Short Communication

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Determination of the optimal aeration for nitrogen removal in biochar-amended aerated vertical flow constructed wetlands

*Xu Zhou [a], Lei Gao [b], Hai Zhang [a, 1], Haiming Wu [a, b, 1]**

[a] College of Natural Resources and Environment, Northwest A&F University, Yangling, Shanxi 712100, PR China

[c] Key Laboratory of Plant Nutrition and the Agri-environment in Northwest China, Ministry of Agriculture, PR China

[1] These authors contributed equally to this work.

[*]*Corresponding author.*

Email address: haimingwu14@nwsuaf.edu.cn (Haiming Wu)

Abstract

Nitrogen removal in vertical flow constructed wetlands (VFCWs) is still a key problem especially for treating low C/N wastewaters. In this study, nitrogen removal and nitrous oxide (N_2O) emission in biochar-amended aerated VFCWs were evaluated under the varying intermittent aeration (different aeration times and aeration rates). The results indicated that the optimal aeration time and rate were 2 h d^{-1} and 0.6 L min^{-1}, which could create alternant of aerobic and anaerobic conditions for the simultaneous nitrification and denitrification in VFCWs. Much higher removal efficiency of COD (95.9%), NH_4^+-N (96.6%), and TN (74.7%) was achieved under the optimal conditions, and moderate N_2O emission (282 $\mu g \cdot m^{-2} \cdot h^{-1}$) was observed simultaneously. The results can be used to select the optimal aeration in the further design and application of biochar-amended aerated CW treatments.

Keywords: Biochar; Constructed wetlands; Intermittent aeration; Nitrogen removal; Nitrous oxide