

Sub-department of
Environmental Technology

Plant microbial desalination cell: in-situ salt removal without an external energy input

Jan 2016-2019

Researcher
Lucia Zwart

Supervisor
Dr. ir. David Strik

Promotor
Prof. dr. ir. Cees Buisman

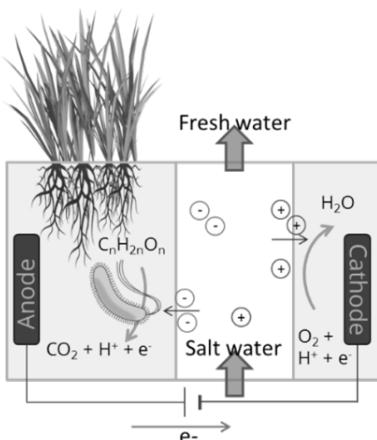
Motivation

Fresh water is becoming scarce. Our ever increasing population results in a higher demand of fresh water for drinking purposes, irrigation and use in industries. These demands are becoming greater than the Earth's natural reserves can supply. The quality of water needed can however vary for different applications and complete deionization or purification of water is not always needed. The plant microbial desalination cell (Plant-MDC) could offer a partial desalination treatment of salt (waste) water.

The technology can be applied in all (constructed) wetlands without harming the ecosystem or altering the aesthetics of the area. And since no external energy storage or input is necessary, the technology can be applied in remote areas without electrical infrastructure, keeping the costs low.

Technological Principle

The plant microbial desalination cell will combine the technology of the plant microbial fuel cell with that of water desalination.



Concept of a plant microbial desalination cell.

Micro-organisms in the anaerobic soil of (salt) marshes convert exudates from the roots of plants or dead plant material into CO₂, protons and electrons. These electrons can be harvested by placing an anode in proximity of the micro-organisms which is connected through an external circuit to another electrode where a reduction reaction is taking place. By reducing oxygen and protons to water at the cathode, the electrons will flow over the circuit as a result of the potential difference.

Research Challenge

The research challenges are to:

- provide a proof of principle for the plant desalination cell;
- optimize the system for different water streams and plants;
- apply the technology in an actual wetland, combining contaminant- and salt removal.



Potential location for the Plant-MDC in constructed wetlands treating polluted salt water from oil drillings in the desert.



CV Researcher: Lucia Zwart
Graduated: Wageningen University, Environmental Technology (2015)
Hobbies: Cooking, sports and crafting
e-mail: lucia.zwart@wur.nl
tel: 0317-483227
website: -

