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IMPACT OF DESIGN AND CLIMATIC PARAMETERS ON PERFORMANCE OF DOMESTIC TYPE INTEGRATED SINGLE SLOPE SOLAR STILL – AN EXPERIMENTAL VALIDATION

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Abstract

The work was spurred by the expanding familiarity with the requirement for improving water supplies plots in bone-dry terrains highlighting a suitable innovation for sunlight based vitality use in the desalination field in India. The routine desalination advances like multi stage streak, different impact, vapor pressure, press trade, switch osmosis, electro dialysis are costly for the generation of little measure of new water, likewise utilization of customary vitality sources negatively affects nature. Sunlight based refining speaks to a most appealing and straightforward method among other refining procedures, and it is particularly suited to little scale units at areas where sun oriented vitality is significant. The present work is identified with impact of plan and climatic parameters on execution of local sort coordinated single incline sun powered still with and without level plat authority with 6, 9, 12 cm water profundity. From the present trial think about it has been inferred that water profundity, slant of glass cover gives huge impact on yield of single incline sun based still. Tests of still with level plate gatherer have additionally been performed and it has been seen that there is significant impact of level plate authority on the execution of still. In spite of the fact that sun oriented still have not been effectively marketed so far, with the progressing research endeavors, they can be adjusted and enhanced for future residential applications.

Introduction

The new water emergency is now apparent in many parts of India, shifting in scale and power at various circumstances of the year. The crisp water emergency is not the consequence of common variables, but rather has been brought on by human activities. India's quickly rising populace and changing ways of life additionally expands the requirement for new water. Extraordinary rivalry among contending client's horticulture, industry and residential part is driving the ground water table further and more profound. Across the board contamination of surface and groundwater is lessening the nature of crisp water assets. Crisp water is progressively becoming the dominant focal point on the monetary and political motivation, as more debate between and inside states, regions, districts, and even at the group level emerges. Almost One million youngsters in India kick the bucket of looseness of the bowels maladies every year straightforwardly on account of drinking hazardous water and living in unhygienic conditions. Somewhere in the range of 45 million individuals are influenced by water quality issues brought about by contamination, by abundance fluoride, arsenic, press or by the entrance of salt water. Millions don't have sufficient amounts of safe water, especially amid the mid year months. In country zones, ladies young ladies still need to walk long separations and spend up to four hours each and every day to give the family unit water [1]. Shortage of new water issues are confronting numerous bone-dry zones of Gujarat and Rajasthan, fortunately these spots are getting more measure of sunlight based vitality, separated Gujarat and Rajasthan that in western India, which confront water deficiency and have tremendous underground saline water sources, certain areas in Haryana state and Maharashtra states additionally have underground saline water regardless of high rain fall [2]. The town people groups are confronting part of challenges to get crisp water for their family needs. All families the ladies and youngsters are in charge of gathering and capacity of water. The nature of drinking water additionally not appropriate for human wellbeing, it was found by tried the town water tests at Guru Kripa test house at Ajmer locale. In the wake of dissecting in every one of the

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perspectives creators inferred that, the town people groups are expecting reasonable minimal effort cleaning gadgets for getting immaculate drinking water [3]. Desalination of salty water and seawater to give the required drinking water satisfy a fundamental social need and it does this with no genuine effect on the earth. The routine desalination advancements like multi stage .slag, various impact, vapor pressure, press trade, switch osmosis, electro dialysis are costly for the creation of little measure of crisp water, additionally utilization of customary vitality sources negatively affects nature. Sun powered refining gives mostly bolster humankind's needs to crisp water with free vitality, basic innovation and clean environment.

Sun powered stills have a decent shot of achievement in India for lower limits which are more than 20 km far from the wellspring of crisp water and where the TDS of saline water is more than 10,000 ppm or where seawater is to be desalted [4]. India, being a tropical nation, is honored with a lot of daylight. The normal day by day sun powered radiation changes between 4 and\ 7 KWh per square meter for various parts of the nation. There are on a normal 250–300 clear sunny days a year. In this manner, it gets around 5000 trillion kWh of sunlight based vitality in a year. The yearly worldwide radiation changes from 1600-220 kW/m2. The most elevated yearly worldwide radiation is gotten in Rajasthan and northern Gujarat. Notwithstanding the constraints of being a weaken source and irregular in nature, sun based vitality has the potential for meeting and supplementing different vitality prerequisites Solar vitality frameworks being particular in nature could be introduced in any way according to the necessity. This paper presents of a general audit and specialized appraisals of different uninvolved and dynamic sun powered refining frameworks in India. The appraisal likewise suggested some examination territories in the field of sunlight based refining, prompting to high effectiveness are highlighted lastly communicated the monetary investigation of sun powered stills quickly.

Refining has for quite some time been viewed as a method for making salt water drinkable and purging water in remote areas. As ahead of schedule as the fourth century B.C., Aristotle portrayed a technique to vanish polluted water and after that gather it for consumable utilize. Middle Eastern chemists were the soonest known individuals to utilize sun oriented refining to deliver consumable water in the sixteenth century. In any case, the initially reported reference for a gadget was made in 1742 by Nicolo Ghezzi of Italy, despite the fact that it is not known whether he went past the theoretical stage and really fabricated it. The principal advanced sunlight based still was implicit Las Salinas, Chile, in 1872, by Charles Wilson. It comprised of 64 water bowls (an aggregate of 4459 square meters) made of darkened wood with inclining glass covers. This establishment was utilized to supply water (20,000 L/day) to creatures working mining operations. After this region was opened to the outside by railroad, the establishment was permitted to fall apart however was still in operation as late as 1912-40 years after its underlying development. This plan has shaped the reason for the larger part of stills worked since that time [5].

