Experimental works on Solar distil combined to EGT (Evacuated Glass Tube) By means of an air as unimportant Fluid

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Abstract *—Only 1% of Ground's water is in a fresh, liquid state, and almost all of this is dirty by both infections and toxic substances. For this reason, cleansing of water is extremely essential. Observance these things in notice, a novel lively solar still has been devised which will alter the dirty/saline water into pure/potable water using the solar energy. The effects are obtained by evaporation of the dirty/saline water and stylish it out as pure/drinkable water. The sun's energy heats water to the point of vaporization. When water evaporates, water vapour rises leaving the impurities like salts, heavy metals and condensate on the underside of the glass cover. In this study, the experimental performance of a single slope solar still combined with an evacuated tube collector has been investigated. In conventional active solar still combined with evacuated tube collector (ETC), the saline water has normal rotation through the evacuated tubes. This leads to installation of skins on the inner surface of the inner tube which finally decreases heat transfer from the absorber. In the present model heat collected by ETC is relocated to the saline water via air under the basin of solar still. This avoids scale realization inside the ETC. To develop the heat transfer from ETC to air, novel wiry helical structured fins are delivered inside the ETC. A theoretical model has been developed based on the energy balances for the different components of the solar still and it found to be in good agreement with experimental results.*

Keywords-*Introduction, Review papers, Methodology, Discussion about Results of SAH, Conclusion.*

I. INTRODUCTION

Clean water is a basic human necessity and without water life will be impossible. The running of renewed water is suitable a progressively important issue in many areas of the world. The increasing world populace growth together with growing manufacturing and agricultural undertakings all over the world contributes to the exhaustion and pollution of renewed water resources. The position of supplying potable water can hardly be overstressed. Conventional energy resources are finite, depleting fast and this fossil fuel-era is gradually coming to an end. So, with the heightening concerns of environmental issues, rapidly rising fuel prices and continuous increase in energy demand as well as usages, it is important to develop renewable energy based technologies to meet the country's future energy demands and the pace of development. Solar radiation (heat, light and other radiation emitted from the sun) is the primary energy source for almost all natural processes on earth. The amount of solar energy that falls on the Earth in just one hour is enough to power the world for a whole year. [1]. Solar distillation is a tried and true technology. The first known use of stills dates back to 1551 when it was used by Arab alchemists. Other scientists and naturalists used stagnant s over the coming centuries including Della Porta (1589), Lavoisier(1862), and Mauchot (1869). The first "conventional" solar still plant was built in 1872 by the Swedish engineer Charles Wilson in the mining community of Las Salinas in what is now northern Chile (Region II). This stagnant was a large basin- type still used for supplying renewed water using brackish feed water to a nitrate mining community. The plant used wooden days which had blackened bottoms using logwood dye and alum. The total area of the distillation plant was 4,700 square meters. On a typical summer day this plant produced 4.9 kg of distilled water per square meter of stagnant surface [3]. Concentration is one of the most important methods of getting potable water from brackish and sea water by using the free energy supply from the sun. In nature, solar concentration produces rain when solar radiation is absorbed by the sea and causes water to evaporate. The evaporated water rises above the ground's surface and is moved by the wind.

