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The Biological Approach to Enhance Durability in Concrete Structures

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Concrete durability is the function of its internal pore structure, porosity and the permeation properties. Improved pore structure, reduced porosity and enhanced permeation properties lead to the durability of structures. The objective of the present paper is to discuss the biological approach to enhance durability in concrete structures. Research has shown that specific species of alkaliphilic bacteria can be used to repair cracks in already existing concrete structures. A novel eco friendly self healing technique called 'Biocalcification' is one such approach on which studies were carried out to investigate the crack healing mechanism to study the enhancement of durability in concrete. Microbiologically induced calcite precipitation (MICP), a highly impermeable calcite layer formed over the surface of an already existing concrete layer, due to microbial activities of the bacteria Bacillus subtilis JC3 (cultured at JNTU) seals the cracks in the concrete structure and also has excellent resistance to corrosion therefore increases the durability of concrete structures. MICP is a complex mechanism and is a function of cell concentration, ionic strength, nutrient and pH of the medium. This paper aims to reports the investigations on the enhancement of durability by microbiologically induced calcite mineral precipitation (MICP) in ordinary (M20) and standard (M40) grades of concrete. Quantification and Characterization was done using Scanning Electron Micrograph (SEM) analysis, only to be noted that cracks were sealed up by crystalline material grown over the surface due to microbial activity of the bacteria.

Biography

V Srinivasa Reddy is a Research Scholar at Jawaharlal Nehru Technological University College of Engineering, Hyderabad, India.

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Antibiotic susceptibility and determination of Minimum Inhibitory Concentration (MIC) of potent antibiotics used against Staphylococcus spp. isolated from raw milk

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The uncontrolled use of antibiotics has led to the development of multiple antibiotic resistance, there by rendering the treatment ineffective. In the present study, raw milk samples were collected from different areas of Patna. Out of the 12 isolates obtained, nine were identified as Staphylococcus species. The isolates were examined for their susceptibilities by Bauer Kirby Disc Diffusion test against ten antibiotics. Results showed that incidence of resistance to the antibiotics was quite high, as the maximum susceptibility obtained was only about 13.19%, Rifampicin and Tetracycline being the most ineffective in vitro. Amoxicillin and Cloxacillin were the most effective in phase I exhibiting 12.13% and 11.24% efficacy, respectively, whileAmpicillin + Cloxacillin was the most effective combination exhibiting 14.31% efficacy in phase II. The MIC values of two antibiotics in pure form and three in combinations were determined by agar dilution and broth dilution methods. The MIC values ranged between 0.5 – 1.0 μg/L showing comparable results throughout the dilution range. However, slightly higher values were obtained for Amoxicillin + Erythromycin and Amoxicillin + Clavulanate i.e. > 1.0 μg/L.

Biography

Ankita Shrestha has completed her graduation at the age of 23 from Patna Women's College, Patna and qualified the All India Combined Biotechnology Entrance held by JNU, New Delhi. She is currently pursuing her Masters Degree in Biotechnology from Utkal University, Bhubaneswar. She has underwent several summer internships under renown scientists and also done a Research Project under University Grants Commission of India. She is a young budding scientific mind who wants to build up a career in the Biotechnology Industry.

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