Amid the 1950s, enthusiasm for sun based refining was resuscitated, and in for all intents and purposes all cases, the goal was to grow expansive unified refining plants. In California, the objective was to create plants fit for delivering 1 million gallons, or 3775 cubic meters of water every day. In any case, after around 10 years, analysts around the globe reasoned that expansive sunlight based refining plants were an excess of costly to rival fuel-.red ones. Along these lines, examine moved to littler sun powered refining plants. In the 1970s, 38 plants were inherent 14 nations, with limits extending from a couple of hundred to around 30,000 L of water for each day. Of these, around 33% have since been disassembled or surrendered because of materials disappointments. None in this size range is accounted for to have been inherent the most recent 7 years. In spite of the developing disheartening over group estimate plants, McCracken Solar Company in California proceeded with its endeavors to advertise sun oriented stills for private utilize. Overall enthusiasm for little private units is developing, and now that the cost of oil is ten circumstances what it was in the 1960s, enthusiasm for the bigger units might be restored. Albeit sun based refining at present can't contend with oil-.red desalination in huge focal plants, it will without a doubt turn into a suitable innovation inside the following 100 years, when oil supplies will have moved toward weariness [6].

Classification of solar distillation systems

On the premise of different changes and method of operations presented in customary sun based stills,

these sunlight based refining frameworks are delegated inactive and dynamic sun oriented stills. On account of dynamic sun oriented stills, an additional warm vitality by outer mode is sustained into the bowl of inactive sun powered still for speedier vanishing. The outer mode might be gatherer/concentrator board squander warm vitality from any concoction/modern plant and so on. In the event that no such outer mode is utilized then that sort of sun oriented still is known as uninvolved sun powered still [7, 8, 9].

Distinctive sorts of sun powered still accessible in the writing are routine Solar Stills, Single-incline Solar Still with Passive Condenser, Double Condensing Chamber Solar Still, Vertical Solar Still, Conical Solar Still, Inverted Absorber Solar Still, Multi-Wick Solar Still, and Multiple Effect Solar Still [10. 11, 12].

Fig 1: Experimental setup of solar still (23^o) with collector

The exploratory setup was introduced at RKDF University, Bhopal as appeared in picture given beneath. This place has been chosen because of open space no shadow zone amid sun sparkle hours. Examinations are performed for still (23o) joined with and without level plate authority with various profundity of water to three sequential days. Diverse parameters, for example, temperatures at water surface, inward and external surface of glass and encompassing condition, worldwide and diffuse radiation and yield are recorded hourly.

RESULT AND DISCUSSION

Yield of single slope solar still without flat plat collector with 6 cm water depth

Variation of ambient temperature and relative humidity for 6 cm water depth-

Figure 2 shows the variation of ambient temperature (Ta) and relative humidity (γa) with respect to time. This observation was performed in the month of August with 6 cm depth of water in the single slope solar still.

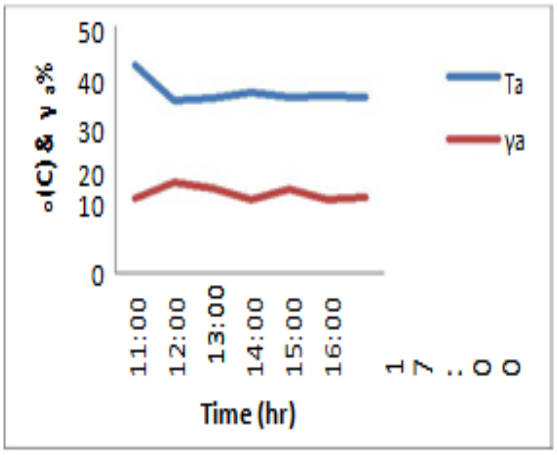

Fig 2: Variation of ambient temperature (Ta) & relative humidity (γa) for 6 cm water depth

The ambient temperature and relative humudity at 11:00 hour is 42.2 & 15.2 respectively and it reduce up to 35.8^{o}c
& 15.3% repectively at 17:00 hr. Temperature is inversly proportional to relative humidity. So as ambient temperature increases, relative humidity deceases that's why the highest ambient temperature 36.6^{o}C obtained at 14 hours whereas the lowest ambient humidity obtained 15% at the same time.

Varaition of ambient temperature, global and diffuse radiations for 6 cm water depth-

Fig 3 shows the variation between global radiation and diffused radiation with respect to time. It also performed in the month of August and it is noticed that the value of global radiation is always higher than the diffused radiation. The global radiation and diffuse radiation is 1070 and 169 w/m^2 at 11:00 hr and at 17:00 hr it becomes 105.1 and 52 w/m^2. The maximum global radiation radiation is obtained at 12 hours i.e. 1084 w/m^2. The global radiation is mainly responsible for increase in atmospheric as well as inside still temperature.

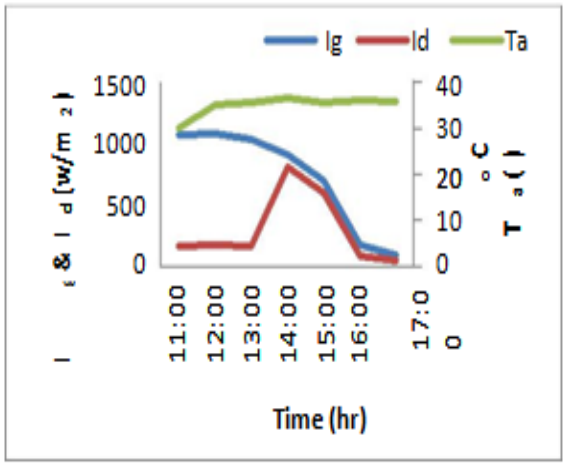

Fig 3: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 6 cm water

Variation of global, diffuse radiations and yield for 6 cm water depth-

Figure 4 shows the variation between global radiation (Ig), diffused radiation (Id) and yield (m). This figure shows the yield of the single slope solar still with respect to time.

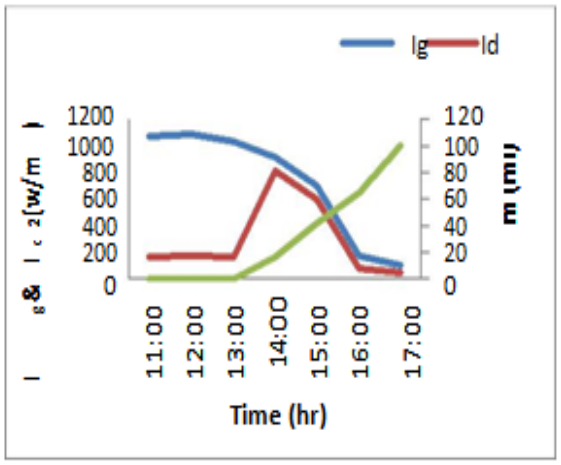

Fig 4: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 6 cm water depth

During 11-13 hour yeild is zero ml but after 13 hours some yeild is found.The total yield obtained from 11:00 hr to 17:00 hr is 224 ml. The highest yeild obtained during 17 hours i.e. 100 ml becase of higher condesation process. In this inside the solar still temperature is higher than the ambient so condesation prosess increases and simultaniously yeild.

