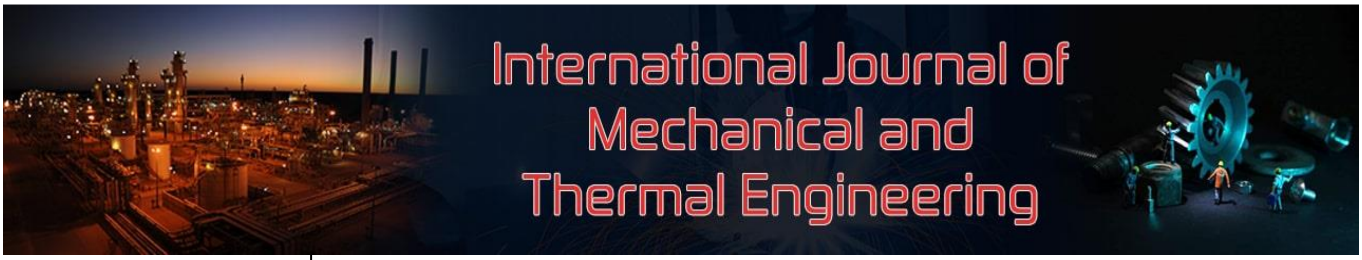

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Pradeep Dhama
Students, Department of Mechanical Engineering, HRIT College, Ghaziabad, Uttar Pradesh, India

Dr. Pankaj Mishra
Director, HRIT, Ghaziabad, Uttar Pradesh, India

Gaurav Sharma
Assistant Professor, HRIT, Ghaziabad, Uttar Pradesh, India

Corresponding Author:
Pradeep Dhama
Students, Department of Mechanical Engineering, HRIT College, Ghaziabad, Uttar Pradesh, India

Analytical study of ventilation (Heat & mass transfer) effect in green house

Pradeep Dhama, Dr. Pankaj Mishra and Gaurav Sharma

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Abstract
In comparison to all other agricultural industry sectors, the commercial greenhouse has the highest energy requirement. In this case, energy management is crucial from the standpoint of global sustainability. Under steady and unstable state conditions, it was examined how the temperature changed over time for different air change rates in the dry/wet soil, roof, side walls, internal air, and wetness of a greenhouse. The current research can predict the interior climate of the greenhouse for a given outside scenario and greenhouse material characteristics. The investigation of sensible features revealed a linear relationship between the temperature of different components and the roof transmissivity, soil reflectivity, and both.

Keywords: Analytical study, ventilation, green house

Introduction
Because of their inexpensive investment costs and potential to increase crop productivity by 10–20 times compared to outdoor agriculture; greenhouse shelters have been widely used for agricultural production [1]. In order to achieve the serialization and standardization of agricultural facilities, developed nations design suitable greenhouses in accordance with local environmental factors, agricultural resources, climate, and cultivation characteristics [2]. They also make full use of the standard solar global radiation facilities. The fundamental conceptual equations used to simulate the numerous processes in any thermal system, including the greenhouse, are mass and energy balance. Analysis of Indoor Temperature Distribution Crop output is significantly influenced by temperature in the environment. Plants' ability to absorb carbon and move electrons during photosynthesis are also influenced by temperature, but excessive heat can harm these organs [3-6].
Farmers are concerned about temperature since it is a key greenhouse environmental indicator. For temperature detection, almost all greenhouses are outfitted with liquid or electronic thermometers. The result of this experiment can be drawn by comparing the temperature data from the various types of greenhouses included in the experiment with those from each control group.

