

***Canna indica* AND *Eleocharis dulcis* ON BOD₅ AND COD IN DAIRY WASTEWATER THROUGH HORIZONTAL SUBSURFACE FLOW CONSTRUCTED WETLAND: COMPARATIVE STUDY**

K.G.S. Madhushani^{1,2*} and U.D.S.S. Ranasinghe^{1,2}

¹Department of Bio-Science, Faculty of Applied Science, Vavuniya Campus of the University of Jaffna, Vavuniya, Sri Lanka

²Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka
*sanjeewanimadhushani@gmail.com

Wastewater discharged from industrial operations contains high concentrations of organic and inorganic substances causing environmental pollution. Green technologies are extensively applied in many countries in treating wastewater. Constructed wetlands (CW) are one such greener wastewater treatment technology practised worldwide over many decades. Among the different types of constructed wetlands, horizontal subsurface flow constructed wetlands (HSSFCW) are most widely used, thus becoming low impact alternatives to more conventional wastewater treatment processes. The study compared the influence of *Canna indica* and *Eleocharis dulcis* on Biological Oxygen Demand (BOD₅) and Chemical Oxygen Demand (COD) in dairy wastewater through HCCFCW. The raw water was fed into each treatment ($n = 4$) once in five days. The samples were collected in three days of hydraulic retention time from each treatment and control unit ($n = 4$), where no plants were included before subjecting samples for laboratory analysis. The data from water samples from the inlet and outlet of treatments were analyzed using a Paired t-test. Significant differences among treatment means were separated using Duncan's multiple range test using SPSS 25.0 at $\alpha = 0.05$ and confident interval (CI) = 95%. The results revealed that there was a significant difference between the inlet and outlet of each *C. indica* unit ($p = 0.0030$) and its control unit ($p < 0.0001$), *E. dulcis* unit ($p = 0.0040$) and its control unit ($p < 0.0001$) for BOD₅. The highest reduction efficiency of BOD₅ in the control unit was 40.5%, whereas 91.7% was observed in the *C. indica* unit, and 72.3% was observed in the *E. dulcis* unit. Also, there was a significant difference between the inlet and outlet of *C. indica* unit ($p = 0.0240$) and its control unit ($p = 0.0150$), *E. dulcis* unit ($p = 0.0040$) and its control unit ($p = 0.0018$) regarding COD. The highest reduction efficiencies related to COD were 90.4%, 93.9% and 69.5% in the control unit, *C. indica* unit and *E. dulcis* unit, respectively. Further, there was a significant difference ($p = 0.0030$) between the COD reduction efficiencies in both units where *C. indica* and *E. dulcis* were used. The results also revealed that the influence on the reduction of BOD₅ in both selected wetland species remained the same, and COD reduction efficiency in the *C. indica* unit was higher than that of *E. dulcis*. Hence, horizontal subsurface flow constructed wetlands through phytoremediation may be an effective green technology for treating dairy wastewater.

Keywords: BOD₅, *Canna indica*, COD, *Eleocharis dulcis*, Horizontal subsurface flow constructed wetland