Variation of water temperature, inner surface of the toughened glass, outer surface of the toughened glass and yield for 6 cm water depth-

Figure 5 shows the variation of temperature of water inside the still (Tw), inner surface of the toughened glass (Tgi), outer surface of the toughened glass (Tgo) and yield (m) with respect to time.

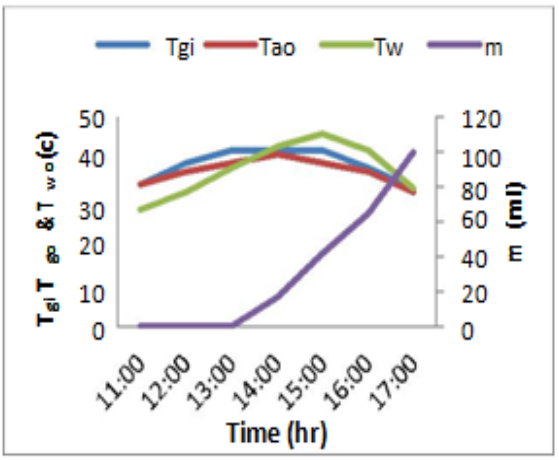

Fig 5: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 6 cm water depth

There is slightly variation in the values of Tw, Tgi and Tgo at 11:00 hr. But after that temperature of the water increased upto 46 ^{o}C at 15:00 hr it became 16^{o}C and 33^{o}C. Further when temperature of the atmosphere decreases then due to condensation process yield increases. Results of maximum yield 100 ml obtained at 17 hours.

Effect of Water Depth of 9 cm on Yield of Single Slope Solar Still Variation of ambient temperature and relative humidity for 9 cm water depth-

Figure 6 shows the variation of ambient temperature (Ta) and relative humidity (ya). This observation was performed in the month of august with 9 cm depth of water in the single slope solar still.

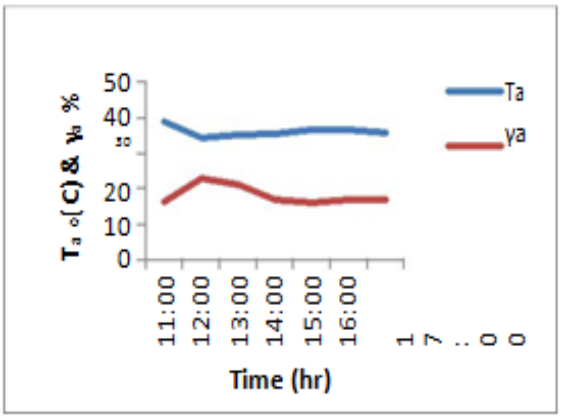

Fig 6: Variation of ambient temperature (Ta) & relative humidity (ya) for 9 cm water depth

Here the values of Ta and γa at 11:00 am is 39.1°C and 16.4% respectively whereas at 17:00 hr it was changed up to 36.0°c and 17.1% respectively.

Varaition of Ambient Temperature, Global and Diffuse radiations for 9 cm water depth-

Fig 7 shows the variation between global radiation and diffused radiation with respect to time. It also performed in the month of August and it was examined that global radiation is always more than diffused radiation. The maximum value of global and diffuse radiation are 1038 w/m^2 at 13 hour and 374 w/m^2 at 14:00 hour repectively. The minimum value of global and diffuse radiation are 100.4 w/m^2 at 17 hour and 92.6 w/m^2 at same time. The ambient temperature increases with global radiation.

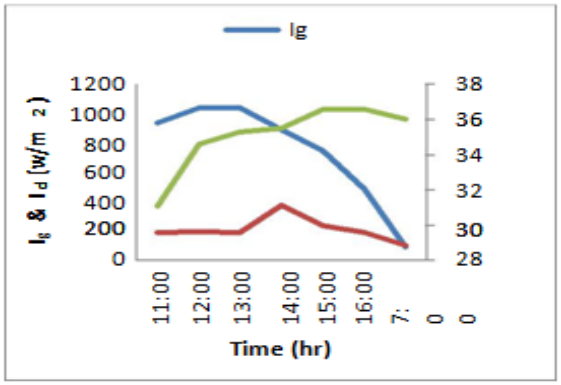

Fig 7: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 9 cm water depth

During the experiment maximum ambient temperature 36.6°C is found at 15 hours whereas minimum 31.1°C at 11 hours.

Variation of Global, Diffuse radiations and yield for 9 cm water depth-

Figure 8 shows the variation between global radiation, diffused radiation and yield. This figure shows the yield of the single slope solar still at 9 cm water depth.

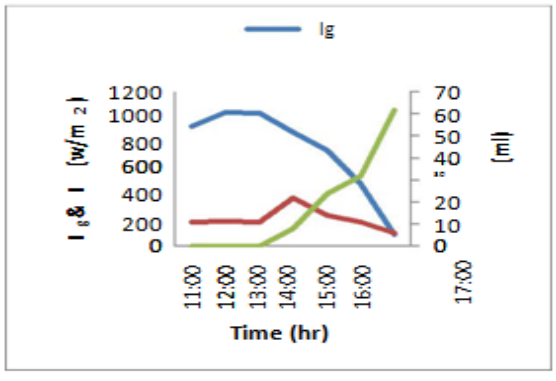

Fig 8: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 9 cm water depth

The value of Ig is greater than Id between 11:00 to 13:00 hr and no yield is present, but after that it suddenly increased and reached up to a level of 62 ml at 17 hour. Total yeild during the day is 126 ml which is lower than the first day of experiment. This is found bacause of amount of water increased. The higher quantity of water needs more energy for distillation process.

Variation of Water Temperature, Inner Surface of the Toughened Glass, Outer Surface of the Toughened Glass and Yield for 9 cm water depth-

Figure 9 shows the variation of temperature of water inside the still (Tw), inner surface of the toughened glass (Tgi), outer surface of the toughened glass (Tgo) and yield (m) with respect to time.

