PERFORMANCE OF THE INTKAM MODEL FOR GREENHOUSE CROP TRANSPIRATION

Anne Elings[1], Wim Voogt[2]

[1]Wageningen UR Greenhouse Horticulture, P.O. Box 16, 6700 AA Wageningen, The Netherlands

[2]Wageningen UR Greenhouse Horticulture, P.O. Box 20, 2265 ZG Bleiswijk, The Netherlands

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Abstract

The management of crop transpiration in greenhouses increases in importance, being part of both the water and energy balance. A good simulation model for crop transpiration can serve as a soft-sensor in an early warning system for the grower, and is an essential component of an energy model for a greenhouse with a crop. Observations on crop transpiration rates under commercial settings are scarce. In an effort to develop a model-based soft-sensor for crop transpiration, continuous and instantaneous rates of crop transpiration were obtained over a large part of 2006 from 2 tomato growers using a weighing gutter. The wide variation in outdoor and associated indoor environmental conditions caused similarly wide variation in crop transpiration rates, both among and within days, and among locations. This enabled broad model validation.

Validation was not fully satisfactory. Parameters that influence the stomatal conductance (Gs) in response to environmental conditions were calibrated on the basis of total daily transpiration. For one grower this was more successful than for the second grower. The variable quality of simulation suggests that the empirical description of Gs behaviour in response to environmental conditions is not sufficiently robust. Further data analysis can reveal structural patterns in the relations between model parameters and simulated transpiration. Built on this, on-line sensor information on transpiration can be used to continuously optimize the transpiration model, and increase its usefulness in information and early-warning systems.