



**EVALUATION OF GROWTH AND PRODUCTION OF SOME TERPENOIDS AND
SECONDARY METABOLITES UNDER THE EFFECT OF NITRIC OXIDE IN
NIGELLA SATIVA CELL CULTURE**

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Nigella sativa has long been known for its medical use as an antispasmodic, especially against gastrointestinal disorders or respiratory ailments, in many countries. The plant contains thymoquinone, monotropens such as *p*-cymene and α -pinene, nigellidine, nigellimine and a saponin [1]. Plant cells and tissues culture provides secondary metabolites production in *in vitro* conditions. Cell suspension cultures are now recognized as an important model for studying natural products biosynthesis. Manipulating cell cultures by elicitors is one of the important strategies for induction of valuable metabolites in plant biotechnology [2]. In this study the effect of nitric oxide on cell growth and secondary metabolites production including terpenoids in cell culture of black cumin was evaluated. The experiment was conducted in a completely randomized design with three replications. The cell cultures treated by sodium nitroprusside (a nitric oxide donor) various concentrations (0, 25, 50 and 100 μ M). The parameters such as cell growth and some biochemical and phytochemical characteristics were evaluated. The results showed that nitric oxide had no significant effect on cell growth. Production of phenolics, anthocyanins and flavonoids, as well as the membrane lipid peroxidation, antioxidant potential and catalase and polyphenol oxidase enzymes activity significantly increased under the effects of nitric oxide. Terpenoids analysis by GC-MS showed that variation in their composition and content. Production of terpenoids such as beta-pinene, limonene, beta-selinene, menthol, pulegone and squalene in treated cultures was significantly increased compared to control cultures. Therefore, black cumin cell culture and its elicitation can be a good source for the production of terpenoids and other useful compounds.

References

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[2] Zhao, J.; Davis, L. C.; Verpoorte, R. *Biotechnol. Adv.* **2005**; *23*, 283–333.