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ASSESSING THE ROLE OF *Phragmites australis* IN WASTEWATER TREATMENT THROUGH RESPONSE SURFACE METHODOLOGY

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Abstract

Treatment of domestic wastewater using constructed wetland system vegetated with *Phragmites australis* was studied at lab scale. Response surface methodology (RSM) a mathematical model was employed for analyzing the effect of independent factors (inlet flow rate, outlet flow rate, retention time) on wastewater parameters e.g. electrical conductivity, BOD_5, COD, nitrates, phosphates, total solids, suspended solids, heavy metals in order to maximally treat wastewater. All independent variables were standardized using central composite design matrix utilizing different run orders. Average hydraulic loading of wastewater was 0.0104- 0.0208 cm^3/day in each system. Treatment of wastewater was best obtained with 22.5mL/min of inlet and 9mL/min of outlet and 12.5 hrs of retention time. A reduction of 60- 67% was obtained in some parameters like total solids, BOD_5, COD, and heavy metal concentration as compared to the control unplanted system. The present study enables usability and effectiveness of RSM for constructed wetland modeling and its optimization in wastewater treatment studies.

Key words: constructed wetland, *Phragmites*, phytoremediation, retention time

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