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Use of high output **LED** in ornamentals

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Background

Until recent there have been more or less two choices for light emitting diodes – to use low output units close to plants either for confined environments or for interlighting between crops typically vegetables, while or high output lamps that can substitute current HPS lamps has been in the pipeline from several smaller companies.

> High output LED has high energy saving potential in low temperature requiring plants.

Aim and methods

We wanted to evaluate the use of novel highoutput LED (Fionia, Søndersø, Denmark) (Fig 1) and conventional lamps in a standard setup using four varieties potted roses and two varieties of campanula growing in the same light level (120 µmol m-2s-1) and identical temperature set points (18°C night, 21°C day and 24°C for ventilation) and 800 ppm of CO2 We did not use chemical growth regulation as one focal point was the effects of plant growth and morphology. To secure that the leaf temperatures was maintained at the same level the top heating system was allowed to increase if needed. The energy use in kWh for lamps and for heating (below/above) was recorded on a daily basis (Fig 2).

Fig 1. Spectral distribution of LED lamps (Fionia, DK).

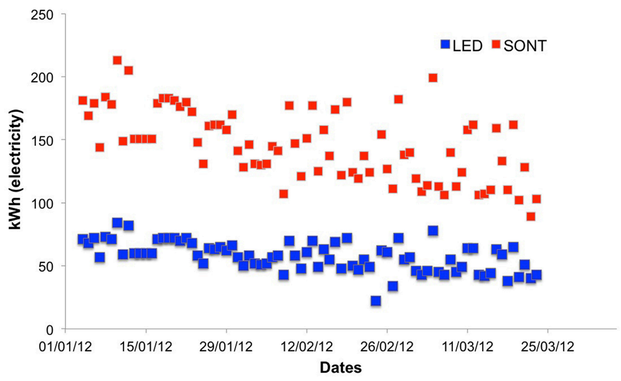


Fig. 2. The effect of light source on electricity use.

Results

The results showed relative small differences between the treatments. Significant differences in roses was seen in stem weight and number of flowers and buds reflecting that the SONT grown plants were 2-4 days earlier irrespective of cultivars. There were no differences in leaf area but we found more yellow leaves in the roses. Campanula showed no differences in fresh/dry weights but one cultivar was approximate one week earlier (Fig 4). Since the set points for supplemental lights was identical in the two compartments the light period was identical and the LED lamps used 40% of the energy supplied to the SONT lamps in the period. The energy used for heating was identical for the bottom heating but increased by on average 100% resulting in an average heat energy increase (in kWh) of 40-50% depending on the outside weather which was unusual cool in 2012. Since the costs of electricity per kWh is higher that heat kWh.

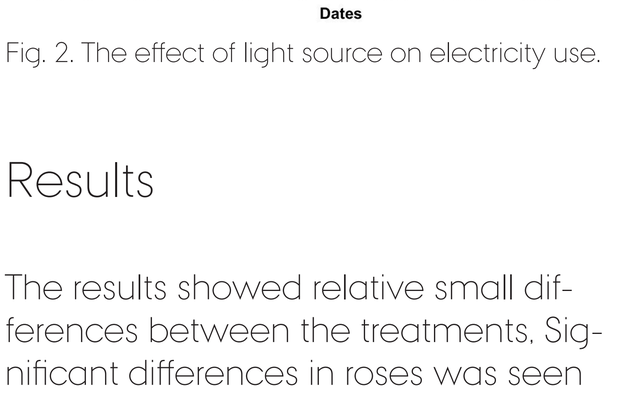
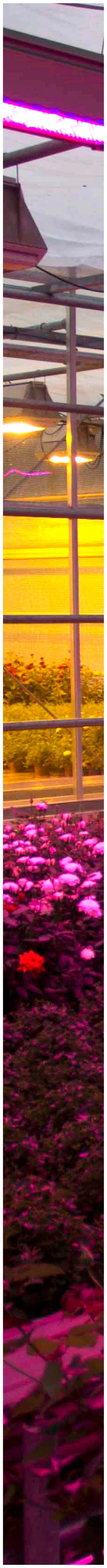


Fig 3. LED vs SONT in potted roses "Escimo" after 8 weeks

Fig. 4. LED vs SONT in campanula after 12 weeks

Conclusion

The experiment proves that high output LED has reached a stage that results in substantial energy saving potential especially on crops that does not require high leaf temperatures.



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