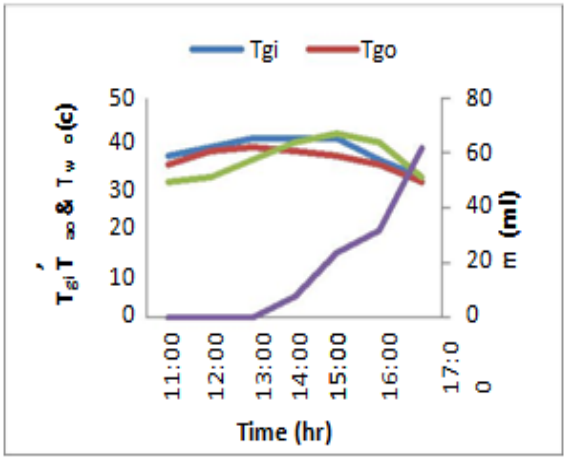

Fig 9: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 9 cm water depth

The total yield is 126 ml between 11:00 to 17:00 hr. Water temperature and inside glass temperature at the 11:00 hr is 31 °C and 37°c while at l7:00 it becomes 32 °C and 32 °C which is almost same. But the maximum temperatures of water temperature and inside glass are 42 °C and 41 °C respectively.

3.3. Effect of Water Depth of 12 cm on Yield of Single Slope Solar Still

Variation of ambient temperature and relative humidity for 12 cm water depth-

Figure 10 shows the variation of ambient temperature and relative humidity. This observation is performed in the month of August with 12 cm depth of water in the single slope solar still.

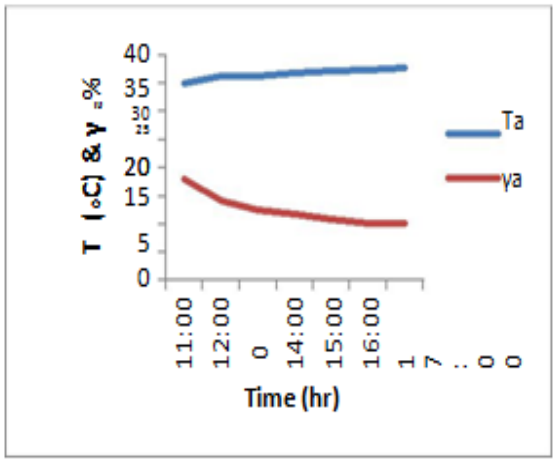

Fig 10: Variation of ambient temperature (Ta) & relative humidity (ya) for 12 cm water depth

The value of ambient temperature at 11:00 hr is 35.2 ^{o}C and at 17:00 hr it becomes 37.8 ^{o}C. The relative humidity is decreased from 18% to 10.2% during 11 hrs to 17 hrs. the maximum ambient temperature and relative humidity is found 37.8 ^{o}C and 18%.

Varaition of Ambient Temperature, Global and Diffuse radiations for 12 cm water depth-

Fig 11 shows the variation of ambient temperature with respect to global and diffuse radiations for 12 cm water depth. It also performed in the month of August. The maximum value of global and diffuse radiation are found 1108 w/m^2 at 12 hour and 304 w/m^2 at 14:00 hour repectively. The minimum value of global and diffuse radiation are 90 w/m^2 at 17 hour and 88 w/m^2 at same time.

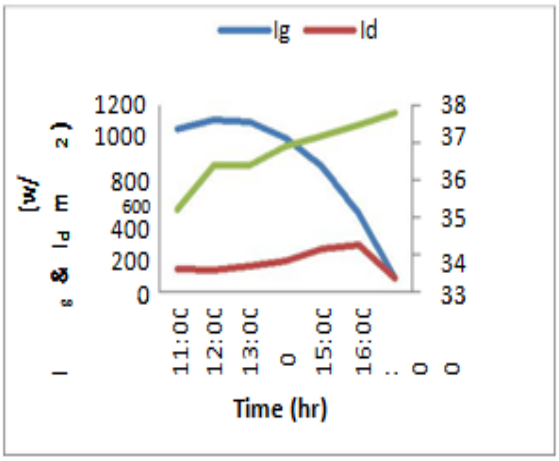

Fig 11: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 12 cm water depth

The ambient temperature increases with global radiation. During the experiment maximum ambient temperature 37.8^{o}C is found at 17 hours whereas minimum 35^{o}C at 11 hours.

Variation of Global, Diffuse radiations and yield for 12 cm water depth-

Figure 12 shows the variation between global radiation, diffused radiation and yield of the single slope solar still with respect to time.

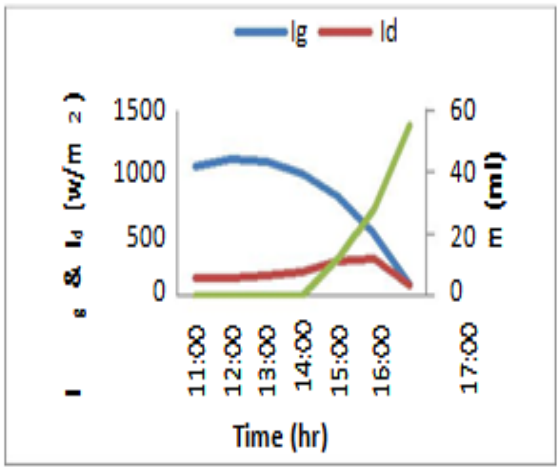

Fig 12: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 12 cm water depth The total yield obtained from this is 95 ml.which is quite less as the depth of the solar still is increased.

Variation of Water Temperature, Inner Surface of the Toughened Glass, Outer Surface of the Toughened Glass and Yield for 12 cm water depth-

Figure 13 shows the variation of water temperature, inner surface of the toughened glass, outer surface of the toughened glass and yield for 12 cm water depth with respect to time.

