

Energy and climate analysis of greenhouse system for tomatoes cultivation using CFD and open studio energy plus software

ABSTRACT

Tomato plants are sensitive toward climate changes thus affecting growth development and pollination of the plant. This study was conducted to assess energy performance and environment in greenhouse agriculture to support tomatoes cultivation using Computational Fluid Dynamics (CFD) and OpenStudio EnergyPlus software. To achieve efficient energy performance and to balance it with the environment in tomato greenhouse, architectural and engineering design have been integrated in the study. Analyses on indoor environment and energy consumption of the greenhouse are carried out by installing various electrical equipment such as exhaust fans and humidifier in the greenhouse to meet indoor environment requirement of good tomato cultivation. Three properties of the greenhouse were monitored and these are temperature, relative humidity and energy consumption. Results show that the proposed greenhouse model in this study could meet the required temperature and relative humidity for good tomatoes cultivation.

Keyword: Tomatoes cultivation; Greenhouse agriculture; Energy performance