



Grip on light – Optimal use of (diffuse) light for improving crop growth and reducing energy use in in 'shade-tolerant' Pot Plants

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Background

Natural light has potential for reducing energy costs and crop improvement. More light in the greenhouse provides additional growth and saves energy and to prevent damage by light, practical plant monitoring will be developed (no focus in this poster).

Goal

50% energy saving with a combination of more natural light, less screening, temperature integration and high pressure mist without crop quality problems.

Approach

Anthurium, Bromeliad (2012/2013) and Phalaenopsis (from week 18, 2013) are grown under diffuse conditions: 1 reference, diffuse screens, diffuse glass and the focus greenhouse. The focus house is a greenhouse with Fresnel lenses in the roof that focuses sunlight and transfer it into heat and electricity. Targets for daily light integrals are 7.5 and 10 mol PAR m⁻² d⁻¹, this is 50 and 100% more than common practice. Phalaenopsis is only grown at 10 mol PAR m⁻² d⁻¹. In winter light integration on week level with DLI target of 5 mol PAR m⁻² d⁻¹ and lowering heating with 2 degrees.



Figure 1. Overview grip on light from the reference compartment

Results

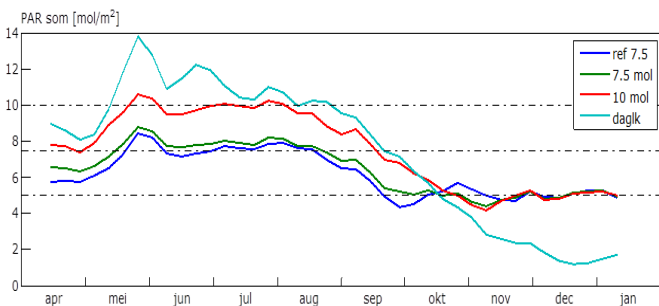


Figure 2. realised daily light integral in reference (ref 7.5), 7.5 and 10 mol PAR m⁻² d⁻¹ and Focus greenhouse in (daglk) in 2012/2013

Anthurium/Bromelia

Summer

- Acceleration of growing cycle with 6 weeks (Anthurium) and 4 weeks (Bromeliad)
- Good quality, heavy plants with much flowers, no leaf burning, pink anthurium bit pale.

Winter

- Lowering temperature gives energy saving, but costs some acceleration and quality especially without artificial light (focus greenhouse).

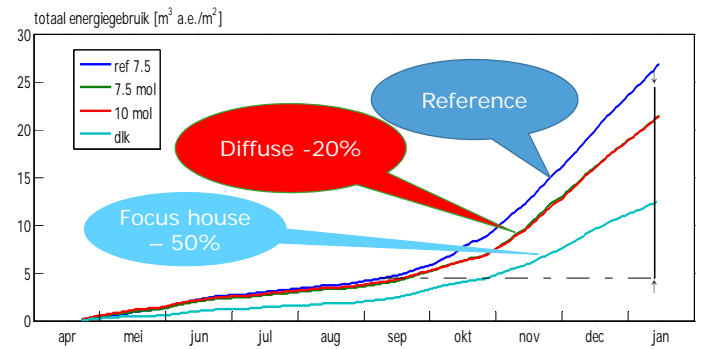


Figure 3. Energy efficiency in m³ gas equivalents m⁻²

Phalaenopsis

The more the light is diffuse, the better the growth of phalaenopsis was (focus house 17%, diff. glass 10% and diff. Screen t.o.v. ref.) but the differences did not affect the amount of flowering spikes. So far the energy saving in the generative phase was about 7%. The final measurements are not completed yet, but the differences are not as big as expected, based on the trial with Anthurium and Bromeliad.

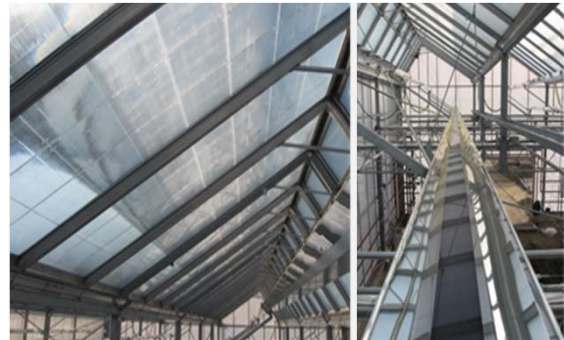


Figure 4. overview focus greenhouse

Left: fresnellenses in the south roof
Right: thermal collector for light conversion

Partners

Guardian, Ludvig Svensson, Bromeliadcommittee, Potanthuriumcommittee Anthura, Rijnplant, Floricultura, Sion orchids, Microflor.