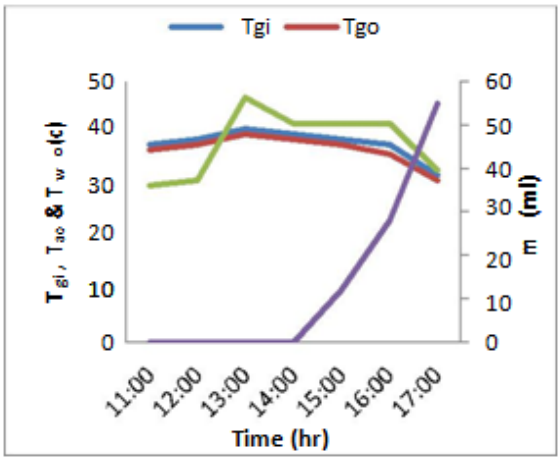

Fig 13: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 12 cm water depth

As the experiment is started at 11:00 hr and there is no yield during 11 hr to 14 hr but from 14 hr yield suddenly increased and reached to a total of 95 ml at 17:00 hr, as the experiments is performed between 11:00 to 17:00 hr. where as in Tgi and Tw there is slightly variation in both the values. It has been noticed that as the depth of the solar still is increased the yield obtained dereased and the value of Tgi is greater than Tgo.

Yield of single slope solar still with flat plate collector with 6 cm water depth Variation of ambient temperature and relative humidity for 6 cm water depth-

Figure 14 shows the variation of ambient temperature (Ta) and relative humidity (γa) with respect to time. This observation was performed in the month of September with 6 cm depth of water in the single slope solar still **with Flat Plate Collector**.

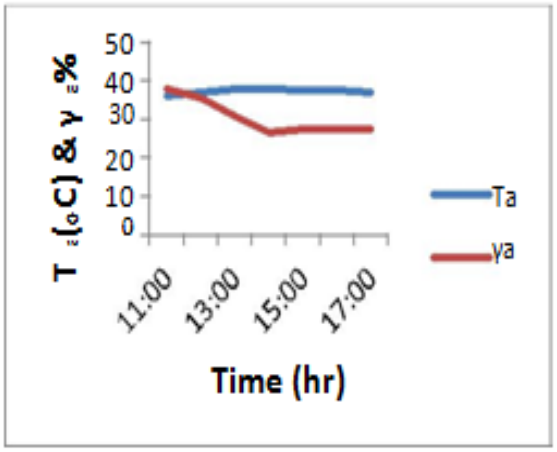

Fig 14: Variation of ambient temperature (Ta) & relative humidity (γa) for 6 cm water depth

The ambient temperature and relative humudity at 11:00 hour is 36.2 °C & 38.1% respectively and at 17:00 hr it bacomes 37.33c & 27.7% repectively. Temperature is inversly proportional to relative humidity. So as ambient temperature increases, relative humidity deceases that's why the highest ambient temperature 38.22°C obtained at 13 hours whereas the lowest ambient humidity obtained 27.7% at 17 hours.

Varaition of ambient temperature, global and diffuse radiations for 6 cm water depth-

Fig 15 shows the variation between global radiation and diffused radiation with respect to time. It also performed in the month of September and it is noticed that the value of global radiation is always higher than the diffused radiation. The global radiation and diffuse radiation is 410 and 154 w/m^2 at 11:00 hr and at 17:00 hr it becomes 18 and 15 w/m^2. The maximum global radiation radiation is obtained at 13 hours i.e. 1048 w/m^2. The global radiation is mainly responsible for increase in atmospheric as well as inside still temperature.

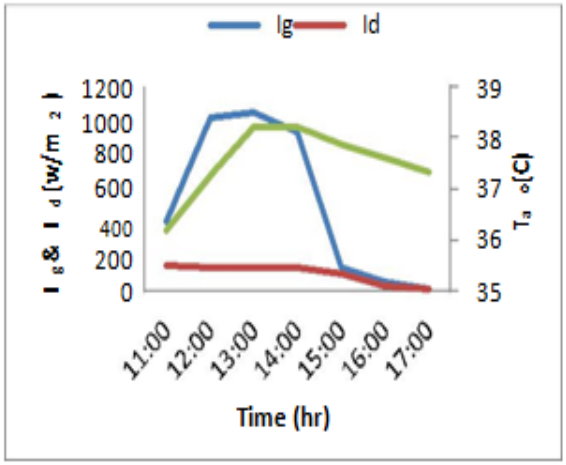

Fig 15: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 6 cm water depth

The maximum ambient temperature 36.6°C is achieved at 14 hours and minimum 38.22°C at 13 hours.

Variation of global, diffuse radiations and yield for 6 cm water depth-

Figure 16 shows the variation between global radiation (Ig), diffused radiation (Id) and yield (m) with respect to time.

This figure shows the yield of the single slope solar still **with Flat Plate Collector**.

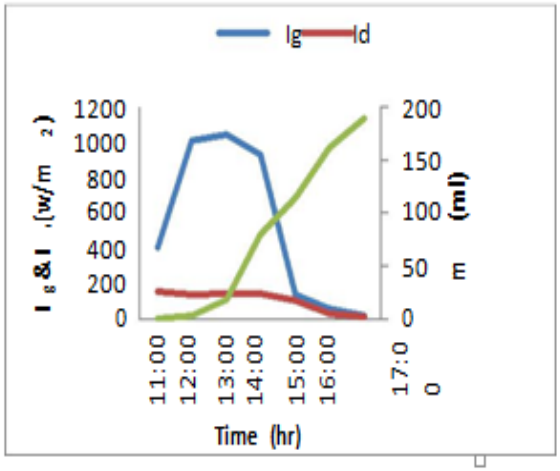

Fig 16: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 6 cm water depth

At 11 hours yeild is zero ml but after 11 hours some yeild is found in terms of mililitre (ml).The total yield

obtained from 11:00 hr to 17:00 hr is 568 ml which is double. The highest yeild obtained during 17 hours i.e. 190 ml becase of higher condesation process. In this inside the solar still temperature is higher than the ambient so condesation prosess increases and simultaniously yeild.

Variation of water temperature, inner surface of the toughened glass, outer surface of the toughened glass and yield for 6 cm water depth-

Figure 17 shows the variation of temperature of water inside the still (Tw), inner surface of the toughened glass (Tgi), outer surface of the toughened glass (Tgo) and yield (m) with respect to time.

