

Low cost of solar still

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ABSTRACT : Different solar stills were developed and evaluated for comparison with other solar stills available in market. Comparatively more distilled water was obtained from the solar still having an area of 1m² fabricated in fibre or metal body with glass glazing like single slope, double slope and wick type solar still. Average maximum temperature and humidity was more in double slope, single slope and wick type solar still and hence, the average quantity of distilled water obtained as 1350 ml/day, 1550 ml/day and 2450 ml/day, respectively. The plastic made up of W-shape solar still provided with 3 channels produce maximum distilled water as 2104 ml/day where as W-shape solar still with two channels erected on concrete and ground produced only 1012ml/day and 1443 ml/day, respectively. L shape solar still produce average distilled water was 925 ml/day which was very low among the all type of solar still. Comparative cost of compact nature of solar stills like single slope, double slope and wick type solar still was more than Rs.7000/- which is four times more than newly developed W-shape 3 channel solar still. Comparative output from newly developed solar still was low but it has several advantages that it is cheapest, cost efficient and easy to clean. Concentration of pH, EC, TDS and ions in solar distilled water was found to be similar as conventional distilled water. The cost of W shape three channel solar still is recovered within 4 months 6 days only.

KEY WORDS : Solar stills, Chemical analysis, Economics

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INTRODUCTION

Distilled (Evaporated and condensed) water is requisite for various (inverters) laboratories viz., Soil chemistry, Agronomy, Biochemistry, Soil analysis laboratory, Post-harvest and Food Processing, Winery etc. and also at central workshop in University. Generation of distilled water for laboratory work and topping up of the batteries is costlier and difficult due to constant supply of electricity and water supply. The theoretical minimum work needed to desalt seawater at 25°C is 0.7kWh/m³. The cost of 1lit-distilled water is Rs 17/-. Similarly the saline water can be converted into potable water with desalination unit using solar energy. The Konkan region is endeavored

with solar energy of 450–600 W/m² available for 7 to 8 hours in a day. The single slope single basin type desalination unit is commercially available which uses the solar energy for production of desalinated water. The average size of solar desalination unit is 1 sq.m with average output of 1 to 1.5 lit per day. The available solar stills are costlier and difficult to clean from inside and hence the study was undertaken with design and development of low cost solar stills.

EXPERIMENTAL PROCEDURE

Wick type, W shape and L shape of solar stills were designed on the basis of solar declination angle, slope of collector and available insolation. During theoretical design calculations of solar still (Plate A), peak winter season was considered. In winter season, December month was selected for finding the solar declination angle (δ), slope of collector (β), intensity of insolation on horizontal and vertical surface and value of $\cos \theta$ is shown in Table A. The newly developed solar stills were evaluated for load test and compared with the output of single and double slope solar still available in market.

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