study appears to be a good colonisation matrix to increase the quantity of biomass in the reactor. The packing medium had a dual role in the retention of the biomass that is entrapment of biomass within the support and filtration of the biomass in suspension to some extent. This result was confirmed by the specific biomass activity values, which were very close to that of suspended biomass. The efficiency of liquid mixing was good, even if the biomass matrix represented up to 70% of the reactor volume for the reactor fed with fruit canning wastewater.

**Keywords:** UAF; Anaerobic digestion; Agro-food industrial wastewaters; Packing media; Biomass activity

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