PROMOTING ENERGY EFFICIENT PRODUCTION IN HORTICULTURE EXCHANGE OF KNOWLEDGE BETWEEN RESEARCH AND PRACTICE THROUGH THE INTERNET

Fokke Buwalda[1*], Gert Jan Swinkels[1], Feije de Zwart[1], Jop Kipp[1], Frank Kempkes1, Ton van Gastel[2], Hans van Bokhoven[3]

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

[2]Reed Business Information, Benoordenhoutseweg 46, 2596 BC The Hague, The Netherlands

[3]LetsGrow.com, Westlandseweg 190, 3131 HX Vlaardingen, the Netherlands

[*]*fokke.buwalda@wur.nl*

Keywords

Knowledge exchange, horticultural research, growers, internet, energy efficient production

Abstract

In view of increasing fuel cost and current targets for CO2 emission reduction, there is a need to increase energy efficiency in horticulture. Horticultural production is a complex process, the efficiency of which is rarely attributable to a single factor. In addition, optima tend to vary with internal states and outside conditions. Hence research-based advice to growers aimed at improving performance of the production process is often too generic in nature to be useful to growers dealing with specific situations. The challenge is to generate advice, specifically addressing current conditions, without the need to frequently visit large numbers of individual nurseries. In The Netherlands, internet technology is being used to collect data at commercial example nurseries, monitor crop and climate conditions using dynamic models, and publish nearly real-time results on a generally accessible web portal, where it is linked with an information database and weblogs by growers, advisors and researchers. Five nurseries are currently acting as data sources for the project, including tomato (2), chrysanthemum (1), ficus (1) and Freesia (1) growers. By using local 7 d weather forecasts and current climate controller settings as input for crop and climate models, the information presented in the form of time courses does not only encompass last week's performance, but also a forecast for the coming week. Model output includes a real-time energy balance of the greenhouse/crop system, calculated daily fuel efficiency over the period stretching from 4 days in the past to the next 4 days in the future,

as well as time courses of the response of crop photosynthesis to variations in light, temperature and CO2 concentration, of condensation risk, and of the ratio between crop growth and development. Three aspects are being tested, which may improve knowledge exchange between practice and research: (i) experience-based knowledge of growers is treated as being different from, but equally valid as, the process-based knowledge of scientists; (ii) displaying real-time model output makes it possible to deal with the context-dependency of complex dynamic systems; (iii) extending the calculations into the future enables growers visiting the site to anticipate the effects of changing weather conditions and adjust the settings of their climate controllers in order to increase the energy-efficiency of their production process.