

**EXPERIMENTAL STUDY OF FORCED CONVECTION HEAT TRANSFER
IN A TROPICAL GREENHOUSE USING A COOLING PAD AND FAN
SYSTEM**

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ABSTRACT

A greenhouse is a cultivation technology that provides a more controlled environment for plant growth. However, in tropical regions, the air temperature inside a greenhouse tends to increase due to solar radiation. This study aimed to analyze the characteristics of forced convection heat transfer in a tropical greenhouse using a cooling pad and fan system. The research employed an experimental method conducted over 28 days with measurements taken at twelve sensor locations. The observed parameters included outdoor air temperature, indoor air temperature, relative humidity, and air velocity. The collected data were analyzed to determine temperature distribution, air mass flow rate, and the effectiveness of the cooling system. The results showed that the average outdoor air temperature was 31.9°C, while the average indoor air temperature was 27.7°C, resulting in an average temperature reduction of 4.2°C. The average relative humidity reached 77%, the average air velocity was 1.03 m/s, the air mass flow rate was 0.090 kg/s, and the evaporative cooling effectiveness was 50%. These findings indicate that the cooling pad and fan system effectively reduced indoor air temperature, increased relative humidity, and improved air distribution, thereby enhancing the greenhouse microclimate.

Keywords: *greenhouse, forced convection, cooling pad, fan, evaporative cooling.*