A PRELIMINARY STUDY ON DEW CONDENSATION FROM ATMOSPHERE AS A SUPPLEMENTARY SOURCE OF WATER

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All living organisms require water for survival. About 75% of earth's surface is covered with water. Still about 40% of the world's population faces water shortages. With the increase in population, deforestation and industrialization the requirement for water has increased. Therefore it is important to utilize the existing water in a more efficient manner and at the same time look for other alternative sources of water. The possibility of using a heat exchange system that utilizes the temperature difference between the night time atmospheric air and soil temperature for cooling the atmospheric air at or below it's dew point temperature in order to condense atmospheric moisture was tested.

Soil temperature was measured at different depths at regular time intervals to determine the soil temperature profile. At the same time the temperature variation of dry bulb and wet bulb was also measured. A simple device was designed and developed using thin gauge Aluminum tube as a heat exchanger and a small D.C. fan was fixed at the outlet to regulate air through the heat charger. The experiment was conducted at two different soil depths, two different mulches and with a medium inside the tube. The device was operated from mid night to 8.00 a.m in the following day. Power was supplied to the fan using a D.C power pack.

During the period of testing the device was able to condense moisture ranging from 15 to 60 cm^3 at efficiencies between 70 to 80%. The energy used by the device to collect a unit amount of water was in the range of 1.75 kJ/cm^3 to 7 kJ/cm^3. A negative exponential function could be fitted to this relationship with R^2 value of 0.96. This study gave evidence that soil temperature could be used to reduce the atmospheric air temperature below its dew point temperature. But the main disadvantage was that the device could be operated only during the time period where the soil temperature is below the dew point temperature of air, which is only during the early hours of morning, also the amount of energy consumed by the device to collect a unit volume of moisture is high.

Further studies could be conducted on this principle by using a cooling system such as a compression refrigeration cycle or a Ammonium refrigeration cycle, but the cost benefit of such a system should be looked at in relation to different applications. It is imperative that the amount of energy consumed by such a system is low.