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A Comparative study on proteomic and biochemical alterations in the cyanobacterium Anabaena sp. PCC 7120 under short term exposure of abiotic stresses: Pesticide, salinity, heavy metal and UV- B

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Cyanobacteria are significant contributors to global photosynthetic productivity, thus making it relevant to study how the different abiotic stresses can alter their cellular activities. Here, changes in phycocyanin pigment composition, antioxidants enzyme activity, peroxidase production, NADPH, thiol content and SDS-PAGE protein profile were examined during a short-term exposure of the cyanobacterium Anabaena sp. strain PCC7120 to Salinity, Butachlor, Cadmium and UV-B. Of these stress conditions, a maximum inhibiton of phycocyanin content was observed for UV-B irradiation followed by butachlor, salt and Cd as compared to control. The total thiol content in the organism is raise slightly over the basal level, to overcome stress imposed by salt and cadmium. However, in UV-B and butachlor only showed the 0.6 and 0.95 fold significant decline in thiol level in comparison to control. Interestingly, in all cases, NADPH\NADH level is significantly decrease below the basal level. Lipid Peroxidation was found to be increase significantly in all stresses, while a SOD and catalase registered a maximum increase in cadmium and UV-B. A peroxidase production found to be highest in response to butachlor. Further, SDS-PAGE analyses of the total protein profile revealed the appearance of several differentially expressed protein bands in all the four stress. In addition, several up and down regulated proteins, newer protein bands appeared in treated cultures when compared to the control. However, biochemical and proteomic attributes suggests that, to overcome the abiotic stress, organisms generally might have defense mechanisms that prevent interaction with the stress factors and that counteract the stress-induced damages.

Keywords: Abiotic stress, Cyanobacteria, Antioxidant enzymes, SDS-PAGE.

Biography

Dhammika Leshan Wannigama is the final year student of Bsc (Hons) Industrial Microbiology at Center for Advanced studies in Botany, Banaras Hindu University, Varanasi-221005, India. He has published three international research publications, two seminar publications and including final year dissertation project related to molecular biology, under supervision of Professor L.C Rai. In year 2011 he has won the summer research training fellow ship in Tropical Microbiology, Department of Microbiology, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand.

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Cationic albumin grafted onto superparamagnetic magnetite nanoparticles surface used for hyperthermia

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Our newly developed carrier, cationic albumin conjugated with citrate capped magnetite nanoparticles (MNPs) is designed with proper physicochemical characteristics for hyperthermia applications. MNPs of about 10 nm were synthesized through co-precipitation of Fe^{2+} and Fe^{3+} in an ammonia solution, then citric acid was used to stabilize the MNPs suspension. It was anchored on the surface of freshly prepared MNPs by direct addition method. Carboxylic acid terminal group provides a site for further surface modification. The surface modification of the MNPs is provided by cationic albumin, which was covalently conjugated to carboxylic function located at the distal end of MNP's surface by carbodiimide chemistry. The cell surface membrane is negatively charged, so this charged surface provides sites of interaction for cationic particles. From which we obtain nanoparticles with hydrodynamic sizes of about 100 nm. Magnetic measurement revealed that the saturation magnetization of the nanoparticles was 64 emu/g and the nanoparticles were superparamagnetic at room temperature. We also have analyzed the potential of these particles for magnetic fluid hyperthermia by determination of the specific absorption rate. This study experimentally proves the high efficiency of these new particles to absorb the energy of an alternating magnetic field and convert it into heat which shows great potential of these nanoparticles in hyperthermia.

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