II. REVIEW PAPERS

A used different ways to generate distill water and did experimentation for the improvement of the result. A stepped solar still is used to enhance the productivity of the solar still. The concept of integrating the stepped solar still along with inclined flat plate collector is introduced in this research work. In this stepped type solar still, a conventional basin of area 1 m^2, was placed at the bottom. Another absorber plate, stepped type was fixed on the top of the conventional basin. Experiments were conducted with various depths in the conventional basin. A conventional stagnant was fabricated and run parallel with the experimental set up for comparison. Sensible heat storage mediums such as rocks, pebbles were added to the top basin of stepped trays and bottom conventional basins to increase the temperature of water in the stagnant. They used different packing materials such as wooden chips, sand, coal, coconut coir, were added in the inclined flat plate collector to increase the area of exposure. For different packing material analyses, rock, sponge and wick combination gains the maximum productivity of 1745 kg/m^2 and lowest productivity is for sand and wick combination (1200 kg/m^2) [5]. They were tested different designs by researchers to improve the productivity of solar still. In their experimentations, the solar still was integrated with external or internal condenser is deemed to be effective and efficient design. In this detailed survey, they wear seeking to introduce, explain and discuss the status of different solar stills integrated with different condensers arrangements. It was found that the annual yield of the solar still was maximum when the condensing glass cover inclination is equal to the latitude of the place. Providing additional area for condensation increases the condensation rate as well increases the evaporation rate in the basin. Condensers can be used either to pre-heat the mineralized water or to provide hot water or, both depending on requirements. The glass and basin water temperatures of solar still integrated with external condenser are less than that of conventional stagnant. This is mainly because the small power fan is used to exhaust the water vapour from the still to the condenser. In addition, the fan takes the non-condensable gases away from the basin stagnant to the condenser. The double condensing chamber solar still will be more economical on large scale productivity to provide drinking water in remote areas [7]. They did some preliminary work to make low cost MES was done as well as its outdoor test because cost of land and installation can be partially compensated by regular construction cost of buildings in BIDSAL, MES could be a practical solution for micro solar concentration , if it can be produced in low cost. Since each water deficient country has its own specific environmental condition as well as specific social and economic requirements of water concentration , collaboration with researchers in such countries would be helpful to speed up the development. Actual field test with improved prototypes in such countries should be done in future. Amount of water production as well as quality of the water should be analyzed in actual test bed to check its edibility [9]. An experimentally investigated the performance parameters of the corrugated solar still (CrSS) and conventional solar still (CSS) are from view concerns with using the double layer wick material and also reflectors together inside the CrSS. Experimental investigations were implemented covering many operating conditions. For example, the variation of solar emission, atmospheric temperature, basin water temperature, and glass temperature of at saline water depth 1 cm. As expected, it is observed that the brine and glass temperatures go up as the time grows to get a maximum value in the afternoon and begin to decline after that. This is due to the solar emission increases in the morning hours, reaching its maximum values around midday and then decreases in the afternoon [10]. A developed mathematical and experimental set up to investigate the optimum inclination angles of the glass cover of the double slope solar still, and orientation for maximum collected solar energy that could be captured by the solar still glass cover. From the experimentation they obtain that the mathematical expression for the transmitted solar energy through the surface of the glass cover of the double slope solar still is obtained. For single glass solar still, the optimum cover tilt angle that is close or almost equal to the latitude angle with facing to the south direction. The optimum tilt of the cover glass of the double slope solar still not necessary to be symmetrical but has values depend on the direction of each surface with respect to the south direction [12]. They have made an attempt to evaluate inner and outer glass temperature and its effects on yield. They found that higher yield is obtained for an active solar still as compared to the passive solar still due to higher temperature difference. They have also carried out study on effect of condensing cover material on yield of an active solar still. It is observed that copper gives higher yield as compared to glass and plastic due to higher thermal conductivity. They also developed the thermal model of active solar still on two assumptions (i) temperature of inner and outer glass is equal and (ii) temperature of inner and outer glass is not equal. They observed that the daily yield values were 3.08 kg and 2.85 kg for the two above condition respectively [16]. They studied the transient performance of a solar still coupled with flat plate collector under thermosyphon mode. The study revealed that the evaporative heat transfer coefficient depended on temperature when evaluating performance of solar still. Single slope solar still coupled with flat plate collector in which mirrors are fixed inside the solar still was investigated by. They found 36% more yield with coupling of flat plate collector. Their result showed that at 2 cm water depth output is higher and observed that solar still productivity proportional to the solar radiation intensity [19]. A designed, fabricated and tested a modified photovoltaic thermal PV/T double slop active solar still. System operated with natural and forced circulation mode. From their experimental study, they concluded that parallel forced Circulation mode configuration of solar still produced higher yield than the other configurations and obtained 7.54 kg/day with 17.4 % energy efficiency. The electric efficiency of integrated PV module was in the range of 9.5 to 12.4 % as analyzed. They experimentally studied on comparative evaluation of the annual performance of single slop passive and hybrid PV/T active solar still for New Delhi climatic conditions. They found efficiency of active and passive solar still in the range of 9.1 to 19.1 % and 9.8 to 28.4 % respectively [22]. They inferred that the integration of evacuated tube solar collector with solar still increased the water temperature as well as yield. They found that, yield was decreased with increase in water depth and obtained 3.8 kg/m2 for 3 cm basin water depth. They also concluded that, to make system efficient the combination between the size of evacuated tube collector and basin water depth needs adjustment. They suggested that, small size of evacuated tube collector with 10 numbers of tubes is preferable. Double basin active solar still coupled with evacuated glass tube solar collector and use of glass stray inside the solar still, to reduce heat loss of upper portion and to get more output was reported. Their experimental study showed that, maximum productivity was increased by 14.7% with double basin as compared to single basin solar still [25].

III. Methodology

Experimental measurement will be measure to evaluate the performance of the solar still under the field conditions. At the beginning of test the basin will filled with saline water to a desire level before some hours to bring the water in steady state. The condensing cover will be clean properly before the starting of experiment or remove the dust deposition. Using tap valve, the same thermal mass of water maintain in the basin. The experiments will conduct at the water depth of 1cm, 2 cm, and 3 cm. The period of test will start at 9:00 am and continue till 4:00 pm. During experimentation the following parameters were measured hourly. Solar intensity on glass covers of solar still and evacuated solar collector. Following temperatures, Ambient air temperature, Basin temperature, Air temperature in air chamber.

