

Title The impact of daily diurnal temperature alternation and light quality on growth and morphology in cucumber (*Cucumis sativus* L.)

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Citation ISHS Acta Horticulturae 804:145-152. 2008.

Keywords light quality; growth; morphology

Abstract

The aim of this study is to explore the impact of day/night temperature alternation and light quality on morphology of a wild type (wt) and a phytochrome B deficient mutant (*lh*) of cucumber (*Cucumis sativus* L.) grown under three different day (DT)/night temperature (NT) regimes of 25/19, 22/22 and 19/25°C (12 h photo-period) in combination with photo selective plastic films giving rise to red (R)/far-red (FR) - ratios lower (R/FR ratio=0.75) and higher R/FR ratio=1.62) than a daylight control (R/FR ratio=1.11). Stem, hypocotyls and internodes of the wt were up to 38% shorter under a low compared to constant temperature or a high DT/NT combination. The stem length was reduced 45-50% under plastic film with a high R/FR ratio compared to the daylight control. With low R/FR ratio plastic film stem elongation was stimulated more under DT/NT of 25/19°C (41%) than under 19/25°C (21%). Hypocotyl length of the *lh* mutant was neither affected by temperature regime nor type of plastic cover creating different light qualities. Under DT/NT of 19/25°C, the final stem length was reduced with 15-20% compared to 25/19°C due to an effect on internode length. In conclusion, plastic film creating higher R/FR ratio was more effective in reducing stem elongation of cucumber than a DT/NT regime of 19/25°C (negative DIF). The physiological mechanisms of the stem elongation response to DIF and light quality are discussed.