FLOW TYPE AND TEMPERATURE DISTRIBUTION ANALYSIS AT STANDARD PEAK GREENHOUSE USING COMPUTATIONAL FLUID DYNAMICS (CFD)

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ABSTRACT

This experiment was analyzed of air flow and temperature distribution in standard peak greenhouse using computational fluid dynamics (CFD) as a basic consideration for air movement design. The method is using three models of greenhouse which modified condition of being slant roof to be 30° and 45°. The dimensions of greenhouse existing were: 12 m in length, 6 m in width, and 5.14 m in height. The floor was made from concrete. Polycarbonate was used as roof of the greenhouse and the wall was use screen as natural ventilation with 1.5 mm². The results of the analysis showed that during the daytime, air temperature inside greenhouse surrounding the roof increased by the condition of being slant roof is steep. The CFD simulation showed clearly the air flow and temperature distribution in greenhouse. This cause showed the average of error at 00:00 o’clock is 1.44%, at 07:00 o’clock is 1.83%, at 12:00 o’clock is 2.34%, and at 17:00 o’clock is 1.49%. Therefore, it can be used as basic consideration for the modified of slant roof design with respect to low air temperature and uniform air temperature distribution. It was recommended that one of the optimal condition of being slant roof is 30°.

Key words: greenhouse, air temperature distribution, slant roof, computational fluid dynamics (CFD)