

DESTWATER: Drops from the Desert

Turning produced water into irrigation water

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Deserts in Oman are the driest places in the country. However, a large amount of water is produced daily in this areas as by-product in the production of oil. The Destwater project by Petwa changes this large amount of produced water into distilled water, which can be used for greenhouse irrigation.

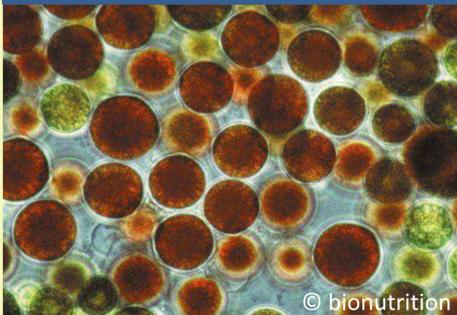
PRODUCTION PROCESS



Step 1

The algae used for beta carotene production are the saltwater algae *Dunaliella Salina*. Under ordinary conditions the algae have a green colour, but under stress conditions they turn orange, because of beta carotene they produce to protect themselves. Stress conditions rise with increasing salinity, temperature and the intensity of light and oxygen in the water. At the end of the basin the beta carotene is collected from the algae at a rate of $2.45 \text{ mg/m}^2/\text{day}^{-1}$. After collection the algae can be re-used.

Dunaliella Salina



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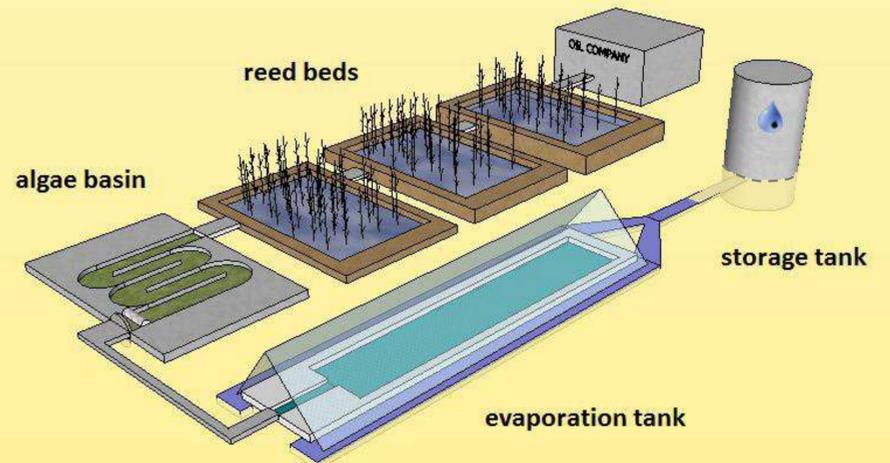
Beta carotene

- ✓ Colour substance
- ✓ Lowers free radicals in the body
- ✓ Substitute for vitamin A

Step 2

The water is desalinated in an evaporation tank. The tank consists of a basin covered by a transparent plastic sheet, which keeps the evaporated water inside the tank. The condense will run down along the roof into gutters, which transport the water underground to a buffer tank. The buffer tank has the size of one day production, so water can be stored before transportation.

PROJECT PLAN



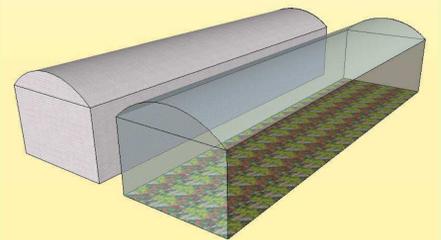
Origin of Destwater

The used water is a by-product of oil production. An average of 200 m^3 water is produced per well per day. Part of this water is used for pressure maintenance. The rest of the water is cleaned from its small residual of oil content and chemical waste in reed beds. The treated water is relatively saline (5-12%) and contains significant amounts of calcium and bicarbonate.

Step 3

Destwater can be used for hydroponic greenhouse irrigation systems. Certain types of crops, such as cucumbers, lettuce and decoration plants can be used. There are many other future options for usage, but this will need further research.

Greenhouse irrigation



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Why choose Destwater?

- ✓ Good start in the direction of sustainable use of water
- ✓ Create jobs in a new area of agriculture
- ✓ Environmental friendly process with low carbon dioxide footprint
- ✓ Possibility for salt beta carotene production
- ✓ Future options for Destwater usage, like tree and grass growth for paper production and as base for fertilizers and cleaning material in factories