POTENTIAL OF *Eleocharis densa* FOR THE CONSTRUCTION OF WETLANDS

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ABSTRACT

The potential of *Eleocharis densa* (*Ed*), plant emergent, native of Mexico and Guatemala, was evaluated to be used in the construction of wetlands, with regard to *Schoenoplectus americanus* (*Sa*) and *S. tabernaemontani* (*St*).

With each one of species, two experimental sub-superficial 100 L batch units were installed, in March 2005; using river gravel backup, besides two no-planted units. We measure their capacity of removal units shaped of fecal coliforms/mL, in log natural (FC), phosphates (PO₄) and ammonia (NH₃) in mg/L, as well as the changes in µS/cm of electric conductivity (EC) and units of pH, of domestic residual water of the region they were evaluated during 8 days each 48 hours. It was repeated 4 times to the 0, 100, 140 and 220 days since the system establishment.

The wastewater used in the experiment was taken from a channel of the region, this water had average characteristics: 0.06 (±0.03) mg/L of dissolved oxygen, pH of 7.3 (± 0.38), NO₃ no detectable, total solids of 542 (± 73) mg/L, total volatile solids 112 (± 7) mg/L, EC of 703 (± 12), 8 (± 1.4) of NH₃, 12 (± 4.5) of PO₄, and 16.12 (± 6.9) of FC, these characteristics are like a primary effluent or a septic tank effluent; because of this, down river has problems of health and eutrophization. The results in the removal of PO₄ and NH₃, was because of the gravel used as support. The gravel was evaluated independently to determine its adsorption potential and its life useful time. The depuration of FC, followed a reaction of first order, without statistically significant differences among the systems, but although they were not detected significant differences, *Ed* needed the less time to carry out the remotion with a constant average of fall of -2.2791, with which it could reach the removal of the FC with a HRT of 3.73 days. As conclusion all the species were tolerant to the wastewater employed; *Ed* showed smaller time to remove CF and went as efficient as *Sa* and *St*. 
INTRODUCTION

The rivers of the state of Durango, Mexico; present a contamination level from several to regular of residual water domestic, because of the lack of systems of depuration of easy implementation as are the wetlands. As first phase to establish wetlands, it is elaborated a semi-aquatic and aquatic list of plants natives of Durango, related to the quality of the water (Pérez, et al., 2005). From the list was chosen to Eleocharis densa (ED), plant emergent, native of Mexico and Guatemala, to evaluate its performance in the depuration of domestic wastewater with regard to other species (Schoenoplectus americanus (SA) and S. tabernaemontani (ST)), and with it to establish its potential for to be used in the construction of wetlands.

METHODS

In Sep of 2004, they were carried to the exemplary greenhouse the vegetable species before mentioned. With each one of them, two experimental sub-superficial type batch of 100 L units were installed by species in March of the 2005; utilizing river gravel backup, besides of two units unplanted. So their capacity of removal of: units shaped of fecal coliforms/mL, in log natural (FC), phosphates (PO$_4$) and ammonia (NH$_3$) in mg/L, as well as the changes in µS/cm of electric conductivity (EC) and units of pH, of residual water domestic of the region were evaluated during 8 days each 48 hours. It was repeated 4 times to the 0, 100, 140 and 220 days of established the systems, with the information the graphics were built and with them the hydraulic retention time (HRT) was determined, to carry out the removal. The differences among the systems were compared with aid of an ANOVA ($\alpha$=0.05).

RESULTS AND DISCUSSION

The wastewater used in the experiment was taken from a channel of the region, this water had characteristics average: 0.06 (±0.03) mg/L of dissolved oxygen, pH of 7.3 (± 0.38), NO$_3$ no detectable, total solids of 542 (± 73) mg/L, total volatile solids 112 (± 7) mg/L, EC of 703 (± 12), 8 (± 1.4) of NH$_3$, 12 (± 4.5) of PO$_4$, and 16.12 (± 6.9) of FC, these characteristics are like a effluent primary or a septic tank effluent, because of this down river have problems of healthy and eutrofization.

The species used showed tolerance to the characteristics of wastewater. The results of the finals contest and their comparison between the different systems are in the Table 1.

The answer in the removal of PO$_4$ and NH$_3$, was because of the gravel used as support; by which it was evaluated the independent way of adsorption potential that it present and the useful time of life was determined removing PO$_4$. 
The depuration of FC, followed a reaction of first order, without statistically significant differences among the systems, but although they were not detected differentiates significant, ED showed the less time to carry out the remotion with a constant average of fall of \(-2.2791\), with which it can reach the removal of the FC with a HRT of 3.73 days, look Fig. 1.

**CONCLUSIONS**

All the species were tolerant to the wastewater employed; ED showed smaller time to remove CF and went as efficient as SA and ST.

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REFERENCES

