

Urease is an important enzyme that hydrolyses urea into ammonia and carbon dioxide. The aim of the study was to isolate and optimize the urease producing bacterial strain useful in microbially induced calcium carbonate precipitation. Soil samples were collected from different areas of Lahore such as agriculture land and Marble shops etc. The qualitative analysis of isolated bacteria was performed using Christensen's agar plates and CFU. The selected bacteria were grown in ten different media for the production of urease enzyme. The effect of different carbon sources (lactose, sucrose, glucose, maltose, fructose and xylose) and nitrogen sources (ammonium nitrate, ammonium acetate, ammonium phosphate, potassium nitrate, peptone, yeast extract and tryptone) was investigated on urease production. The effect of temperature and fermentation period on urease production was investigated. Two distinct strains of *Bacillus subtilis* and *bacillus paralicheniformis* were isolated. Furthermore, it includes the identification of a maximum 900 U/mL and 740 U/mL units, underscoring their potential applications. For the development of self-healing concrete, collaboration of external source (University of Engineering and Technology Lahore) was required. Beam and cube test specimens (tentatively having size 100mm x 100mm x 500mm and 150mmx150mm x 150 (respectively) were prepared by varying bacterial dosage. Healing of the cracks were seen using electron microscope and quantification of width of the cracks were also done. Compression test (ASTM C39/C39M) and flexural strength test (ASTM C 78-02) were performed for compression and flexural strength of the specimens respectively using UTM and Flexural Testing Machine. The findings contribute to our understanding of urease enzyme and their potential applications in diverse fields