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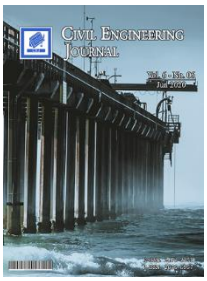

Influence of Jute Fibre on CBR Value of Expansive Soil

Sanjeev Kumar [a*], Anil Kumar Sahu [b], Sanjeev Naval [c]

[a] *Lecturer, Department of Civil Engineering, Vaish Technical Institute, Rohtak (Haryana), India.*

[b] *Professor, Department of Civil Engineering, Delhi Technological University, Delhi, India.*

[c] *Associate Professor, Department of Civil Engineering, DAV Institute of Engineering & Technology, Jalandhar (Punjab), India.*

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Abstract

Construction of structures on expansive soil is highly risky due to its susceptible behavior towards differential settlements. Different soil stabilization techniques including soil reinforcement have been adopted to improve the properties of the unsuitable soils. In this present study, randomly distributed jute fibres have been used to improve geotechnical properties of expansive soil collected from South Delhi (India). California Bearing Ratio (CBR) tests were carried out on the expansive soil blended with jute fibres. Jute fibres of length 10 mm and 30 mm were included in different percentages viz. 0.25, 0.50, 0.75, 1.00, 1.25 and 1.50 by the dry weight of the soil. The test results indicate that the inclusion of randomly distributed jute fibres significantly improves the CBR value of the soil. The Optimum value of fibre content is found to be 1.25%. An improvement of 226.92% in CBR value of the reinforced soil as compared to unreinforced soil has been observed at the optimum jute fibre content. Since Jute is agricultural waste, the present study provides a cost-effective solution to problematic clayey soils.

Keywords: Random Inclusion; Jute Fibre; California Bearing Ratio; Expansive Soil; CBR Value.

1. Introduction

Infrastructure development like buildings, roads, bridges etc. on expansive soil is a challenging job for Civil engineers due to its swelling and shrinking nature in wet and dry conditions respectively. Nearly 20% of total area in India is covered by black cotton soils. Due to the changes in moisture content, these types of soils exhibit much variation in swelling, compressibility; shear strength and results in failure of structures. Therefore, certain properties of these types of soils require improvement. Among different proven techniques chemical stabilization using lime or cement is one of the technique to improve soil properties [1-3] but soil reinforcement is reliable and effective technique to improve properties of fine grained soils. The established methods of soil reinforcement include metallic strips, bars, geogrids, geotextile or fibres. The reinforced soil obtained using ideally inextensible inclusions like metallic strips or bars is known as reinforced earth [4] whereas that obtained using ideally extensible inclusions like geogrids, geotextile or fibres is known as ply-soil [5].

The stress deformation behavior is different in these two types of reinforced soils. The reinforcement using metallic strips, geogrid or Geotextiles increases tensile strength of soil in one particular direction. Despite the fact that the role of tensile stresses may be considerable but there may be possibility to develop planes of weakness at soil-reinforcement interface. Random mixing of fibres with soil is also considered as more effective soil reinforcement technique [6-8] and is quite similar to that of admixture stabilization. Fibres in this technique are simply added and

* Corresponding author: snjvbansal67@gmail.com

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