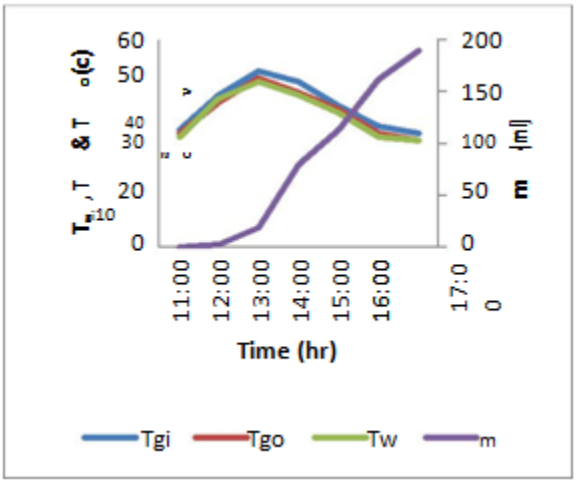

Fig 17: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 6 cm water depth

There is slightly variation in the values of Tw, Tgi and Tgo at 11:00 hr. But after that temperature of the water increased upto 48°C at 13:00 hrs. Further when temperature of the atmosphere decreases then due to condensation process yield increases. Results of maximum yield 190 ml obtained at 17 hours. The total yield is 568 ml.

Effect of Water Depth of 9 cm on Yield of Single Slope Solar Still with Flat Plate Collector Variation of ambient temperature and relative humidity for 9 cm water depth-

Figure 18 shows the variation of ambient temperature (Ta) and relative humidity (ya). This observation was performed in the month of september with 9 cm depth of water in the single slope solar still with Flat Plate Collector.

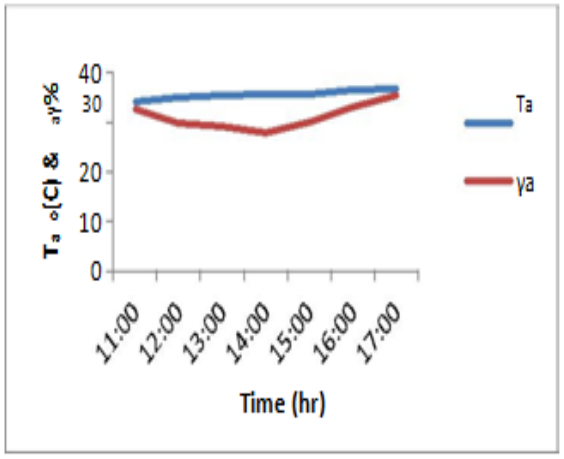

Fig 18: Variation of ambient temperature (Ta) & relative humidity (ya) for 9 cm water depth

Here the values of Ta and ya at 11:00 am are 34.27°C and 32.8% respectively whereas at 17:00 hr it was changed up to 36.72°c and 35.1% respectively.

Varaition of Ambient Temperature, Global and Diffuse radiations for 9 cm water depth-

Fig 19 shows the variation between global radiation and diffused radiation with respect to time. It also performed in the month of September. The maximum value of global and diffuse radiation are 970 w/m^2 at 13 hours and 302 w/m^2 at 15:00 hours repectively. The minimum value of global and diffuse radiation are 220 w/m^2 at 17 hour and 90 w/m^2 at same time. The ambient temperature increases with global radiation.

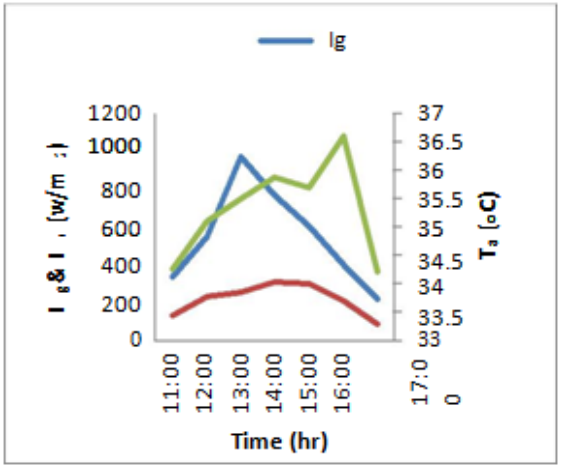

Fig 19: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 9 cm water depth

During the experiment maximum ambient temperature 36.6°C is found at 14 hours whereas minimum 34.22°C at 17 hours.

Variation of Global, Diffuse radiations and yield for 9 cm water depth-

Figure 20 shows the variation between global radiation, diffused radiation and yield. This figure shows the yield of the single slope solar still **with Flat Plate Collector** at 9 cm water depth.

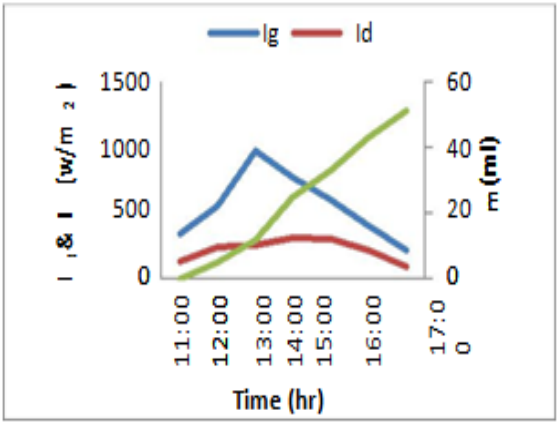

Fig 20: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 9 cm water depth

The value of Ig is greater than Id between 11:00 to 17:00 hrs but yield start from 12 hrs, and after that it suddenly increased and reached up to a level of 51 ml at 17 hour. Total yeild during the day is 169 ml which is lower than the first day of experiment.

Variation of Water Temperature, Inner Surface of the Toughened Glass, Outer Surface of the Toughened Glass and Yield for 9 cm water depth-

Figure 21 shows the variation of temperature of water inside the still (Tw), inner surface of the toughened glass (Tgi), outer surface of the toughened glass (Tgo) and yield (m) with respect to time for single slop solar sill **with Flat Plate Collector**.

