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# Variations in photoperiods and their impact on yield, photosynthesis and secondary metabolite production in basil microgreens

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## Abstract

**Background** The effects of different photoperiods on plant phytochemical synthesis can be improved by adjusting the daily light integral. Photoperiod is one of the most important environmental factors that control growth, plant's internal rhythm and the synthesis of secondary metabolites. Information about the appropriate standard in terms of photoperiod for growing basil microgreens as one of the most important medicinal plants is limited. In this study, the effects of five different photoperiods, 6 (6 h × 3 cycles), 8 (8 h × 2 cycles), 16, 18, and 24 h day<sup>-1</sup> on the yield, photosynthesis and synthesis of secondary metabolites of three cultivars and one genotype of basil microgreens in floating system were evaluated. The purpose of this research was to determine the feasibility of using permanent light in growing basil microgreens and to create the best balance between beneficial secondary metabolites and performance.

**Results** The results showed that the effects of photoperiod and cultivar on all investigated traits and their interaction on photosynthetic pigments, antioxidant capacity, total phenolic compounds, proline content and net photosynthesis rate were significantly different at the 1% level. The highest levels of vitamin C, flavonoids, anthocyanins, yield and antioxidant potential composite index (APCI) were obtained under the 24-h photoperiod. The highest antioxidant capacity was obtained for the Kapoor cultivar, and the highest total phenolic compound and proline contents were measured for the Ablagh genotype under a 24-h photoperiod. The highest yield (4.36 kg m<sup>-2</sup>) and APCI (70.44) were obtained for the Ablagh genotype. The highest nitrate content was obtained with a photoperiod of 18 h for the Kapoor cultivar. The highest net photosynthesis rate was related to the Violeto cultivar under a 24-hour photoperiod (7.89 μmol CO<sub>2</sub> m<sup>-2</sup> s<sup>-1</sup>). Antioxidant capacity and flavonoids had a positive correlation with phenolic compounds and vitamin C. Yield had a positive correlation with antioxidant capacity, flavonoids, vitamin C, APCI, and proline.

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