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Biomineralization by biofilm producing bacteria (bio concrete)

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Bacterial surfaces such as cell walls or polymeric materials (exopolymers) exuded by bacteria includes slimes, sheaths, or biofilms, or even dormant spores can act as important sites for the adsorption of ions. Bacterially induced mineralization has recently emerged as a method for protecting decayed construction materials. In nature, building and remediation structures with local materials occurs without any requirement of extreme energy usage. This occurs through the application of microorganisms which deposit carbonates (as part of their basic metabolic activities), one of the most well known minerals. These deposits (commonly called as calcium carbonate crystals/ calcite crystals/ microbial concrete) act as binders between loose substrate particles and reduce the pores inside the substrate particles.

The use of bacteria for remediating building materials is a new idea, In nature many carbonate rocks have been cemented by calcium carbonate precipitation from microbes, This can be used for solving various durability issues of construction materials. Microorganisms are abundant in nature, which paves the way for massive production of bacterial calcium carbonate crystals. As the microorganisms can penetrate and reproduce themselves in soil or any such environments, there is no need to disturb the ground or environment unlike that of cement. This technology also offers the benefit of being novel and eco- friendly.

This new technology can provide ways for low cost and durable roads, high strength buildings with more bearing capacity, long lasting river banks, erosion prevention of loose sands and low cost durable housing.

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Designing and construction of binary vectors containing phytase gene suited for cereals transformation

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Cereals are the most important crops in the world. Phosphorous is stored in their grains as phytic acid which is an antinutrient agent due to its ability to bind with valuable minerals like calcium, iron and zinc. Monogasteric animals including human are incapable of utilizing the phosphorus bound in phytate due to low levels of phytase activity in the digestive tract. Plant biotechnology offers new tools to break down the phytat by introducing phytase gene in crops to increase nutrient content and their feed quality. For this, we designed a set of binary vectors containing phytase gene with different features, phytase genes from A. niger and E.col driven by three different promoters; maize Ubi, rice Act and CaMv35S, different selection markers for plants, kanamycine (nptII), hygromycine (hptII) and herbicide resistance (bar gene), Kozak sequence at start codon site and KDEL retention signal peptide at 3` end before stop codon. The murine signal peptide of mAb24 light chain also has been inserted in 3` of the gene. The main backbone of vectors obtained from Pcambia series. All the constructs confirmed with digestion followed by electrophoresis.

Keywords: Phytic acid, phytase, binary vector, regulatory elements.

Biography

Hassan Rostami is PhD student of biotechnology at CBT, IST, JNTUH. He is studding on barley regeneration and transformation for improving its feed quality.

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