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Improve the Index and Engineering Properties of Black Cotton Soil by Jute Fiber

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Abstract - *Analysis the properties of Black Cotton soils is carried out with and without Jute reinforcement. Jute geo-textile 40-50mm length was used as reinforcing material to stabilize black cotton soil. Almost all the standard laboratory tests. Finally study of the contribution of jute geo-textile on the properties of clayey soils and its feasibility for various civil engineering applications is evaluated. The results show the increment of soil properties like dry density and Optimum moisture content, and settlement decreased on introduction of jute geo-textile, indicating significant improvement in the engineering behavior.*

***Key Words*: Soil stabilization, Geo-Textile.**

1. INTRODUCTION

Soil is a base of structure, which actually supports the structure from beneath and distributes the load effectively.

If the stability of the soil is not adequate then failure of structure occurs in form of settlement, cracks etc. Black Cotton soil under-goes large swelling and shrinkage. In this project an attempt is made study the influence of jute fiber reinforcement on index properties of expansive soil with reinforcement of jute layers between soil. It was observed that inclusion of Jute Geo textile layer into the soil increases the unconfined compressive strength and this increase is maximum corresponding to 4 layers of Jute Geo textile Layers.

In this project we are attempting soil reinforcing as a JUTE LAYERS between soil at different depth and observing the behavior of soil.

1.1 Literature Review

G**ill and singh, (2012)** studied CBR improvement of clayey soil and concluded that CBR was improved by 9.4% with different positions of layer. Curves are plotted between CBR and pavement thickness for light, medium and heavy traffic.

Singh, (2013) Conducted work on strength and stiffness of soil reinforced with jute geotextile sheets and concluded that there is increase in shear strength of soil with inclusion of jute in soil Properties of black cotton soil.

Bairagi, (2014) studied the Effect of jute fibers on engineering characteristics of black cotton soil and gave result that CBR and UCS values of soil were increased significantly when mixed with jute fiber from 0% to 5%.

1.2 Black cotton soil

Rich proportion of montmorillonite is found in BC Soil from mineralogical analysis. High percentage of montomorillonite high degree of expansiveness. These property results cracks in soil without any warning. Use of this type of land may suffer severe damage to the construction with the change in atmospheric conditions. This BC Soils occurs mostly in the central and western parts and covers approximately 20% of the total area of India.

2. SOIL STABILIZATION

Soil stabilization is a way of improving the weight bearing capabilities and performance of in-situ sub-soils, sands, and other waste materials in order to strengthen road surfaces

Types of soil stabilization

1. SURFACE STABLISATION

1.1 Mechanical stabilization

1.2 Physical stabilization

1.2.1 Cement

1.2.2 Lime

1.2.3 Bitumen

1.2.4 Resin

1.3 Chemical stabilization

1.3.1Calcium Chloride

1.3.2 Sodium Chloride

1.3.3 Sodium Silicate

1.3.4 Polymers

2. GROUND IMPROVEMENT

2.1 Deep Compaction

2.2 Soil Replacement

2.3 Pre Loading

2.4 Drainage and GWT Controll

2.5 Injection Grouting

2.6 Soil Freezing

2.7Use of Geotextiles (JUTE BAG)

Table -1: The soil sample was collected and tested in lab and the following characteristics of soil were observed:

S.no	CHARACTICS	SYMBOL	CF0	CF1	CF2	CF3
1	Liquid Limit	LL	52.25			
2	Plastic Limit	PL	24.35			
3	Plasticity Index	PI	27.9			
4	Specific Gravity	Gs	2.4			
5	Optimum Moisture Content	OMC	4.68	5.35	5.96	6.45
6	Maximum Dry Density	MDD	1.619g/cc	2.31	2.34	2.3

CF0 - Clay with 0% jute fibres.

CF1 - Clay with 2% jute fibres.

CF2 - Clay with 3% jute fibres.

CF3 - Clay with 4% jute fibres.

