Comparitive Study of Jute Fiber on The Properties of Flyash Stabilizedsoil in Subgrade

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***Abstract*:- This paper is focusing on the comparitive study of raw soil and stabilization of soil using jute fibre and flyash.we know that the rapid growth of civilization has forced the engineers to use the sites those are not ideal as per the geotechnical engineering.The present project seeks the possibilities of whether waste product flyash can be utilized as highway constructional material. Stabilization is the process by which a soils physical property are transformed to provide long term permanent strength gains. Mixing of jute fibre in soil in varying percentages like 0.5%,1%,1.5%,2%. The laboratory test such as california bearing ratio test, proctor compaction test, ucc test are performed. On the basis of the above experiments conducted, it is clear that the stabilization of soil using flyash and jute fibre is more suitable of pavement.**

1. INTRODUCTION

The rapid growth of civilization has forced the engineers to use the sites those are not ideal as per the geotechnical engineering. The present project seeks the possibilities of whether waste product flyash can be utillized as highway constructional material. Soil not only forms the foundation of road pavements but also is the principle material used for their construction. Soil to be used as subgrade does not satisfy this norm in many parts of the world,,making it mandatory to seeks the alternative solutions for the use of weaker sub grade soil. Subgrade soil transfers the applied load from pavement to the layers beneath. The various defects such as waves, corrugation, ruts, crack etc.Occuring in the road pavement stable and serviceable for a longer period. Waste disposal is the major issue in the world. Some of these materials are not biodegradable and often leads to waste disposal crisis and environmental pollution. The present project seeks the possibilities of whetherwaste product flyash can be suitably utilized as a highway constrution , the pollution and disposal problem may be partly reduced. flyash increase the properties of soil.

2. LITERATURE REVIEW

Shwethaprasanna and nevilmacedons paper focusing on the stabilisation of soil using jute fibre as soil stabilizer.On the basis of the experiments performed, it can be concluded that the stabilization of using 30mm pieces of jute as stabilizer improves the strength characteristics of soil.

Dharmesh lal ,Parvalika Reddy, there study deals with improvement of silcharacteristcs with the addition of jute fibre sheet. Result shows the strength improved.

The instability of structure lies mainly in the properties of soil under which it is constructed. For instance, if the soil is having weak engineering properties, there are chances of crack formation and settlement. One of the major problematic soils of this type are the Black cotton soils which are mainly classified as expansive soils. They are obviously a hindrance to the strength and stability of structures. The present study deals with the improvement of soil characteristics with the addition of Jute fiber sheet. A series of Triaxial and CBR tests were done on normal soil and Jute fiber reinforced one. The observed values indicate a significant contribution of strength improvement when fiber sheets were added.Stabilisation is the process of modifying the properties of a soil to improve its engineering performance and used it for a variety of engineering works.

SwaethaPrasana and Nevil Mendes examined the potential of soil stabilization with jute fibre when it is cut into roughly 30mm lengths as stabilizer. The varying percentages like 0.5%, 1%, 1.5 and 2% of pieces of jute fibre were used and mixed it with soil. The laboratory tests such as California Bearing Ratio (CBR) test, modified compaction tests and direct shear strength tests have been conducted to observe the change in engineering properties of soil. On the basis of the experiments performed, it can be concluded that the stabilization of soil using 30mm pieces of jute as

stabilizer improves the strength characteristics of the soil so that it becomes usable as one of the reinforcing material for the construction of roadways, parking areas, site development projects, airports and many other situations where sub-soils are not suitable for construction.

R Sandeep kumar and Govardhan Gao conducted the tests and said that stabilisation is the process of modifying the properties of a soil to improve its engineering performance and used it for a variety of engineering works. This study examines the potential of soil stabilization with jute fibre when it is cut into roughly 30mm lengths as stabilizer. The varying percentages like 0.5%, 1%, 1.5 and 2% of pieces of jute fibre were used and mixed it with soil. The laboratory tests such as California Bearing Ratio (CBR) test, modified compaction tests and direct shear strength tests have been conducted to observe the change in engineering properties of soil. On the basis of the experiments performed, it can be concluded that the stabilization of soil using 30mm pieces of jute as stabilizer improves the strength characteristics of the soil so that it becomes usable as one of the reinforcing material for the construction of roadways, parking areas, site development projects, airports and many other situations where sub-soils are not suitable for construction

3. MATERIALS

The soil sample used in this test is collected from paddy field near peroor, Etumanoor. The jutefibre used is Procured from Indiamart(online shop),which were loosened and cut in lengths of proper size. Flyash is collected from Neptune readymix ,Edayar Cochin. electrostatic precipitators or bag filters. The fine powder does resemble Portland cement but it is chemically different.

