

Effects of Light on the Medicinal Plant *Nepeta nuda*

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Light is a major factor controlling plant metabolism including the phytochemical composition. In our study we aimed to investigate the effect of different light spectra on the medicinal plant *Nepeta nuda* L. grown under controlled *in vitro* conditions. For our experiment three different light qualities and intensities were examined: white (W) fluorescent light as a control, and a combination of blue and red LED light with high intensity – BR, and with low intensity – BRS. *In vitro* internode explants were cultivated for 5 weeks under the three light variants, and the obtained plantlets were compared in respect to their metabolic and antioxidant parameters. In addition, since the applied blue and red light combination was designed to stimulate flowering, a comparison between the phytochemical profiles of *in vitro* plants and wild-growing plants was performed. The metabolic analyses (UHPLC/MS2 and GC-MS) revealed that the applied light conditions altered the content of bioactive compounds specific for *N. nuda*, such as phenolics, iridoids, and volatiles. The effect of BR light on *in vitro* *N. nuda* demonstrated closest relation to the metabolic profile in flower – with upregulation of the most abundant phenolics and iridoid glucoside, as well as volatiles. In comparison, *in vitro* plants under W and BRS lights had much lower content of the investigated phytochemicals, except for the 4a- α ,7- β ,7a- α -nepetalactone that was with higher level than the BR light variant and the wild-growing plants. These data could serve as a basis for regulation of *N. nuda* flowering by light modulation, as well as for directed biosynthesis of metabolites of interest. Further observation for oxidative stress in leaves of the *in vitro* variants showed an absence in the epidermis. In a following *ex vitro* adaptation it could be pointed out which light treatment would lead to most successful adaptation in nature and restoration of the bioactive potential.

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