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Biology and biotechnological application of marine dimorphic yeasts: Yeast-metal interactions

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Heavy metal tolerance in two marine dimorphic yeasts was evaluated on YPD agar medium. Effect of heavy metal ions on growth kinetics of both yeast was observed. The morphological changes in both yeasts were also observed by scanning electron microscopy (SEM).Biosorption of lead and chromium was studied with respect to pH, temperature, contact time, biomass and initial concentration of metals. The surface sequestration of metal ions on the surface of yeast biomass was investigated by scanning electron microscope equipped with an Energy Dispersive Spectroscope (SEM-EDS) and Fourier Transform Infrared (FTIR) studies. Bioaccumulation of Cr (III), Cr (VI) and Pb (II) in yeast cells was demonstrated by Transmission Electron Microscopy (TEM). Further, Pbs, Cr and Cu nanoparticles were synthesized by using marine yeast cells as a simple, non-toxic, eco-friendly 'green material'. These nanoparticles were characterized by using SEM, TEM, XRD and Uv-Vis techniques. Cu nanoparticles were further tested for their antimicrobial activity.

Biography

Ashok Bankar is PhD student at Institute of Bioinformatics and Biotechnology, from University of Pune, Maharashtra, India. He has awarded CSIR scholarship for his Ph.D. and awarded travel grants from DST, VIBES, MICOM to attend conference at Belgium, Germany and USA. He has published 8 research papers and 1 book chapter in peer reviewed Journals.

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Production of a thermophilic and solvent-tolerant lipase-from a bacterial isolate

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The production of thermophilic and solvent resistant enzymes is a very useful task in industrial biotechnology. From the processing and economic point of view the high boiling point and low vapour pressure of water results in the expensive purification steps to separate the product (s) from an aqueous based biotransformation. Thus keeping in mind all these facts a thermophilic and solvent tolerant lipase producing bacterial isolate has been screened from the mud soil of hot spring. Among the 30 isolates grown on the tributyrin (2% v/v) agar plates the bacterial strain with maximum clear zone is selected and grown in a modified minimal medium. The isolated strain was found to be Gram-positive, rod shaped, sporulating and forming creamish white colonies with irregular edges. The physico-chemical parameters studied to improve the production of lipase in the broth were temperature, pH, inoculums size and agitation rate along with carbon and nitrogen sources. The extracellular lipase produced by isolated strain exhibited maximum activity 118 ± 3.12 IU/ml in DMSO. The lipase producing capacity has been studied against various organic solvents DMSO, hexane, heptane and hexadecane at different concentrations. It has been found that production of lipase and growth of bacteria varies with increasing the concentration of organic solvent. However the bacterial strain had shown the growth up to 25% (v/v) DMSO but lipase activity decline sharply at such higher concentration. The maximum lipase activity has been reported at 10% (v/v) DMSO. The behavior of lipase has been also varying with the nature of solvent have different pKa values. The yeast extract as a nitrogen source was found to increase the enzyme activity 120 ± 4.02 IU/ml in the broth and among the different carbon sources glucose 0.5 % w/v has also elevated the lipase activity. Among the different oils used in production medium cottonseed oil has been found to increase the production of lipase after 48 h incubation under shaking. Such solvent-tolerant lipases will probably boost many biotechnology-based industries for the synthesis of various products of commercial value.

Keywords: Solvent tolerant, lipase, tribytyrin, gram positive, spores.

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