Intensity of LEDs illumination affects growth and nutritional quality of *Brassica* microgreens

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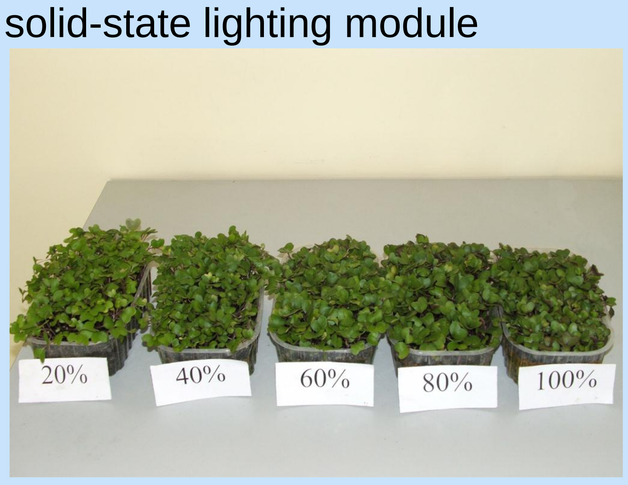
The aim of our studies was to evaluate the effect of light intensity produced by solid-state light-emitting diodes (LEDs) on the growth and nutritional quality of *Brassica* microgreens.

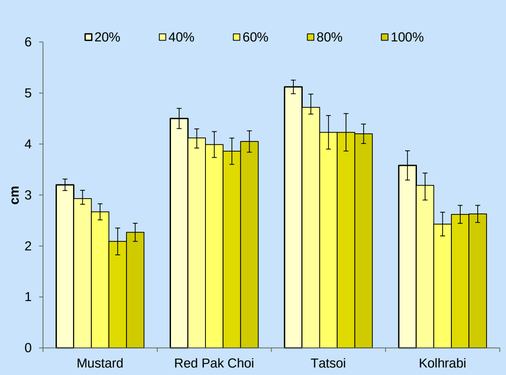
Microgreens under high-power solid-state lighting module

Materials and methods. Microgreens such as kohlrabi (*Brassica oleracea var. gongylodes*, 'Delicacy Purple') mustard (*Brassica juncea* L., 'Red Lion'), red pak choi (*Brassica rapa var. chinensis,* 'Rubi F_1'), tatsoi (*Brassica rapa var. rosularis*) were grown in phytotron chambers to harvest time (10 days) in a peat substrate. There determined such growth parameters as hypocotyl length, height, leaf area, fresh and dry weight and nutritional quality parameters as ascorbic acid, anthocyanins, phenolic compounds, tocopherols, carotenoids, non-structural carbohydrates, nitrates in fresh leaf sample (FW) and chlorophylls and flavonols using flavonols and chlorophyll meter Dualex 4. Day/night temperature 21/17°C, 16 h photoperiod and ~70% relative air humidity was maintained. A system of five high-power solid-state lighting modules with the main 455, 638, 665 and 731 nm LEDs were used in the experiments. Maximum photosynthetically active flux density (PPFD) of LEDs was 546.72 µmol m^{-2} s^{-1}. Other lighting options accounted for 80 % (437.376 µmol m^{-2} s^{-1}), 60 % (328.032 µmol m^{-2} s^{-1}), 40 % (218.688 µmol m^{-2} s^{-1}) and 20 % (109.344 µmol m^{-2} s^{-1}) of the maximum.