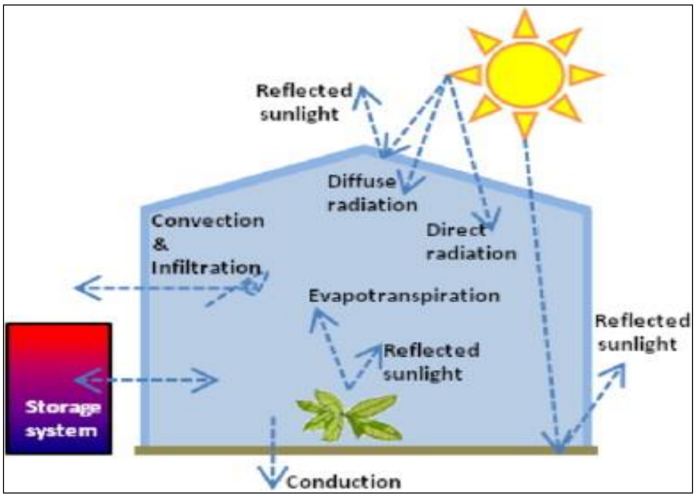

Fig 1: Green house model

The main goal of greenhouses is to produce agricultural goods outside of the growing season. 30% of the total operating expenditures in the greenhouse business are related to heating, which is accomplished using conventional fuel-burning equipment [7]. Although these studies have a lot of scientific study value, SSGs in Wei fang should not use them. There is a paucity of information regarding plant density and plant height in the greenhouses, two factors that should be taken into account while running the test. Additionally, regional climate characteristics differ from those of Wei fang. Second, the majority of research don't pay attention to the greenhouse's detailed operation and upkeep. A reasonable internal temperature and airflow are maintained by the ventilation system when the greenhouse system is in use. In most parts of China, greenhouse ventilation regulation is typically relied on staff experience and ignores objective test data. Therefore, when studying the greenhouse microclimate, it is important to take the presence of a ventilation system into account. However, the author of a study on the heat exchange of subterranean pipes in greenhouses [8] thought that the local greenhouse's ventilation was always closed in the winter. Researchers' assumptions about the operation scenario could differ from the real scenario. In addition, the solar heating and climate control system for greenhouses was studied [9]. The input factors used in the calculations are listed at the beginning of this paper. These variables include the environmental conditions, greenhouse size, greenhouse material properties, greenhouse component mass, view considerations, and air and water properties. These inputs are used to run the simulation. Simulation findings are produced for cases of both steady and erratic states in three different circumstances.

1. Empty greenhouse with dry soil
2. Empty greenhouse with wet soil

Greenhouse with plantation Innovative (selected surface) cover materials may improve summer growth conditions, minimize insect pressure, and save energy.

Sonneveld *et al.* presented an innovative prototype greenhouse they had developed in 2010 that combined the generation of PV power with the reflection of near-infrared radiation. As a result of the study, the near-infrared greenhouse climate has improved. Bodalan Ciprian (2014) led a hypothetical investigation into heat transfer between nurseries and the environmental factors that affect them and came to the conclusion that the direction of intensity transfer in nurseries is variable, with heat accumulation during the daytime occasionally turning into a deficiency of intensity around dusk as well as the reverse. A nursery's total energy equilibrium, he continued, "clearly illustrates how radiation energy retained is utilised for happening, dissipation, reasonable intensity of the air, and soil warming." Every situation's temporal soil, inside air, roof, and sidewall fluctuation is charted and described [10]. Wet soil serves as a visual representation of the changing moisture content of greenhouse air over time. In this chapter, the findings from investigations on the effects of ventilation rate on soil, internal air, roof sidewalls, and plant temperatures are presented. Results on how plants' steady-state temperatures change over time are also given.

