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STABILIZATION OF BLACK COTTON SOIL USING COCONUT LEAF ASH

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Abstract - The study to find the use of coconut tree leaf ash as a stabilizing agent for improving the properties of soil. This is an agricultural waste obtained from natural sources, coconut tree leaf ash is generated from the process of burning in open air. Few attempts had been made with coconut tree leaf ash with the combination of other materials on the soil stabilization. In our project, the coconut leaf ash will be added in the proportion of 3-9% with the 3% of interval to the soil which examine the optimum percentage. The index properties of soils are Liquid limit, Plastic limit, Shrinkage limit, Specific gravity, Sieve analysis, Standard compaction permeability determination, Compression and CBR are tested to find the soil stabilization using coconut leaf ash in a black cotton soil**.**

Key Words: sample soil (black cotton), coconut tree leaf ash, proctor test, cbr test, spt test

1. INTRODUCTION: The world is meeting large amount of soil requirement and disposal of waste. This waste or even through Eco-friendly there is no use in it. When through out. They stag in a place causes improvement of pesticides and stagnant water and pollute environment. This waste or even through Eco-friendly there is no use in it. When through out. They stag in a place causes improvement of pesticides and stagnant water and pollute environment. The black cotton soil have shrinkage and swelling in moisture content and the coconut tree leaf is easy found and more available in south zone of India specifically Tamil nadu. Thus they are not usable of after disposal. In our project we are going to add the ash of coconut tree leaf which is a simple and large amount waste into useful product. They are not expensive and easy available material. And here we are add I the different ratio to find the strength increased due to mixing of Ash.

1.1 **OBJECTIVE OF THE STUDY**: To convert the coconut leaf which is exist as a tremendous waste into an useful manner. Conduct various test to study the black cotton soil properties and characteristics. To find better percentage of mixing of soil and ash to obtain optimum amount of stabilization of soil.

2. **STUDY AREA**: We have take sample from inside our college and 5KM radius surrounding of our college location in kariapatti, Virudhunagar district.

3. MATERIAL USED

3.1 BLACK COTTON SOIL

Black cotton soil is one of the major soil deposits on Indian land surface they have more potential of shrinkage and swelling in high rate of moisture content and they are found to be more troublesome for engineering consideration. The presence of mont-morillonite in black cotton soil which is responsible for expansiveness and crack occur which is dangerous for construction.

FIG 1 : Black Cotton Soil

3.2 COCONUT TREE LEAF ASH

The coconut tree leaf ash is obtained by burning dry coconut tree leaf which is one of the major available in tropical ,sub-tropical and warm temp zones of India thus they are cost efficient and ecofriendly waste ,the ash is obtained by simple treatment of burning in open area. The engineers took challenge for safe disposal of agricultural waste and the various measures of research undergo to use agricultural waste in stabilizing black cotton soil, with various steps and attempts of different proposal percentage of mixing.

FIG 2 : Coconut Tree Leaf Ash

4. METHODOLOGY:

The characteristic and properties of black cotton soil , strength and mixing properties were tested in laboratory. The results obtained for various mixing have been compared .the test undergone for soil stabilization using coconut tree leaf with three different percentages.

- 1.California bearing test
- 2.Std.proctor compaction test
- 3.Unconfined compression test

5. TEST RESULTS

S.no	Test	100% soil	97% soil+ 3% ash	94% soil+ 6% ash	91%soil+9%ash
1	Liquid Limits (%)	36.5	34.3	32.5	30.4
2	Plastic Limits (%)	27.6	26.5	22.98	16.2

S.no	Test	100% soil	97% soil+ 3% ash	94% soil+ 6% ash	91% soil+ 9% ash
1	SPT				
				1.855	1.735

