Abstract

The Effects of Light on the Enzyme Production of Trichoderma atroviride †

Ioana-Alexandra Bala 1,2,‡, Naomi Tritean 1,3,‡, Diana Constantinescu-Aruxandei 1,*, and Florin Oancea 1,2,●

1 INCDCP-ICECHIM Bucharest, 202 Splaiul Independenței, 6th District, 060021 Bucharest, Romania; ioana-alexandra.bala@icechim.ro (I.-A.B.); naomi.tritean@icechim.ro (N.T.)
2 Faculty of Biotechnologies, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Măriști Boulevard, 1st District, 011464 Bucharest, Romania
3 Faculty of Biology, University of Bucharest, Splaiul Independenței 91-95, 050095 Bucharest, Romania
* Correspondence: diana.constantinescu@icechim.ro (D.C.-A.); florin.oancea@icechim.ro (F.O.)
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‡ These authors contributed equally to this work.

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The behavior of living organisms is influenced by sunlight, which is an environmental key factor. Ambient light influences many processes involved in growth, development, and reproduction metabolism [1]. Processes like signal transduction, blue-light perception and related responses have been extensively studied in plants, bacteria, algae and fungi [2]. A common soil fungus, Trichoderma atroviride can be used as a biocontrol agent because it has the capacity to parasitize phytopathogenic fungi. Conidiation, asexual reproduction, is influenced by light and the presence of certain nutrients [3]. The expression of some enzymes, such as lignocellulolytic ones, was shown to be regulated by light as well [4]. The aim of the study was to test the effects of blue-light laser radiation on the production by T. atroviride of enzymes that degrade lignocellulytic biomass. T. atroviride were grown on PDA medium at 28 °C for 5 days. The mature spores were removed and inoculated into ISM medium. To induce biomass-degrading enzymes the mycelium from ISM was incubated in water supplemented with rice husk in Erlenmeyer flasks on a rotary shaker at 28 °C for 15 days. The samples were subjected to blue-light laser for 60 and 300 s at three laser intensities and at different incubation time intervals. The supernatant was sterilized by filtration and used to determine the enzymatic activities, cellulases, proteases and laccases. Irradiation of T. atroviride with blue-light laser was found to influence the cellulase and protease activities. The highest cellulase and protease activities were observed in the case of 60 s irradiation at a laser intensity of 0.271 µmol/s. Some effects seem to follow a hormesis behavior which needs further investigation. Neither the treated samples nor the controls presented any laccase activity. Our results indicate an increase in enzymatic activities for T. atroviride when exposed to medium intensity of blue-light laser for 60 s.

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