

FLOATING TREATMENT WETLANDS TO IMPROVE THE WATER QUALITY OF THE HANG BANG CANAL, HO CHI MINH CITY, VIETNAM: EFFECT OF PLANT SPECIES

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<https://doi.org/10.1016/j.scitotenv.2023.168911> Code: Pxxxxmmyyyy

ABSTRACT

Floating treatment wetlands (FTWs) are artificial platforms that allow aquatic emergent plants to grow in water. Aquatic macrophytes and microorganisms attached to plant roots contribute to the remediation of the contaminated water through physicochemical and biological processes. The pollutant removal treatment performance is affected by various factors, including the plant species. In this study, several plant species, i.e. *Canna generalis*, *Phragmites australis*, *Pennisetum purpureum*, *Cyperus alternifolius* Rottb, *Kyllinga brevifolia* Rottb, and *Cyperus odoratus* were investigated for their potential to clean-up water from the Hang Bang canal in Ho Chi Minh City (Vietnam). *Canna generalis*, *Phragmites australis*, and *Cyperus alternifolius* were found to be suitable for FTWs with the highest performance compared to that of other plant species investigated. The organic and nitrogen removal rates amounted to 48–70 gCOD/m³.d and 0.7–1.2 gN/m³.d, respectively, whereas the reduction of pathogens was around 1.86–3.00 log. Furthermore, FTW systems bring other benefits such as improving ecosystem functioning and biodiversity, producing value-added products from plant biomass, as well as attracting the attention of communities, thus increasing social acceptance of environmental technology interventions.