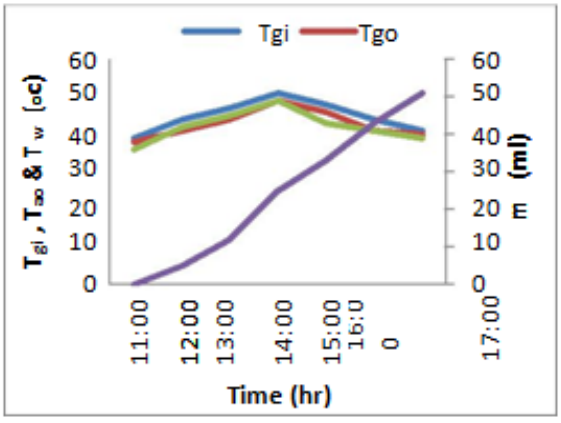

Fig 21: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 9 cm water depth

The total yield is 169 ml between 11:00 to 17:00 hr. Water temperature and inside glass temperature at the 11:00 hr is 36 ^{o}C and 39^{o}C while at l7:00 it becomes 32 ^{o}C and 32 ^{o}C which is almost same. But the maximum temperatures of water temperature and inside glass are 39 ^{o}C and 41 ^{o}C respectively.

Effect of Water Depth of 12 cm on Yield of Single Slope Solar Still with Flat Plate Collector Variation of ambient temperature and relative humidity for 12 cm water depth-

Figure 22 shows the variation of ambient temperature and relative humidity. This observation is performed in the month of September with 12 cm depth of water in the single slope solar still **with Flat Plate Collector**.

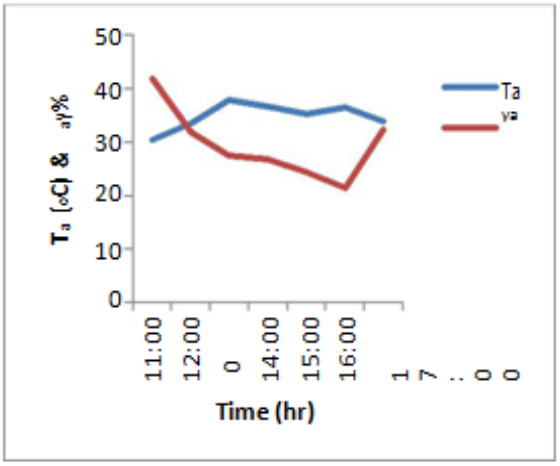

Fig 22: Variation of ambient temperature (Ta) & relative humidity (ya) for 12 cm water depth

The value of ambient temperature at 11:00 hr is 30.5 ^{o}C and at 17:00 hr it becomes 33.9 ^{o}C. The relative humidity is decreased from 41.9% to 32.4.2% during 11 hrs to 17 hrs. The maximum ambient temperature and relative humidity are found 37.9 ^{o}C and 41.9%.

Varaition of Ambient Temperature, Global and Diffuse radiations for 12 cm water depth-

Fig 23 shows the variation of ambient temperature with respect to global and diffuse radiations for 12 cm water depth. It also performed in the month of September. The maximum value of global and diffuse radiation are found 1028 w/m^2 at 12 hour and 328 w/m^2 at 15:00 hour repectively. The minimum value of global and diffuse radiation are 241 w/m^2 at 17 hour and 62 w/m^2 at same time respectively.

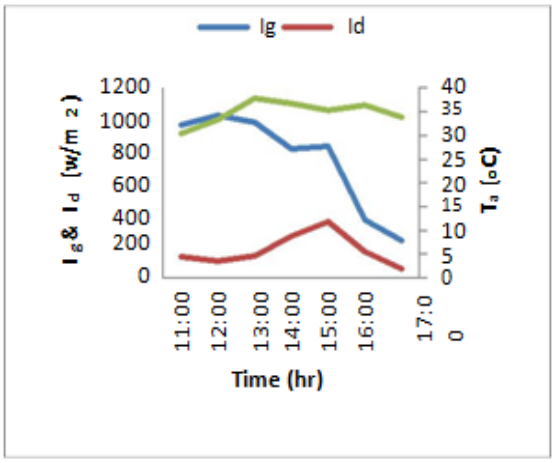

Fig 23: Varaition of Ambient Temperature, Global (Ig) & Diffuse (Id) radiations for 12 cm water depth

The ambient temperature increases with global radiation. During the experiment maximum ambient temperature 37.9°C is found at 13 hours whereas minimum 30.5°C at 11 hours.

Variation of Global, Diffuse radiations and yield for 12 cm water depth-

Figure 24 shows the variation between global radiation ,diffused radiation and yield of the single slope solar still **with Flat Plate Collector**.

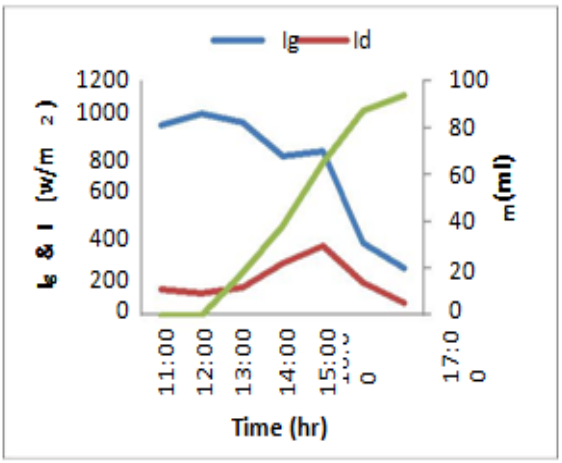

Fig 24: Variation of Global (Ig), Diffuse (Id) radiations & yield (m) for 12 cm water depth

The total yield obtained from this is 302 ml which is quite less than first day of experimentation but higher than second day of experimentation because of availability of good solar intensity during the third day of experiment.

Variation of Water Temperature, Inner Surface of the Toughened Glass, Outer Surface of the Toughened Glass and Yield for 12 cm water depth-

Figure 25 shows the variation of water temperature, inner surface of the toughened glass, outer surface of the toughened glass and yield for 12 cm water depth with respect to time.

