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Utilizing pig urine and limestone application in microbial induced carbonate precipitation as a soil reinforcement technology

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The mechanical properties of soil (cohesion, friction, stiffness and permeability) are important parameters for engineering constructions and ecosystems in sedimentary environments. A novel soil reinforcement technique is being developed based on microbial induced carbonate precipitation (MICP).Many studies on MICP use microbial catalyzed hydrolysis of urea to produce carbonate. It is a process by which living organisms form inorganic solids. *Bacillus Pasteruii*, which is able to convert urea into ammonium and carbonate, are injected in the soil, followed by a solution containing urea and calcium chloride. The produced carbonate precipitates with calcium. The calcium carbonate crystals form bridges between the sand grains, which increases the strength of the sand-mass. However, the remaining ammonium chloride and urea are toxic to soil-mass, that will affect the nature environmental. In order to prove the situation and reduce the cost of MICP, we use limestone (CaO) and pig urine on MICP experiment. Study found that the use of limestone and pig urine also have the precipitation of calcium carbonate which is type of Aragonite. The feasibility of MICP by limestone and pig urine is tested experimentally in sand column experiments. Results of these experiments are presented and discussed.

Keywords: Microbial induced carbonate precipitation; *Bacillus Pasteruii; Calcium* carbonate