IV. DISCUSSION ABOUT RESULTS OF SAH

4.1.1 Results of 1 cm of water without EGT

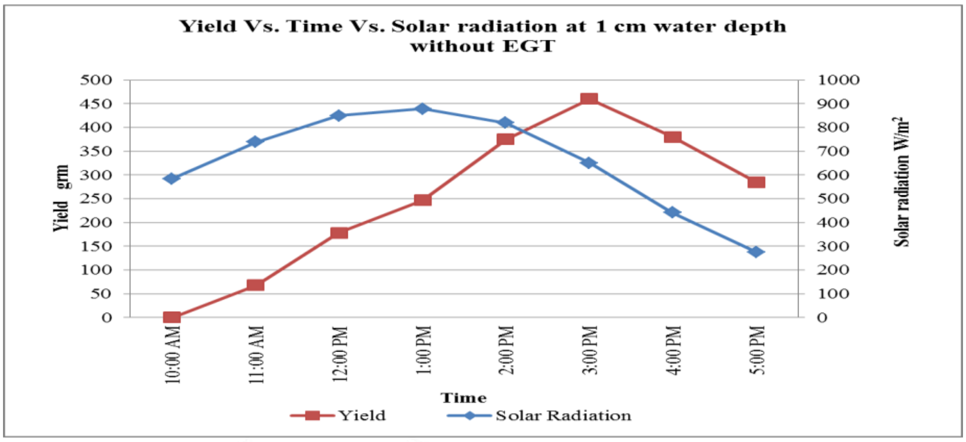

Figure 1 yield at 1 cm without EGT

4.1.2 Results of 2 cm of water without EGT

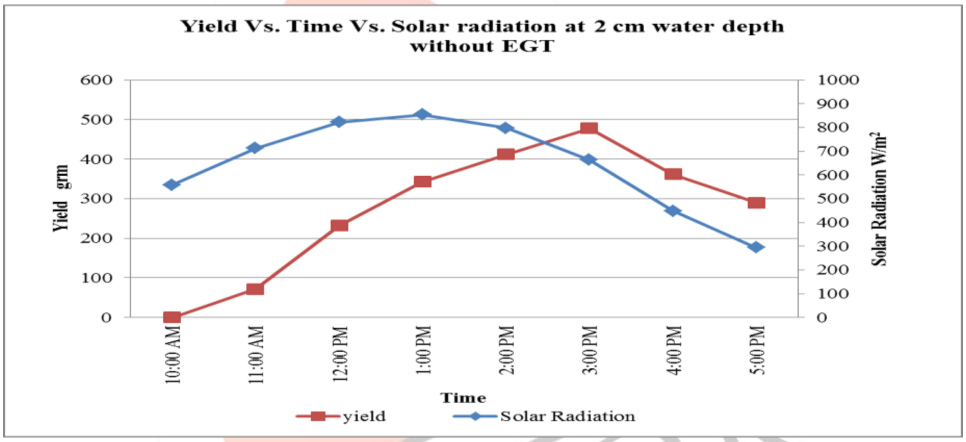

Figure 2 yield at 2 cm without EGT

4.1.3 Results of 3 cm of water without EGT

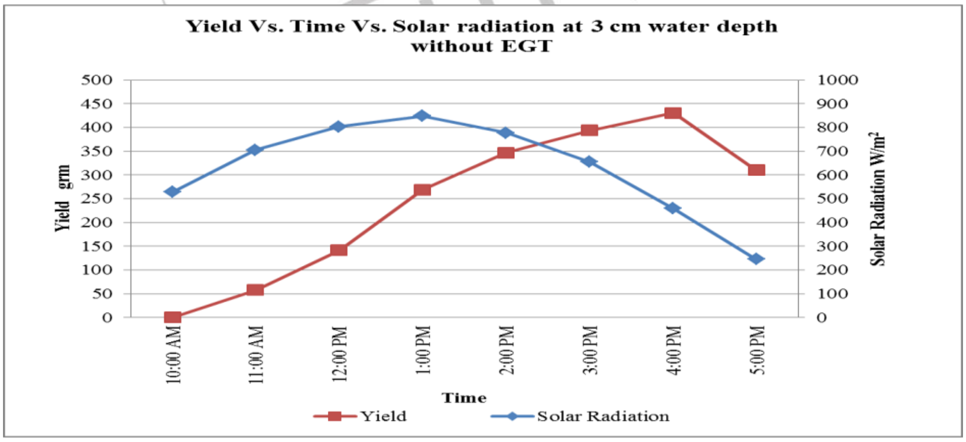

Figure 3 yield at 3 cm without EGT

4.1.4 Results of 1 cm of water with EGT

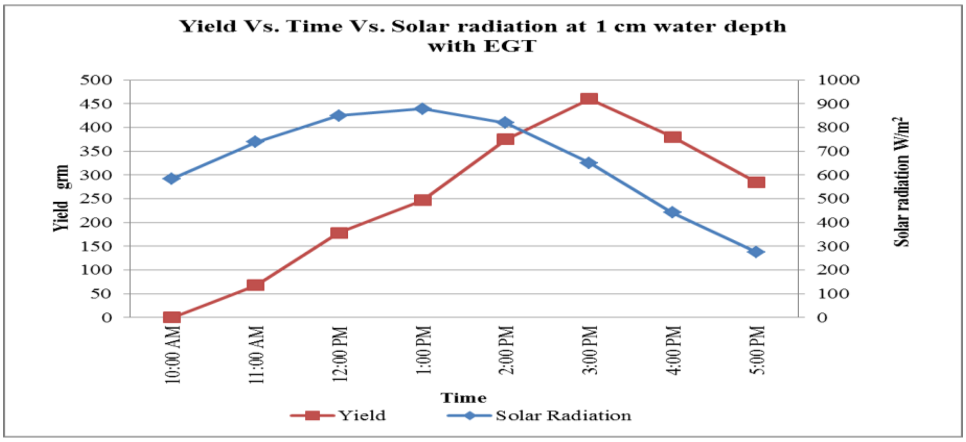

Figure 4 yield at 1 cm with EGT

4.1.5 Results of 2 cm of water with EGT

