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
of

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Evaporative Cooling Efficiency of a Fogging System for Greenhouses

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Abstract: The objective of this study was to investigate the efficiency of fogging system (FS) for greenhouses. The experiments were carried out in a multi-span plastic greenhouse (PG), 105.6 m wide and 205 m long, made of 11 spans. The FS consists of a water softener and filters to prevent nozzle clogging, a water reservoir, pumps and a pressure regulator, and fog generating nozzles (FGN). The required pressure for FGN was 4.5 atm. Three nozzle lines with 82 FGN were installed in each span of the PG. At each nozzle line, 82 FGN were uniformly located at 2.5 m nozzle spacing. The FGN parameters were determined in order to characterize the efficiency of the FS based on air flow rate (AFR) and evaporation flow rate (EFR). The results showed that the FS was able to keep the air temperature inside the PG 6.6 °C lower than the outside. The average ventilation rate of the PG was 13.64 m³ s⁻¹ during the experimental period. The efficiency of the FS ranged from 11.7% to 80%. The efficiency of the FS increased as the difference between the dry-bulb temperature (DBT) and wet-bulb temperature (WBT) rose. The results indicated that air relative humidity (RH) inside the PG was increased by 25% on average by means of the FS examined in this study. The EFR varied between 130.3 g m⁻² h⁻¹ and 1223.4 g m⁻² h⁻¹, while the AFR ranged from 39.3 kg m⁻² h⁻¹ to 298.7 kg m⁻² h⁻¹. Fogging system efficiency (FSE) increased linearly with EFR and absolute humidity difference (AHD) between the inside and outside air.

Key Words: Greenhouse, Fogging system, Air flow rate, Evaporation flow rate

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