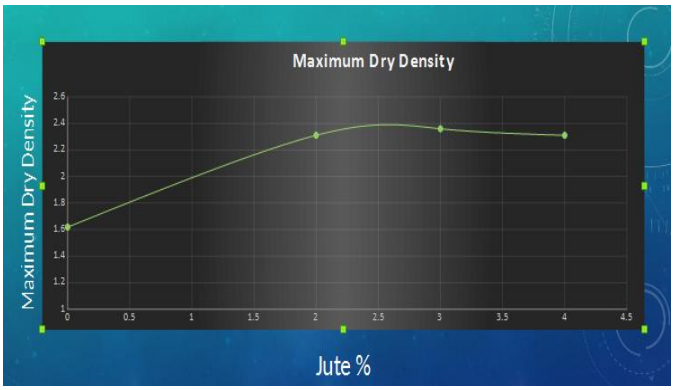

Chart -1: OMC Graph

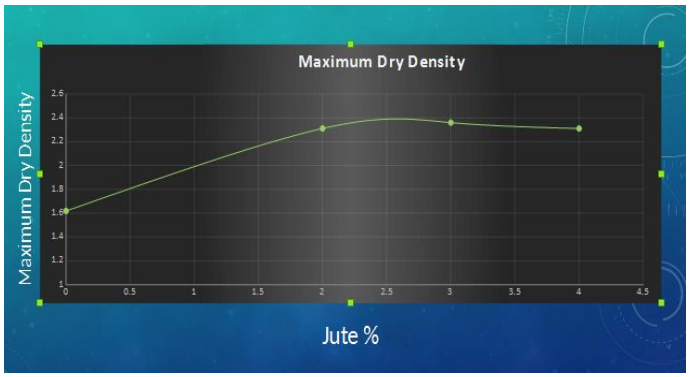

Chart -2: MDD Graph

3. CONCLUSIONS

1. Based on the observation and the result obtained , it can be conclude that the dry density increase with increase the jute fibers.

2. With the increase the jute fiber % the Shrinkage limit value increases from 6.56 to 13.76 %.

3. The optimum moisture content values increases with increase the jute fibers.

4. From the test result it can be conclude that the addition of jute fibers to black cotton soil decrease its swelling behavior.

REFERENCES

[1] BairagiHarshita, Yadav R.K and Jain R; (2014)"Effect of Jute Fibres on Engineering characteristics of Black Cotton Soil". International Journal of Engineering Sciences & Research Technology, PP. 705-707
[2] Choudhary A, Gill K, Jha J; (2012) "Improvement in CBR of Expansive Soil Subgrade with a single Reinforcement layer". ECU Publications, Preceedings of Indian Geotechnical Conference, Paper No. B-214, Delhi
[3] P.B.Ullagaddi,T.K.Nagara," Investigation on geosynthetic reinforced two layered soil system ", Missouri University of Science and Technology,2013
[4] Das T and Singh B; (2014) "Deformation and Strength characteristics of Jute Geotextile Reinforced Soils". JERAD, Vol. 8 No. 04, PP. 987-995.
[5] IS: 2720 (Part 5) 1970: Determination of Liquid Limit and Plastic Limit.
[6] Jagan B; 2016 "A Critical review on applications of natural Jute Fibers A Case Study". (IJCIET) Volume 7, Issue 3, 2016, pp. 200–210.
[7] Singh H.P; 2013 "Strength and Stiffness of soil Reinforced with Jute Textiles". IJCET, Vol.3, No.3, PP. 1143-1146.
[8] Singh Pardeep, Gill K.S; (2012) "CBR Improvement of Clayey soil with Geo-grid Reinforcement". IJETAE, Volume 2, Issue 6, PP. 315-318
[9] Pandit Vinod, Vyas Krishna, Borate Rohan, Adhikar Roshan, Pankaj Verma, Priyanka Ahire; (2016). "Effects of Jute Fiber on Compaction Test". IJMTER, e-ISSN No.:2349-9745.