Solar Desalination Greenhouse

Description

The Solar Desalination Greenhouse (SDGH) is a technology that transforms saltwater into freshwater, which can then be used for irrigation or mineralized for drinking. This desalination process is facilitated by halophytes, plants that have adapted to grow in saline conditions. As these plants grow, they humidify the air within the greenhouse. The SDGH then uses passive and active dehumidification to produce freshwater from this humid air, without the need for energy. Active condensation can yield high amounts of water with the use of electrically powered cooling devices. The SDGH also offers additional benefits such as the production of high-value halophytes and sea salt. It's a flexible system with moderate installation and operating costs, and it can utilize renewable energy sources like solar or geothermal power.

The humidification-dehumidification process (HD) is a key component of the SDGH, making it a versatile solution for water desalination.

Benefits

- Saves water by recycling and reusing the same water. As much as 95-99% water can be saved compared to conventional agriculture.
- Can be build close to the market to cut transportation cost.
- The plants grow 2.5 to 3 times faster compared to conventional vegetable farming because the roots are exposed to water and nutrients permanently.
- Vegetables are seen as organic and sustainable.

Challenges

- High capital cost for infrastructure.
- You need some basic knowledge and skills to operate the system well.
- You need energy to run the water pump.
- You will need fish feed for the fish

Country Example: South Africa

At the Welgevallen Experimental Farm in Stellenbosch, the US has adapted the SDGH to include aquaponics. The system has two water tanks with 1000 Mozambique Tilipia that are linked to 8 raised beds. The Tilipia that are fed daily provide nutrients for the halophyte plants called Salicornia. The water circulates between the plants and the fish in the tanks. The Salicornia grow in the brakish saline water, extracting the salt. The Salicornia plants can be harvested to produce a natural salt and are also used for fodder for livestock.

The water can be harvested for drinking or other agricultural purposes. It was anticipated that the plants would produce significant water vapour in the greenhouse, however, this has not yet transpired in the case of the Salicornia plants.

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Knowledge Sharing Centres

Below are the contact persons for country specific questions. Please refer to them or the Coordinator from Hochschule Wismar, for details about the technologies that have been piloted or project research, training, and dissemination activities that are being planned in your region or country. The project runs until May 2025, with Knowledge Sharing Centres established to continue the work beyond that date. More details available on the website https://www.divagri.org

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This fact sheet serves as a general overview of the above bio-based technology (BBT). It is one of seven BBT factsheets. It describes one prototype of this technology that was developed prior to 2023. Adaptations of it have been made for the various country and local contexts. Please contact the country Knowledge Sharing Centre for more details. The EU-funded DIVAGRI project (2021-2025), 'Revenue diversification pathways in Africa through bio-based and circular agricultural innovations' seeks to provide African subsistence and smallholder farmers with tools to sustainably improve farm productivity, profitability and resilience through improved management of farming resources, output diversification and creation of high-value circular bioproducts. For more, visit divagri.org

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