عنوان مقاله:

Optimum bacteria suspension volume for stabilizing silty sand soils by Sporosarcina pasteurii Bacteria

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خلاصه مقاله:

The bio-mediated soil improvement techniques have been gaining increasing attention recently. In this method, the bacteria was cultivated aerobically in the laboratory and added to the soil with reactant solutions such as urea and calcium chloride. Most of the existing studies are on sandy soils and few researches have been done on silty sandy soils. However, most soils in nature are compounds of fine-grained and coarse-grained soils. In fine-grained soils, silt does not have very good resistance due to the lack of adhesion between its particles. Hence, in this study Sporosarcina pasteurii bacterium was cultivated aerobically for stabilizing sand with different percentages of silt to determine the optimum bacteria suspension volume. After some bacterial tests such as measuring bacterial growth, standard plate count, gram staining, pH determination, growth without urea, and urease test, geo-technical tests like soil sieve, compaction, and Atterberg limits were also done. Standard plate count was estimated ۲.۵*۱۰۸ through serial dilution plating and culture media pH was determined ۸.۶۴ from different samples. Moreover, to achieve the best results, different sampling methods were compared. As the calcium carbonate creates a network of calcified bridges of calcite between sand grains, an electron microscope was used for scanning the surface with a focused beam of electrons. Results of triaxial tests show that the maximum strength for samples with ۰%, ۱۰%, ۲۰%, ۳۰% and ۴۰% of silt was improved from ۷۰۰, ۹۰۰, ۷۵۰, ۶۰۰ and ۵۵۰ to ۱۱۰۰, ۱۴۰۰, ۱۵۵۰, ۱۶۰۰, and ۱۵۰۰ kPa respectively by adding optimum bacteria suspension volume.

کلمات کلیدی:

Bio-mediated Soil Improvement, Microbial Geo-Technology, Sporosarcina Pasteurii Bacterium, Optimum Bacteria Suspension Volume, Triaxial Tests