3.1 FLY ASH

Fly ash is a byproduct from burning pulverized coal in electric power generating plants. During combustion, mineral impurities in the coal (clay, feldspar, quartz, and shale) fuse in suspension and float out of the combustion chamber with the exhaust gases. As the fused material rises, it cools and solidifies into spherical glassy particles called fly ash. Fly ash is collected from the exhaust gases by

Fig 4.1.1 Fly Ash

3.2 JUTE FIBER

Jute fibres are usually classified as bast fibres, which are the plant fibres that can be collected from the bast or the phloem that surrounds the stem of the plant. Other notable examples of fibres derived from the phloem or the bast of the producing plants include linen (derived from the bast of the flax plant), industrial hemp, and kenaf (also known as Java jute and Deccan hemp). It can be noted that jute fibres are usually brown to off-white in colour. The typical length of jute fibre ranges from 1 to 4 metres. It is important to note that jute is sometimes referred to as the golden fibre owing to its high cash value and its colour.

4.2 JUTE FIBER

Clay is the smallest particle among the other two types of soil. The particles in this soil are tightly packed together with each other with very little or no airspace. This soil has very good water storage qualities and makes it hard for moisture and air to penetrate into it. It is very sticky to the touch when wet but smooth when dried. Clay is the densest and heaviest type of soil which does not drain well or provide space for plant roots to flourish.

4.3 CLAYEY SOIL

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TEST	RESULTS
Water Content	34.43%
Specific Gravity	2.65
Liquid Limit	47.33%
Plastic Limit	17.45%
Plastic Index	29.88%
Sieve Analysis	48.81%
Optimum Moisture Content	21.12%
Maximum Dry Density	1.340 /cm^3

Physical And Mechanical Properties of Jute Fiber

Properties of jute fiber	Value
Diameter of fiber	5 - 25
Tensile strength (Mpa)	393 -773
Fiber length(mm)	0.8 -6
Youngs modulus (Gpa)	13-26.5
Cellulose (%)	64.4
Hemicellulose (%)	12
Lignin (%)	11.8

4. METHODOLOGY

In this paper experimental study on the effect of jute fibre and flyash to increase the strength of soil was studied. Tests such as California bearing ratio, unconfined compresiontest, standard proctor compaction test are conducted on varying percentage of jute fibre and flyash. Index properties of the soil such as specific gravity, Atterberg limit (plastic limit
,liquid limit), optimum moisture content , max dry density. Unconfined compressive strenghth.With the CBR value obtained from the test the pavement thickness can be designed

5. RESULT AND DISCUSSIONS

Sieve analysis tests were performed on unreinforced soil samples and it was concluded that soil belongs to poorly graded type. Atterberg's tests were performed on unreinforced soil. The results obtained were as follows; the liquid limit(LL),plastic limit(PL), were 67.7% and 37.2.The proctor test were conducted to observe moisture content on unreinforced soil samples. The tests were performed by taking 5 kg of soil sample and water is added to it starting from 10% by total dry weight of soil sample and on with an increment of an 2% of water content. It was found that the maximum dry density (MDD) of 17.86kn/m3 and optimum moisture content (OMC) of
11.5 .At last,California bearing ratio tests were conducted on unreinforced soil samples. For this test, observations were obsereved at at 2.5mm penetration and 5mm penetration.The CBR results for unreinforced soil sample at 2.5mm penetration was 27.89% and at 5mm penetration was 25.91% The CBR value of reinforced soil for 5mm enetration was 46.51%.

6. CONCLUSION

Claey soil is stabilized using by using jutefiber and flyash.the strength of soil is increased and it can be used for construction purposes .By comparing the results of CBR, it could be observed that the CBR value of the soil increases with the inclusion of jute fibre and flyash. so the thickness of subgrade layer can also reduced.

7. REFERENCES

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