RESPONSE OF *BRASSICACEAE* MICROGREENS TO SUPPLEMENTAL UV-A EXPOSURE

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Abstract. *Low levels of UV-A irradiance increase the content of various plant phytochemicals which have human health-promoting activity. However, there are still little data about supplemental UV-A irradiance in different lighting systems used for plant growing. Therefore, the goal of our study was to investigate the influence of supplemental UV-A light-emitting diodes (LEDs) irradiation for the basal solid-state lighting system indoors and for high pressure sodium lamps (HPS) in the greenhouse on the growth and phytochemical contents of Brassicaceae microgreens plants. The mustard (Brassica juncea L. 'Red Lion'), red pak choi (Brassica rapa var. chinensis 'Rubi* F_1*') and tatsoi (Brassica rapa var. rosularis) microgreens were grown 10 days in peat substrate at 16 h photoperiod, the day/night temperature 21±2/17±2 ºC and relative air humidity – 50-60%. Two experiments were performed: (1) evaluation of the effects of 366-, 390-, and 402- nm UV-A LEDs supplemental to the standard 447-, 638-, 665-, 731- nm set of LEDs indoors and (2) evaluation of the effects of 390 nm UV-A LEDs supplemental to HPS lamps in greenhouses. UV-A photon flux density (PFD) indoors was 12.4 µmol* m^{-2} s^{-1} *and total photosynthetic photon flux density (PPFD) was ~300 µmol* m^{-2} s^{-1}*. UV-A PFD in greenhouse was ~13.0 µmol* m^{-2} s^{-1} *and total PPFD in the greenhouse was ~125 µmol* $m^{-2}s^{-1}$*. Our results revealed that the effect of UV-A supplemental irradiance on phytochemicals content was species dependent. The most obvious positive effect of supplemental UV-A irradiation was detected in red pak choi microgreens. Almost all supplemental UV-A irradiation treatments indoors and 390 nm UV-A irradiation in greenhouse resulted in higher DPPH free radical-scavenging activity, content of total phenols and anthocyanins, ascorbic acid, α-tocopherol, lutein and* β*-carotene. Such illumination indoors caused the increase of red pak choi leaf area, but decreased it under greenhouse conditions. Different supplemental UV-A irradiation had a positive effect on one or another phytochemicals content of other microgreens. Our findings indicated that it is worth to use supplemental UV-A LEDs for improving nutritional quality of Brassicaceae microgreens.*

Key words: *growth, light- emitting diodes, microgreens, phytochemicals, UV-A irradiance.*

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