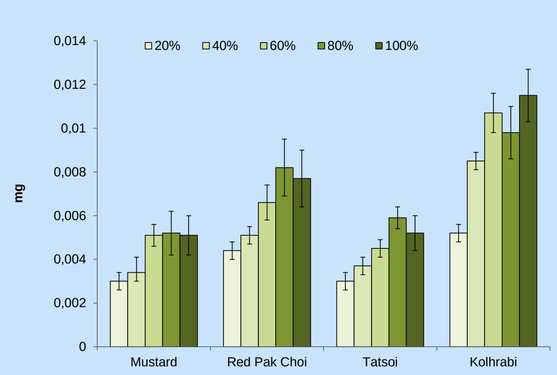


Microgreens cultivated under different light intensity

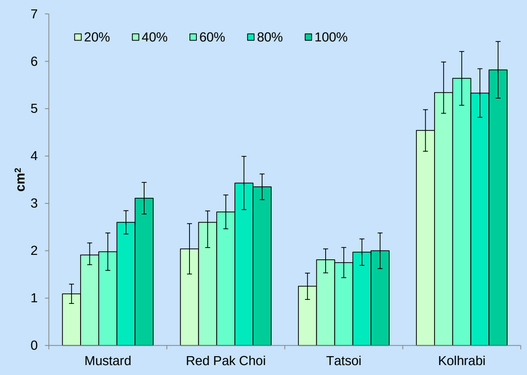
Results



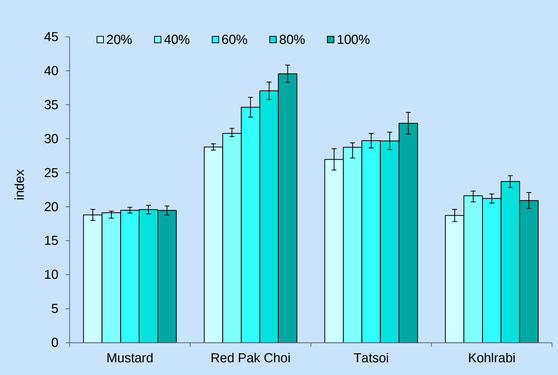
Hypocotyls length



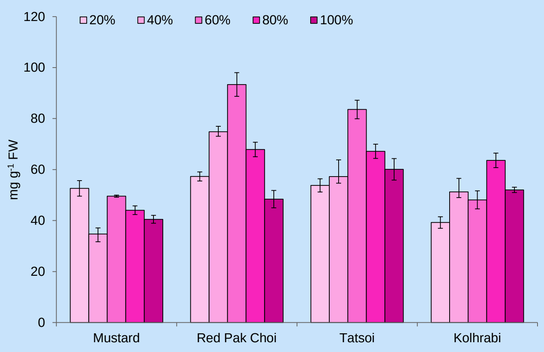
Dry weight



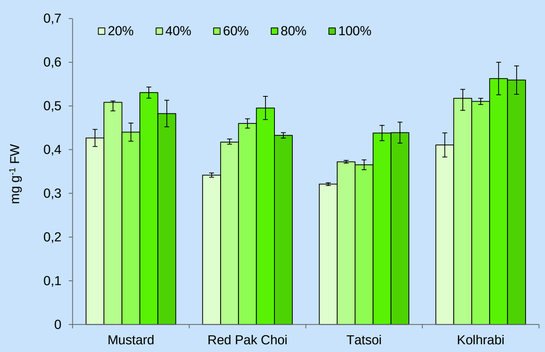
Leaf area



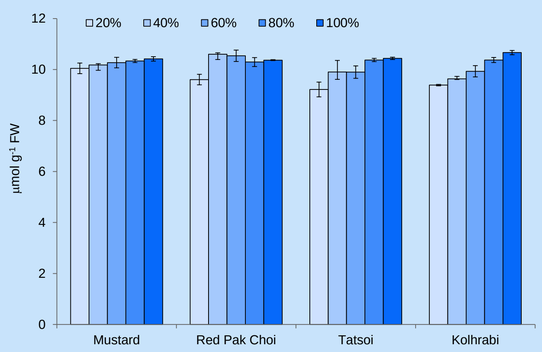
Chlorophylls



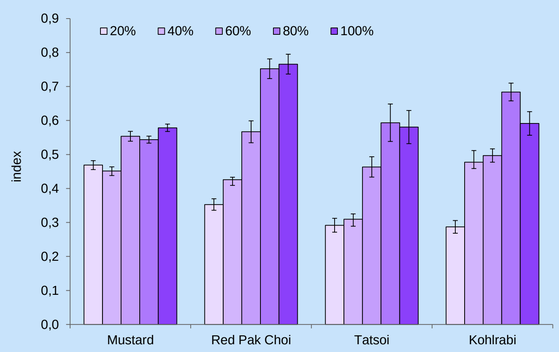
Total anthocyanins



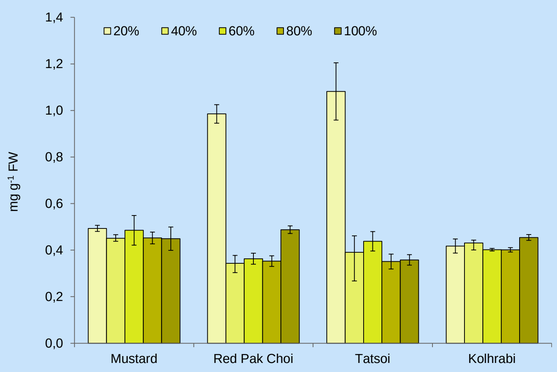
Total phenols



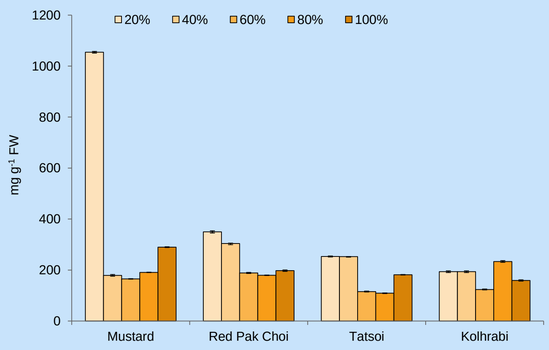
DPPH



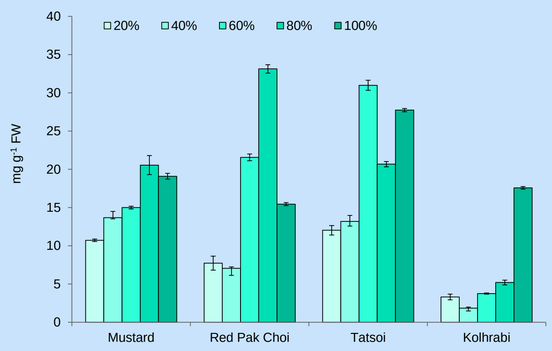
Flavonols



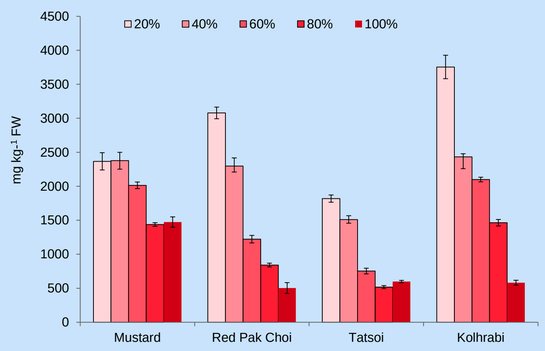
Ascorbic acid



Total tocopherols



Total carbohydrate



Nitrates

Conclusions. Our results revealed that illumination intensity, which amounted 20 % of the maximum, was unfavorable for growth and nutritional quality of microgreens. Meanwhile, 40 % illumination increased some antioxidative compounds (total anthocyanins, total phenols and DPPH free-radical scavenging capacity) and leaf area, besides decreased nitrates content of microgreens. Depending on the species most suitable conditions for growth and nutritional quality of microgreens was under illumination, which amounted for 40-80 % of the maximum. The maximum illumination intensity compared with lowest one had no significant positive impact for many investigated parameters. Summarizing the results it can be stated that during cultivation of microgreens under LEDs optimal light intensity should be about 300 µmol m^{-2} s^{-1}.

Acknowledgements. This research was funded by a grant (No. SVE-03/2010) from the Research Council of Lithuania.