

Application of *Typha domingensis* Pers. in Artificial Floating for Sewage Treatment

Authors : Tatiane Benvenuti, Fernando Hamerski, Alexandre Giacobbo, Andrea M. Bernardes, Marco A. S. Rodrigues

Abstract : Population growth in urban areas has caused damages to the environment, a consequence of the uncontrolled dumping of domestic and industrial wastewater. The capacity of some plants to purify domestic and agricultural wastewater has been demonstrated by several studies. Since natural wetlands have the ability to transform, retain and remove nutrients, constructed wetlands have been used for wastewater treatment. They are widely recognized as an economical, efficient and environmentally acceptable means of treating many different types of wastewater. *T. domingensis* Pers. species have shown a good performance and low deployment cost to extract, detoxify and sequester pollutants. Constructed Floating Wetlands (CFWs) consist of emergent vegetation established upon a buoyant structure, floating on surface waters. The upper parts of the vegetation grow and remain primarily above the water level, while the roots extend down in the water column, developing an extensive under water-level root system. Thus, the vegetation grows hydroponically, performing direct nutrient uptake from the water column. Biofilm is attached on the roots and rhizomes, and as physical and biochemical processes take place, the system functions as a natural filter. The aim of this study is to diagnose the application of macrophytes in artificial floating in the treatment of domestic sewage in south Brazil. The *T. domingensis* Pers. plants were placed in a flotation system (polymer structure), in full scale, in a sewage treatment plant. The sewage feed rate was $67.4 \text{ m}^3 \cdot \text{d}^{-1} \pm 8.0$, and the hydraulic retention time was $11.5 \text{ d} \pm 1.3$. This CFW treat the sewage generated by 600 inhabitants, which corresponds to 12% of the population served by this municipal treatment plant. During 12 months, samples were collected every two weeks, in order to evaluate parameters as chemical oxygen demand (COD), biochemical oxygen demand in 5 days (BOD5), total Kjeldahl nitrogen (TKN), total phosphorus, total solids, and metals. The average removal of organic matter was around 55% for both COD and BOD5. For nutrients, TKN was reduced in 45.9% what was similar to the total phosphorus removal, while for total solids the reduction was 33%. For metals, aluminum, copper, and cadmium, besides in low concentrations, presented the highest percentage reduction, 82.7, 74.4 and 68.8% respectively. Chromium, iron, and manganese removal achieved values around 40-55%. The use of *T. domingensis* Pers. in artificial floating for sewage treatment is an effective and innovative alternative in Brazilian sewage treatment systems. The evaluation of additional parameters in the treatment system may give useful information in order to improve the removal efficiency and increase the quality of the water bodies.

Keywords : constructed wetland, floating system, sewage treatment, *Typha domingensis* Pers.

Conference Title : ICSWRM 2018 : International Conference on Sustainable Water Resources Management

Conference Location : Sydney, Australia

Conference Dates : January 29-30, 2018