

EFFECT OF PINE NEEDLES ON STRENGTH BEHAVIOR OF DANGRI SOIL

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ABSTRACT

Jammu and Kashmir State is gifted by nature with dense forests, which covers 19.95 % of geographical area of the State. Among these forests, a large area of region is under dense Pinus family trees. The Pinus family trees like Chir, Kail and Deodar are having needle like leaves in cluster form. When these needles like leaves become mature and brown in colour, these shed-down in huge quantity on to the ground surface. These pine needles form a carpet and cover entire pine forests area, which are prone to fire hazards and also cause severe environmental instability in the forest area. On the other hand, due to rapid urbanization, there is scarcity of stable ground for construction of various infrastructures. Therefore, utmost efforts are put in-place to use marginal soils after appropriate soil improvement. Among various ground improvement techniques, soil reinforcement with natural fiber technique has been successfully implemented for soil improvement. From the last decade, the use of randomly distributed synthetic fibre as soil reinforcement has recorded a tremendous increase. However, more emphasis is to be laid on use of natural fibres. Use of natural fibres like Pine needles in Civil engineering for improving soil properties is advantageous because they are cheap, locally available, biodegradable and ecofriendly material. The natural fibre reinforcement causes significant improvement in shear strength and other engineering properties of the soil. Among various natural fibers Pine fibers are one of such natural fibers, being used as reinforcing material in soil stabilization. Therefore, the research shows the results of an experimental study to assess the possibility of Pine needles as reinforcing material. Pine needles locally available from forest, Rajouri Jammu and kashmir, have been used as an additive for stabilization of weak soils. Pine needles (chopped into 15mm length) have been chosen as the reinforcement fiber randomly mixed with the soil at different percentages by weight of sample. Natural soil samples randomly mixed with Pine needles were prepared at maximum dry density(MDD) and optimum moisture content(OMC) and subjected to various tests. The main objective of this research has been focused on the strength behaviour of the soil reinforced with Pine needles as natural fiber. The results suggest that Pine needles can be potential additive for use as natural fiber in reinforced composite ground. Thus, using of pine needles as soil reinforcement has two-fold advantage, firstly, to stabilize weak soils by increasing CBR values and decrease in thickness of granular sub-base pavement layers during road construction and secondly to use this unwanted waste material to avoid tremendous fire hazards, environmental instability and its bulk utilization at economical cost for sustainable development.