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A Review on Use of sea water & Solar power for agricultural purpose in coastal areas

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Abstract

In Coastal area plants do not grow properly because of the seawater. So to overcome these difficulties, the use of this technique can provide a proper plant growth. The seawater combines a solar desalination system with an environment for cultivating crops in which transpiration is minimized. To provide fresh water we use sunlight, seawater and cooled humid air to supply more sustainable environment condition for cultivation of crops in arid coastal region. This project tries to describe simulation the seawater considering condition of the arid region in district like Kutch (Gujarat) and in many countries like Iran, Oman. With desalination of seawater, it aims to provide sustainable local production of food by combining a growing environment in which water usage is minimized by solar energy. The technique is adapted for farms in arid coastal region that are suffering from salt infected soils and shortages of potable ground water. This technique may produce around 90-95% of total fresh water.

INTRODUCTION

- The continued growth of demand for water and increasing shortages of supply are two of the most certain and predictable of the 21st century. Agriculture, with a high demand for water, will be a major pressure point. An Estimated 1.75 billion people live in areas affected by severe water stress. Scarcity of water is very detrimental to agricultural and it is expected that growth in world population will aggravate the situation further.
- Water is essential for all forms of life. Although 71% of the earth surface is covered by water, 97.5% of all sources are saltwater and merely 2.5% of all water sources;(lakes, dams, glaciers , underground water), are potable water is mainly used for three types of activities ; domestic consumption , industrial and agricultural purposes . Data shows that agriculture usage has the biggest proportion of the total water usage. And desertification continues to creep towards ever more people. In order to overcome water shortages and produce fresh water, desalination systems have been used for producing fresh water from seawater and saline groundwater. Besides Freshwater production, desalination systems are also used for decreasing salt concentration of brackish and underground water.
- Using greenhouses in agriculture provides a good environment for plant growth and reduces water consumption. Desalination to obtain freshwater from seawater or brackish water has been used in the

regions and areas that have been encountering water shortages.

- The seawater greenhouse is a concept that aims to provide a sustainable means of growing food in necessary places. The approach to provide a growing environment in which water usage of the crops is minimised , at the same time producing freshwater through a process that is driven substantially by solar energy.
- The principle of the operation is maintaining the necessary condition for proper development of the plants. The Penman equation suggests that it is possible to reduce watering requirements by shading the crops and by increasing humidity.in the baseline design, a semi-opaque plastic sheet is used to provide shade. The first option uses a similar sheet; however the air flows in a c-shaped path, travelling in opposite directions above and below the sheet. The second option uses the perforated sheet through which air is drawn. In the third option, an array of plastic pipes carrying seawater provides shade. The warmed seawater from the pipes is fed into the back evaporator to boost freshwater production.

LITERATURE REVIEW

1) A.E.Kabeel and Dr Ali M Almagar have said that in hot and sunny desert regions, it is difficult to grow plant in the open field due to the harshness of land and climates, he discussed about this method in desalination and economics. It is a method of cultivation that provides desalination, cooling and humidification in an integrated system and the process is mainly driven by solar energy. They studied the simple suggested system irrigation using solar energy and this system can be used to irrigate an area of about 2333m2 to produce Tomato, cucumber, pepper and lettuce. They studied different sustainable efforts in low capacity solar thermal desalination system as well as economics. He said that this system showed higher distilled water output especially adopting technological aspects compared with conventional system under the same operational conditions. The distillation process uses very little energy about 2kW to drive pumps and fans for each 1000m2 site. When the solar still is integrated with this system, distillation took place after solar noon and during the night due to the low absorption of solar irradiation contrary to what happens in traditional solar stills.

2) P.A.Davies and C.Paton have said that the System combines a solar desalination with an environment for cultivating crops in which transpiration is minimised. Results from the system in UAE are used to calibrate computational fluid dynamic (CFD) model. He shows that how the temperature inside the system are influenced by 3-D pattern of air movement and by long wave radiation from hot surfaces. They uses a perforated screen, dividing the system into lower and upper compartments with the upper compartment at a reduce pressure. The analysis confirms that improved cooling of the screen reduces the mean radiant temperature in this system.

3) Angela Haren Kelley have said that choosing an adaptation strategy that increases GHG emissions and energy demand (thereby exacerbating the climate change problem) is not a sustainable or reasonable strategy. to increase California's water supply, including conservation, water recycling, and storm water capture and reuse, would provide as much or more water at a reduced cost and would better facilitate climate change adaptation. Desalination might very well have its place in California's water supply portfolio, however, the marine impacts, energy and GHG issues must be addressed and regulatory safeguards established in order to ensure proper construction and minimize environmental impacts before desalination can reasonably be considered a worthwhile adaptation strategy.

4) H. Mahmoudi , S.A. Abdul-Wahab , M.F.A. Goosen ,A. Ouaged , S.S. Sablani and N. Spahis have said that "*The wind energy can be used to power the seawater greenhouse. The aim of this study is to present the feasibility of wind energy in the seawater greenhouse desalination unit.*" This current study has analysed the feasibility of an innovative autonomous wind/ solar powered seawater greenhouse desalination unit. The examination of the data collected during the operation of the SWG confirmed that it is technically feasible to take advantage of renewable energy in order to ensure the autonomy of the SWG. It was found that the use of wind/solar system can produce fresh water without the back up support of fossil fuel energy sources. This was justified by the fact that in only eight hour (between 09.00 and 17.00); the greenhouse produced 98% of total fresh water required. This interval corresponded to the duration of the solar sunning and wind efficiency interval.

5. G.R. Salehi , M. Ahmadpour , H. Khoshnazar have investigated in the Bandar Abass weather conditions and conditions and it shows that by increasing entrance air relative humidity, the water production and floor temperature increases and the differential temperature decreases. Also with increasing seawater flow rate, the water production increases and differential temperature and floor temperature decreases. With increasing entrance air flow rate, the water production water production and floor temperature decreases and differential temperature increases. Also different cycle is developed and investigates in this paper and shows that in cycle C3 which is water exist from first evaporator is passed under the greenhouse floor, is the effective cycle and produces more water than other cycle.

CONCLUSION

Based on different review papers given by the authors we conclude that the technique is adapted for farms in arid coastal region that are suffering from salt infected soils and shortages of potable ground water. It provide a sustainable means of growing food in necessary places. The approach to provide a growing environment in which water usage of the crops is minimised , at the same time producing freshwater through a process that is driven substantially by solar energy.

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