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The use of different plants for phytoremediation of industrial wastewater

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Introduction

The application of phytoremediation techniques in the treatment of polluted waters (rizofiltration or rizosphere bioremediation) seems promising in several situations in which isolated settlements have difficulties in connecting or in utilizing conventional water treatment plants.¹ Based on this technique, a study on the treatment of an effluent from a Portuguese leather company is being carried out. The wastewater from this type of industry has a high organic load and, in most cases, the presence of chromium. Not all wetland species are suitable for wastewater treatment, because they must be able to tolerate the combination of continuous flooding and exposure to wastewater or stormwater containing relatively high and often variable concentration of pollutants, and as such six pilot-scale units, with different plants, were established based on EPA-Environmental Protection Agency recommendations.²

Material and Methods

The pilot scale units have horizontal subsurface flow, with a substrate composed by expanded clay - Filtralite, each one containing different plant species: *Canna indica*, *Typha latifolia*, *Phragmites australis*, *Stenophrum secundatum* and *Iris pseudacorus*. A control was also established.

The chemical parameters analysed for each pilot-unit were: Biochemical Oxygen Demand (BOD₅), Chemical Oxygen Demand (COD), Total Kjeldahl Nitrogen (TKN), Total Phosphorous and Conductivity. The determinations were based on “Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998 (S.M.E.W.W.)”.

A toxicity study was carried out based on S.M.E.W.W.

Outcome

The pilot-scale system installed at the industrial site has been operating for 5 months. The parameters analysed for the influent were COD: 1500-2700 mgO₂/L, BOD₅: 700-800 mg O₂/L, TSS: 67-150 mg/L, pH: 7.26-8.01, NTK: 200-250 mg/L, Total Phosphorous: 0,4-0,55 mg/L and Conductivity: 5.4-7.8 ms/cm.

Conclusions

The plants in the operating systems have not yet reached maturity and the performing of the pilot-scale units will be followed further. Different inlet flows will be tested to evaluate the real capacity of the system. The microbiology underlying the functioning of the system is under study.

Based on this experiment, two pilot-units will be scaled up using the most suitable plants.

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