EXPERIMENTAL SET-UP

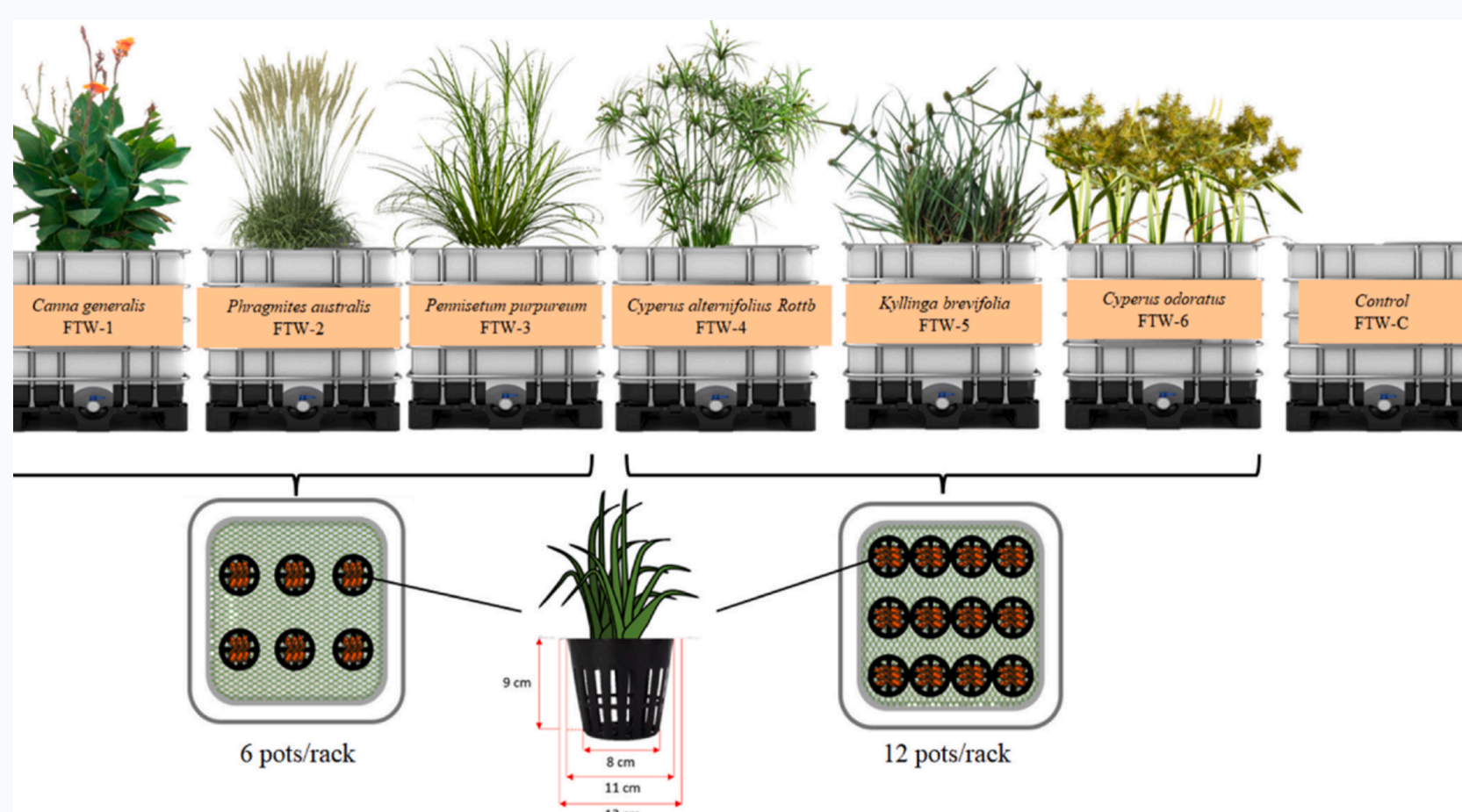


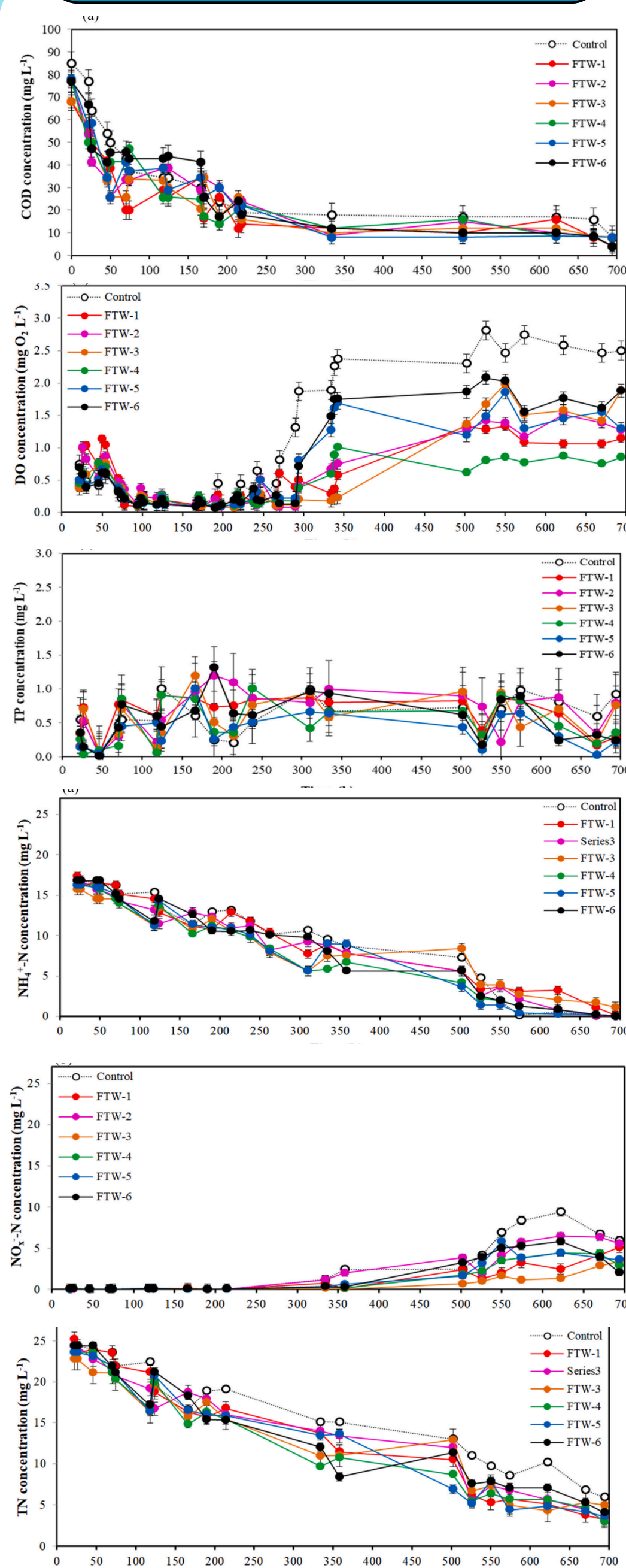
Fig. 1. Lab-scale FTW systems with different plant species: (a) initial system design and (b) after 694 h. Note: FTW-1: *Canna generalis*; FTW-2: *Phragmites australis*; FTW-3: *Pennisetum purpureum*; FTW-4: *Cyperus alternifolius* Rottb; FTW-5: *Kyllinga brevifolia*; FTW-6: *Cyperus odoratus*; FTW-C: the control tank (<https://doi.org/10.1016/j.chemosphere.2024.142786>)

CONCLUSIONS

FTW is a sustainable phytotechnology since it can be installed in any water body such as canals, lakes, and rivers.

- FTW remove nutrients from water through plant uptake and bio-processes carried out by the biofilm attached to the plant roots, while organic matter can be removed by physical filtering/entrapment through the root systems and microbial activity by biofilm layers
- The main mechanisms for eliminating pathogens are sedimentation, attachment/trapping on the roots, UV radiation, and inhibition by high DO concentrations.

WATER TREATMENT PERFORMANCE



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