

Evaluation of the effect of irrigation water quality on chlorophyll content in high Andean plantsX. Rosado^{2,3}, R. Pastor¹, J. Morató¹¹ UNESCO Chair on Sustainability, Universitat Politècnica de Catalunya-Barcelona Tech, c./Colom 1, Terrassa, 08222, Spain² Universitat Autònoma de Barcelona (UAB), Campus de la UAB, Plaça Cívica, Bellaterra, Barcelona³ Universidad Católica de Santa María, Urb. San José, San Jose s/n, Yanahuara, Arequipa, Peru

This study aims: i) to promote constructed wetlands (CWs) as useful profitable alternative for wastewater treatment, ii) to validate atLEAF+ measurements in three high-Andean species and iii) to evaluate autochthonous plants that can act as natural barriers. Nowadays many rivers experiment contamination and flooding episodes by climate change. Wastewater could be treated in CW and could be released safely into the environment and used to irrigate afforestation species on riverbanks. Monitoring changes in chlorophyll content enables to estimate plant health status. The present study comparatively evaluates spectrophotometric chlorophyll measurements and atLEAF+ portable chlorophyll meter measurements in three high-Andean species: Queñua (*Polylepis incana*), Chachacomo (*Escallonia resinosa*) and Totora (*Scirpus totora*). Queñua and chachacomo were irrigated with 4 types of water: mountain spring water (AL), riverine water (RH), septic tank effluent (FS) and constructed wetland effluent (HC). Among them, totora species acclimated in a vertical CW and in a horizontal CW. Leaf chlorophyll content was measured in-vivo and in the laboratory using atLEAF+. Also was measured using a spectrophotometer, for which chlorophyll was extracted using methanol, in order to validate atLEAF+ measurements. The results showed that the correlations between the atLEAF+ chlorophyll measurements and spectrophotometric measures were stronger, thus atLEAF+ is an instrument to measure chachacomo and queñua chlorophyll in the field. While it is true, chlorophyll content of chachacomo and queñua has not been affected by the irrigation with HC (every leaf has above 0.0182 mg/cm² of TCC), HC markedly improved chlorophyll content in chachacomo leaves. Which suggest that CWs are a useful profitable alternative for wastewater treatment and HC could be used for natural barrier plants irrigation.



Figure 1: Treatment of sewage and high Andean plants acting as natural barriers.

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Keywords: Constructed wetlands, high-Andean species, climate change, chlorophyll, atLEAF+.

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