Full-scale photobioreactor for biotreatment of olive washing water: Structure and diversity of the microalgae-bacteria consortium

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Abstract

The performance of a full-scale photobioreactor (PBR) for the treatment of olive washing water (OWW) was evaluated under different HRTs (5-2 days). The system was able to treat up to 3926 L OWW day^{-1}, and consisted of an activated-carbon pretreatment column and a tubular PBR unit (80 tubes, 98.17 L volume, 2-m height, 0.25 m diameter). PBR was an effective and environmentally friendly method for the removal of phenols, COD, BOD_5, turbidity and color from OWW (average efficiencies 94.84±0.55%, 85.86±1.24%, 99.12±0.17%, 95.86±0.98% and 87.24±0.91%, respectively). The diversity of total bacteria and microalgae in the PBR was analyzed using Illumina-sequencing, evaluating the efficiency of two DNA extraction methods. A stable microalgae-bacteria consortium was developed throughout the whole experimentation period, regardless of changes in HRT, temperature or solar radiation. MDS analyses revealed that the interplay between green algae (*Sphaeropleales*),