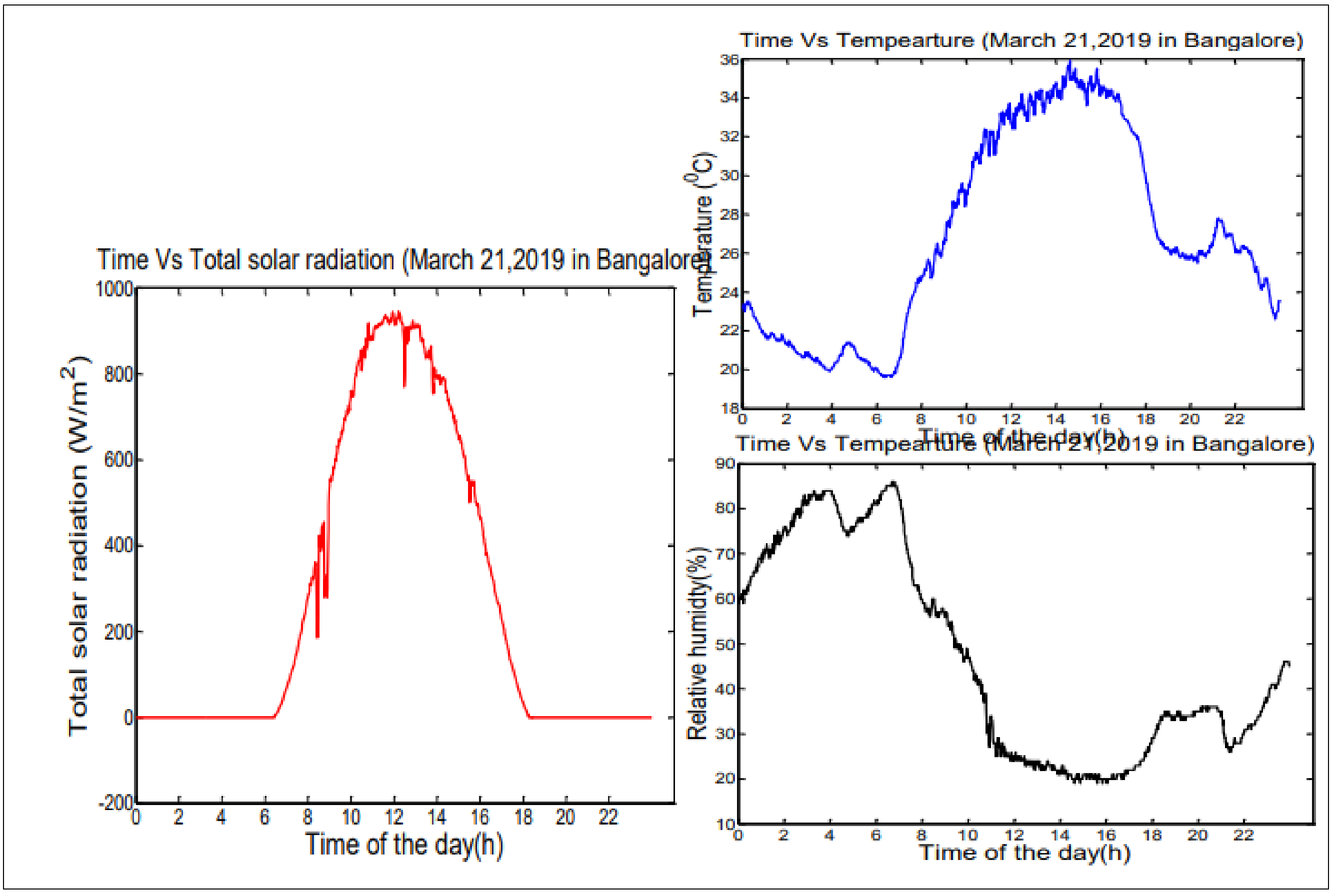

Fig 2: Depicts Bangalore's surrounding circumstances

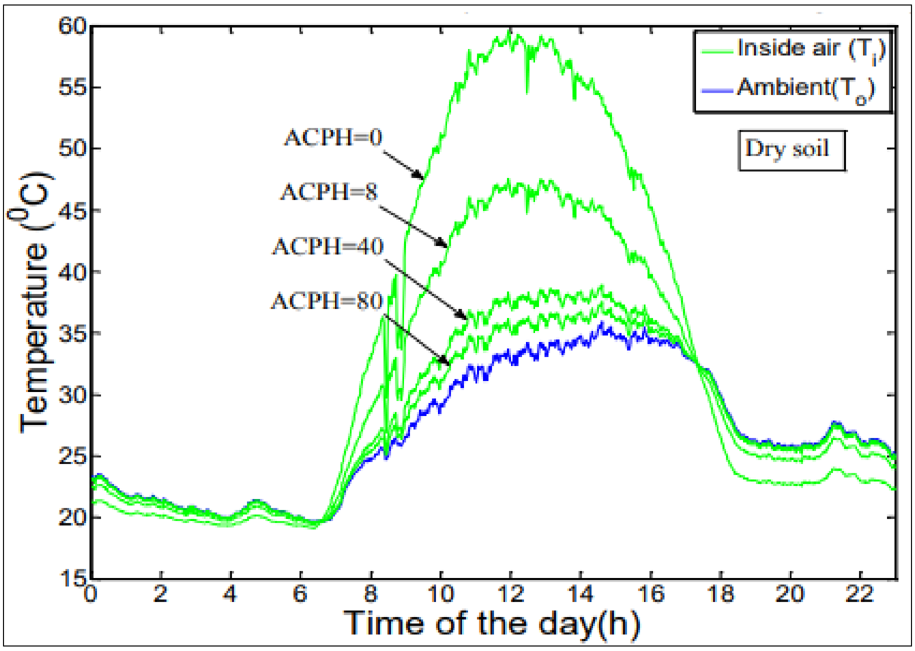

Fig 3: Variation of inside air temperature with time difference change

Conclusion and future investigation

We have shown that the surface energy balance of a greenhouse's numerous parts can be used to model the greenhouse, allowing for accurate predictions of the greenhouse's interior temperature over a wide variety of ventilation rates. We conducted a research and an analysis of unsteady states, compared the solutions, and demonstrated that unstable solutions resemble steady states. The time constant was discovered in steady state. The effects of different air changes in dry and wet soil conditions on the greenhouse surfaces' temperatures over time were investigated.

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