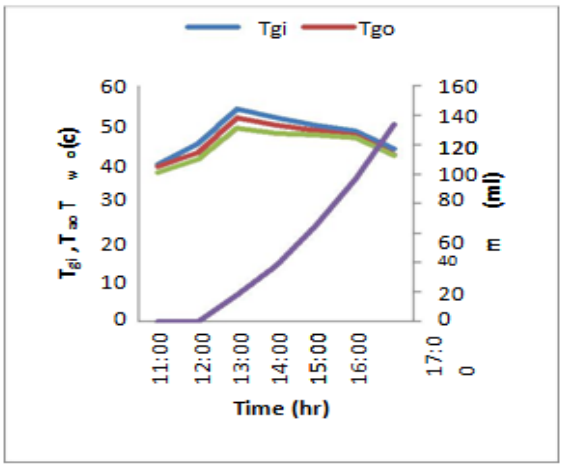

Fig 25: Variation of water (Tw), Inner Surface of the Toughened Glass (Tgi), Outer Surface of the Toughened Glass (Tgo) & Yield (m) for 12 cm water depth

As the experiment is started at 11:00 hr and there is no yield during 11 hr to 12 hrs but from 13 hrs yield suddenly started and increased upto a label of 94 ml at 15 hrs. Total yield obtained during the day is 302 ml. Tgi and Tw have slightly variation in values. It has been noticed that as the depth of the solar still is increased the yield obtained dereased and the value of Tgi is greater than Tgo. The higher value of Tgi,Tgo and Tw are 54 °C, 52 °C and 49 °C during the experiment.

EFFECT OF YIELD WITH DIFFERENT WATER DEPTH WITH AND WITHOUT COLLECTOR

Effect of yield on 6 cm water depth on still with and without collector-

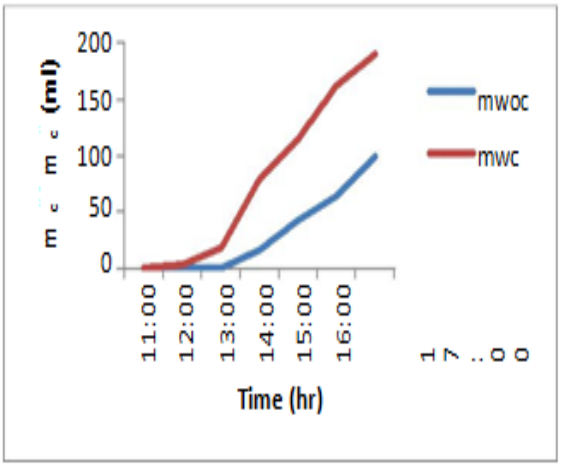

Fig 26: Variation of yield on 6 cm water depth for single slope solar still with and without collector

Figure 26 shows the variation of yield mwoc and mwc for a single slope solar still for a 6 cm water depth at inclination angles of 23^o with and without collector. It is observed that the yield mwc using the flat plate collector is more compared to that of without collector as the case of preheating of water occurs resulting more yield. During the period from 11:00 to 15:00 hrs there is low yield of mwc and after that sudden increment also observed and 15 hours achieved maximum. A total yield mwoc and mwc is obtained 224 ml and 568 ml without and with collector respectively. Result shows the effectiveness of the flat plate collector to increase the efficiency of the system.

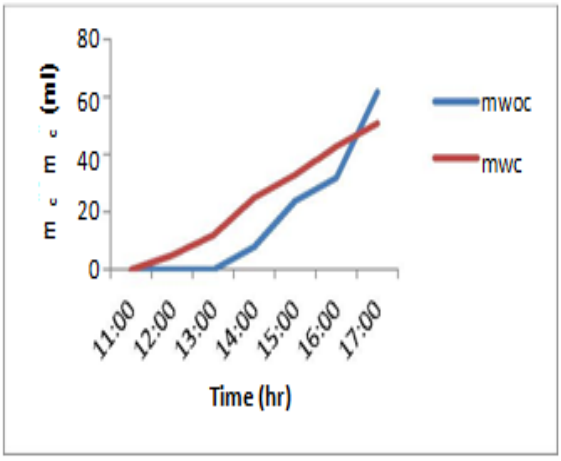

Fig 27: Variation of yield on 9 cm water depth for single slope solar still with and without collector

Figure 27 shows the variation of yield mwoc and mwc for a single slope solar still having 9 cm water depth at inclination angles of 23^o. The yield mwc of solar still with collector is observed more as compared to solar still without collector. Total yield mwoc and mwc is obtained 126 ml and 169 ml without and with collector respectively. The total yield also decreases in the both cases due to increase of water depth as 9 cm because more water requires more heat energy for heat gain.

Effect of yield on 12 cm of water depth on still with and without collector-

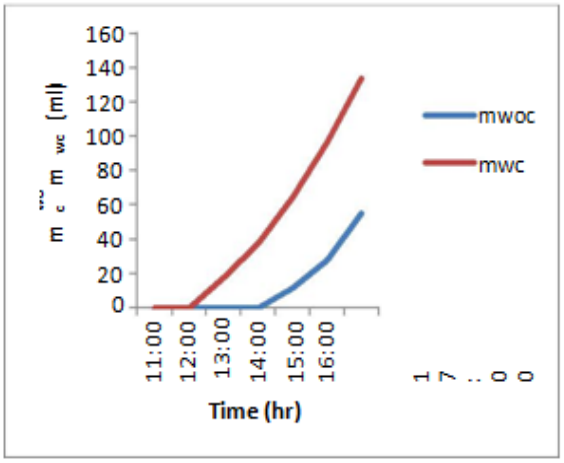

Fig 28: Variation of yield on 12 cm water depth for single slope solar still with and without collector

Figure 28 shows the variation of yield mwoc and mwc for a single slope solar still for a 12 cm water depth at inclination angles of 23^o. In both cases, both day climatic conditions were clear sky that's why yield obtained was good. But due to increase of water label as 12 cm yield is less as compared to 6 cm water depth. Total yield mwoc and mwc is obtained 95 ml and 352 ml without and with collector respectively.

CONCLUSION

It is inferred that the low water profundity in sun based still prompts to quick ascent in temperature and therefore high dissipation rate in this way more yield without any capacity limit. The yield for two unique cases with three defferent water depdth is shown in this work. The estimation of yeild is discovered higher at 6 cm water profundity of in both the cases. The most minimal yeild acquired when sun based still was not associated with level plat gatherer. After analysis and perceptions it is reason that sun based still turns out to be more productive with level plate sun oriented authority at 6 cm water profundity mark. Hourly variety of day by day distillate yield relies on how the radiation is disseminated for the duration of the day. In the performed exploratory area the still which is slanted at 23o yields more without gatherer impact as it is the scope of the area of Madhya Pradesh.

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