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Wetlands for wastewater treatment and subsequent recycling of treated effluent: a review

Reviews in Environmental Science and Bio/Technology

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Details on constructed wetland substrate

Under saturation conditions, the pores in the wetland substrate will be filling-up with water instead of air. In this case, the dissolved oxygen available in the water will be consumed by microbes. Since oxygen will be more than that restored during the circulation phase, the media will become anoxic. Moreover, the substrate will be anaerobic under inundation conditions (Scholz 2006, 2010; Stefanakis et al. 2014). Using a sand and gravel mixture in the wetland substrate is recommended, as this can improve the system behaviour in terms of hydraulic conductivity and contaminant removal (Stottmeister et al. 2003). Moreover, the use of fine-grained instead of large-grained media in a wetland system is preferable as it will provide better conditions for microorganism growth and subsequently improve pollutant biodegradation (Dordio and Carvalho 2013), but at the same time, the fine aggregate will lead to substrate clogging (Song et al. 2015). Langergraber et al. (2003) suggested using compound layers of gravel arranged by size increment from the top. However, their results showed that clogging in such a system is highly likely. Other studies showed that using an anti-sized reed bed system instead of the traditional mono-sized one, is very effective in terms of pollutant removal from heavily contaminated wastewater (Sun et al. 2007), while Song et al. (2015) indicated that the use of large-size packing media will result in high removal of chemical oxygen demand and ammonia-nitrogen, while reducing the likelihood of system clogging.

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