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LASER STIMULATION OF NATIVE TRICHOPHYTON MENTAGROPHYTES VAR. GRANULOSUM AS A NEW METHOD FOR THE ENHANCEMENT BIODEGRADATION OF PETROCHEMICAL HYDROCARBONS

Jan W. Dobrowolski¹, A. Budak², D. Trojanowska², M. Rymarczyk³, J. Macuda³

¹AGH, Krakow, Poland; ²CM UJ; ³AGH

Abstract

Referring to laser photostimulation of different species of plants for better adaptation to the contamination of soil with petrochemical pollutants; our team initiated study on application of laser biotechnology for the enhancement biodegradation of hydrocarbon. We found the algorithm for efficient photostimulation of the growth of fungus *Trichophyton mentagrophytes* var. *granulosum*, activity of N-acetylo-beta glucozoamidase and significantly increased the biodegradation rate of different hydrocarbons, including PAH.

Dermatophytes were isolated from the samples of ground from the area of the oldest in the world region of oil exploitation in south east Poland, using standard procedure of homogenization of the samples of ground in physiological solution of NaCl; followed by cultivation of the fungi on solid Sabouraud mileau (bioMerieux). Incubation was taking place for 3 weeks at 27°C. Four species of *Trichophyton* were isolated. *T. mentagrophytes* var. *granulosum* was cultivated on mileau supplemented with agar. Inoculum of density 9×10^8 spors of the fungi in 1 ml was treated with coherent light of 670 nm from medical laser of 20mW, or by light 473 nm of laser diode of 20 mW. The time of exposure was 3 repetitions of 1 sec or 30 sec. The activity of 19 enzymes of control and photostimulated fungi were analysed after 14 days of incubation by APIZYM (bioMerieux) kit. In laser treated fungi the activity of important in bioenergy of cells enzyme N-acetylo-beta-glucozamidaze was enhanced (in comparision with control material). After 50 days of cultivation of the fungi in liquid mileau contaminated with crude oil (in Erlenmeyer bulbs), the concentration of oil hydrocarbons in control and experimental groups was analysed by Fourier' s method of infrared spectroscopy. Biodegradation rate of all the tested groups of hydrocarbons (especially polycyclic aromatic hydrocarbons) was much higher in the samples containing laser stimulated *Trichophyton mentagrophytes* varietas *granulosum*, than in the control groups.

Experimental study focused on further enhancement of biodegradation of polycyclic hydrocarbons in oil contaminated soil – using different algorithms of laser stimulation of whole consortium of microbs from the samples of soil contaminated for a very long time—is in progress.
