

VAPOR REMOVAL FROM THE GREENHOUSE USING FORCED VENTILATION WHEN APPLYING A THERMAL SCREEN

Jouke Campen

Greenhouse Horticulture, Wageningen UR, Bornsesteeg 65, 6708PD Wageningen,
The Netherlands

jouke.campen@wur.nl

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Abstract

The objective of this study is to dimension a system capable of removing the evaporation of the crop when a thermal screen is applied. The humid greenhouse air is replaced by cold dry outside air using an air distribution system. The common procedure to remove moisture from the greenhouse where a thermal screen is applied is by slightly opening the screen. This results in an air exchange of relatively dry air from above the screen and the humid air below the screen. This procedure is difficult to control and causes horizontal temperature differences in the greenhouse. By mechanically controlling the exchange of the greenhouse air and outside air these problems can be resolved.

The airflow through the system needed over the year resulting from the evaporation of the crop and the outside conditions is determined using a greenhouse simulation model KASPRO. Based on this result the dimensions of the system are calculated and a control strategy is suggested. The KASPRO calculations also showed that using outside air for vapour removal is more energy-efficient as using the air above the thermal screen. The greenhouse climate resulting from using the conventional method of vapour removal as well as with the forced ventilation is investigated using CFD. The CFD calculations show that the climate using the forced ventilation system is much more homogenous and efficient as the conventional system.

The system proves to be economical since investment costs are low (expected to be around 3 EURO/m² maximum) and it ensures a proper well-controlled climate under the thermal screen resulting in a higher use of the screen through the year. The system is currently being tested in practise at a Dutch commercial tomato grower.