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STRENGTH CHARACTERISTICS OF EUICHHORNIA CRASSIPES FIBER ON CLAYEY SOIL

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Abstract - *Soil exhibit generally undesirable engineering properties. Alteration of soils to enhance their physical properties. So that an increase in shear strength of a soil and to control the shrink-swell properties of a soil, thus improving the load bearing capacity of a soil to support foundations. Modification and its effect on soil indicate the reaction mechanism with additives, effect on its strength, improve and maintain soil moisture content and suggestion for construction systems. The main objective of this paper is to improve the physical and chemical properties of clay soil by using additive like and Euichhornia Crassipes fibres which is not yet used for the purpose. This is an alien species of algae invading the backwaters. Invading causes clogging canals, rivers and lakes; displacing native plants and animals thereby becoming a burden. So, the study aims at utilizing this cheaply available burden for soil stabilization purposes. The study was conducted on untreated fibres in clayey soil of varying percentage of fibre 0.25%, 0.5%, 0.75% and1% and percentage increase in strength was obtained as 150% when compared to unreinforced soil. In this study mainly concentrates on the improvement in strength of soil with addition of treated fibres through Unconfined Compressive Strength test. The variation of Liquid limit at varying percentage of fibre in soil is also studied*

Keywords: **- Euichhornia Crassipes, Unconfined Compressive Test.**

1. INTRODUCTION

Stabilization is the process which improves the properties of soil. Soil stabilization is usually done by some materials in the form of powder such as lime, cement and fly ash. These stabilizers controls dust and improve its density, permeability, adhesion, compaction and decrease curing time. Large amount of waste is generated from various industries and human activities. Utilizing waste as stabilizers will reach optimum economic advantages.

Modification of the properties of a soil system by addition of fibres in order to obtain lasting properties. Enhances physical properties of weak soils. Increase Shrink-Swell properties. Reduce permeability and compressibility. Increase bearing capacity and shear strength, environment friendly, no skilled labor required, Reduce water absorption, Better crack control. Spread of invasive alien species is neither easy to manage nor easy to reverse. As a control measure can use the alien species for improving soil properties. Use of cheaply available environmental burden for strength enhancement purpose.

1.1 EXPERIMENTAL DETAILS

A. Materials

Clayey Soil; Clay soil appears to be brown in colour. Table1 shows the initial properties of clay.

Table-1 Properties of Clayey soil

Sl No	Properties	Result
1.	Grain size distribution (%) Clay Silt	 67.8 32.2
2	Specific Gravity(G)	2.31
3	Water Content (Natural)(w) (%)	7.1
4	Liquid Limit, W_L (%)	36.65
5	Unconfined Compressive Strength, Qu (KPa)	10

Euichhornia Crassipes: Variety used: Euichhornia Crassipes from Vellayani Lake, Trivandrum. Commonly known as Water Hyacinth.Alein species of algae abundantly present in backwater highly problematic invasive species. Advantage: cheap, easy to make fibres, helps to minimize algae

Fig-1 Euichhornia Crassipes

1.2 Preparation of sample:

The algae are collected from lake and kept for air drying for about 3 days that it loses all the moisture content. And the stems are separated and cleaned and immersed in a solution for remove the cellulose content for 2 to 4 days and the fibres are extracted from stem.

2. RESULTS AND DISCUSSION

This chapter discusses about the Strength characteristics of clayey soil stabilized with Euichhornia Crassipes fibre. Unconfined compressive strength test (UCS) was carried out on clayey soil and variation liquid limit was studied.

Fig 1 shows the variation of compressive strength of soil with percentage fibre added. From the figure, it is clear that the stress strain curve has an increasing trend with the addition of Euichhornia crassipes fibre. The initial UCS value was 10KPa.The value was improved to 25KPa at soil with 0.5% fibre. There was an increase of 150% in strength with fibre inclusion. Addition of Euichhornia crassipes fibre strengthened the ability of soil to with stand compressive forces. It was difficult to mix the fibre beyond 1% since the volume of fibre was greater than that of the soil. It formed lumps in pockets of low density.

Table -2: Variation of UCS with varying % fiber

Fibre Content (%)	UCS(KPa)
0	10
0.25	20
0.5	25
0.75	22
1	18

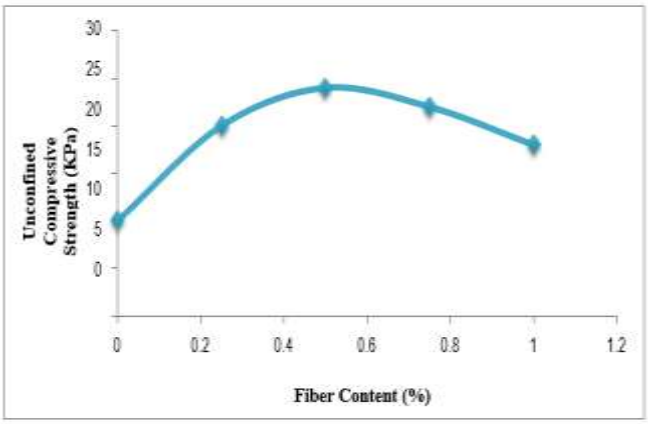

Fig 1; Variation of UCS with varying % of Fiber

Liquid limit was determined using cone penetrometer test on soil with various percentages of fiber say,0.25%,0.5%,0.75%,1%. Fig 3 shows the variation of liquid limit and it reduced at 0.5% fiber content.

Table- 3; Variation of liquid limit with varying percentage of fiber

Fibre Content (%)	Liquid Limit (%)
0	36.65
0.25	35.54
0.5	34.16
0.75	35.77
1	35.93

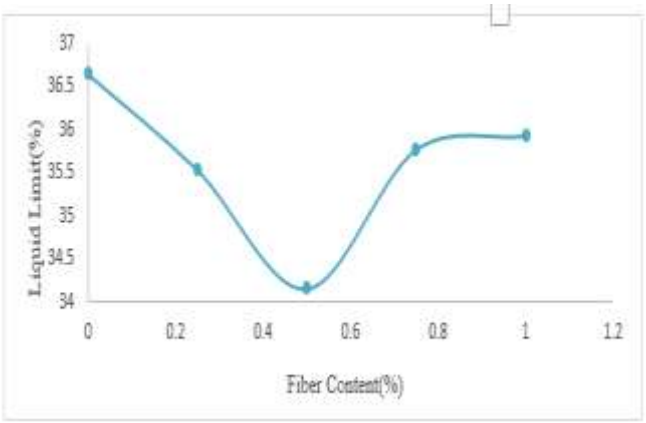

Fig 2; Variation of Liquid Limit with varying % of Fiber

3. CONCLUSION

Stabilization is the physical, chemical, biological or combined method of changing a natural soil to meet an engineering purpose. The initial UCS value was 10KPa.The value was improved to 25KPa at soil with 0.5% fiber. There was an increase of 150% in strength with fiber inclusion. Addition of Euichhornia crassipes fiber strengthened the ability of soil to with stand compressive forces. Liquid Limit decreased by the addition fibre up to 0.5% this shows an improvement in soil properties by the inclusion of fibre.

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