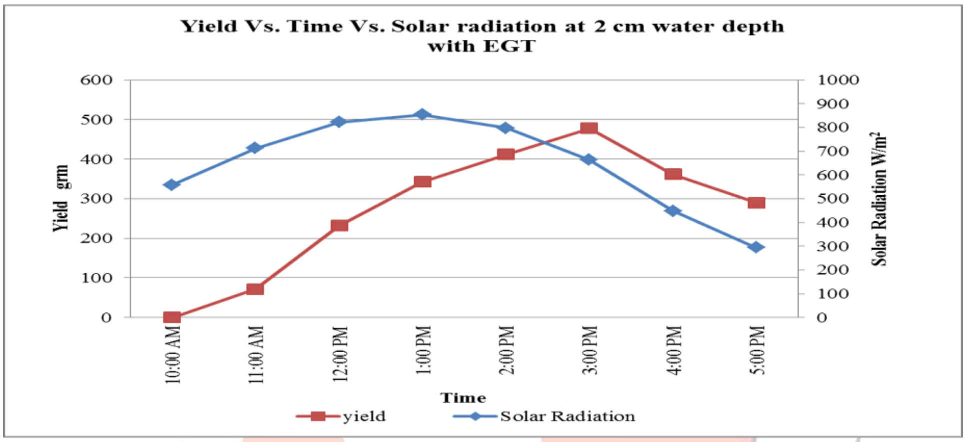

Figure 5 yield at 2 cm with EGT

4.1.6 Results of 3cm of water with EGT

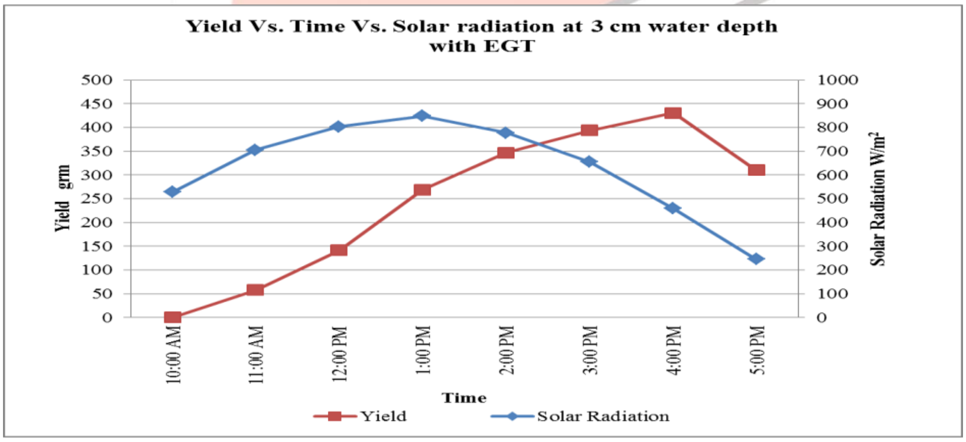

Figure 6 yield at 3 cm with EGT

V. CONCLUSIONS

It has been found that the average thermal efficiencies of active solar still without EGT respective water depth as 1, 2, 3, and with EGT water depth 1, 2, 3 were 20, 19, 15, and 41, 45 and 35% respectively. From the present study, it has been observed that 2 cm water depth gives maximum distilled output and maximum efficiency

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