Performance of Copper Coil Heat Exchangers for Heating Greenhouses: An Experimental and Theoretical Investigation

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Abstract : This study examines the manner in which a solar copper coil heating system performs in a North-South-oriented greenhouse environment. In order to retain heat during the day and release it back into the greenhouse environment at night, this system relies on the circulation of water in a closed loop under the roof of the greenhouse. Experimental research was conducted to compare the results in two identical greenhouses. The first one has a heating system, whilst the second one has not and is regarded as a control. We determined the mass of the heat transfer fluid, which makes up the storage system, needed to heat the greenhouse during the night to be equivalent to 689 Kg using the heat balance of the greenhouse equipped with a heating system. The findings demonstrated that when compared to a controlled greenhouse without a heating system, the climatic conditions within the experimental greenhouse were greatly enhanced by the solar heating system.

Keywords : renewable energy, storage, environmental impact, heating, agricultural greenhouse

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