Where as,

MDD – Maximum dry density

OMC – Optimum moisture content

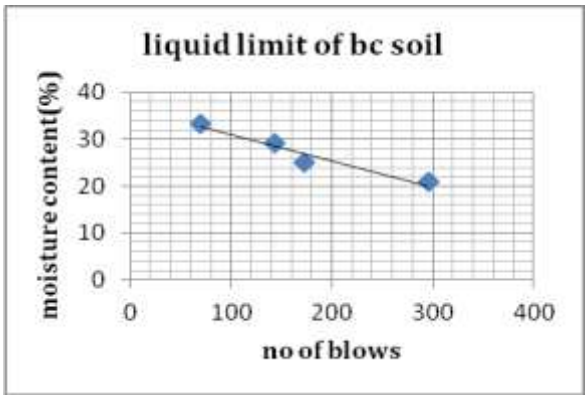
CBR – California bearing ratio

UCC – Unconfined compression test

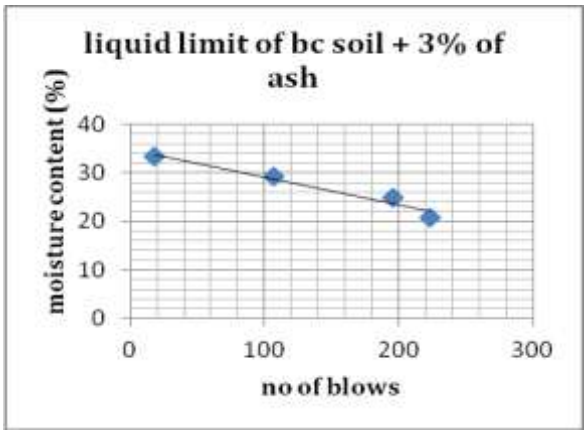
6. RESULTS AND DISCUSSIONS:

With the results of various test conducted in laboratory on soil and coconut tree leaf ash the detailed discussion have been made .The effect of stabilization of soil with three different ratios of CBR,STP,UCC and other test are detaily discussed here

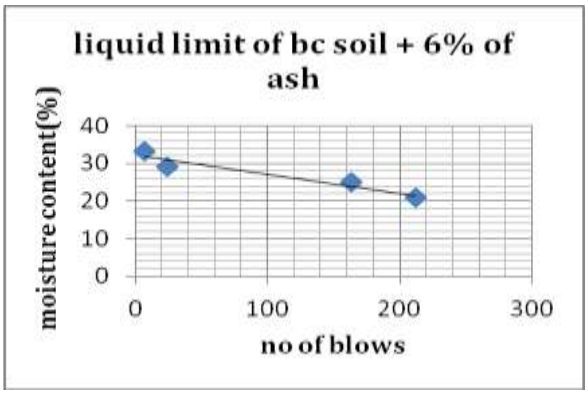
Graph 1 : Liquid Limit of 100% Soil



Graph 2 : Liquid Limit of 97% Soil+3%Ash



Graph 3 : Liquid Limit of 94% Soil+6%Ash



Graph 4 : Liquid Limit of 91% Soil+9%Ash

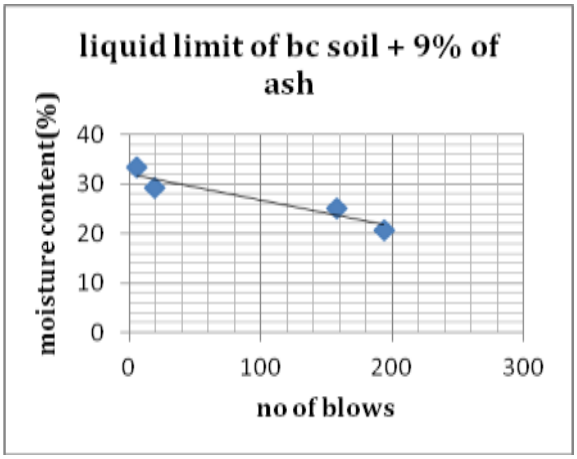


Chart 1 : Standard Proctor Compaction

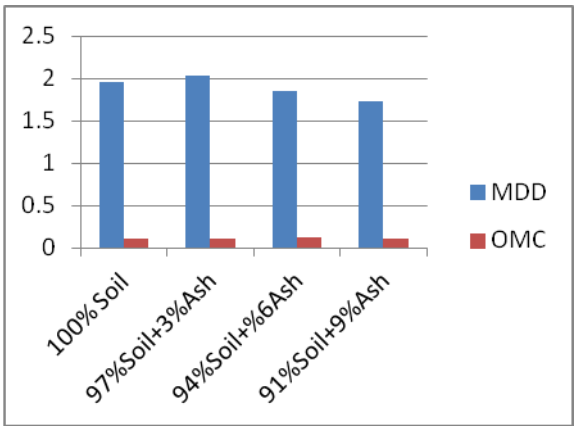
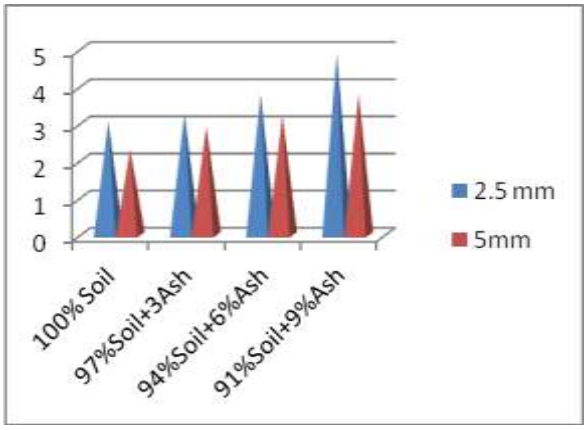


Chart 2 : California bearing ratio



7. CONCLUSIONS:

The following conclusion can be made from the above results obtained from the laboratory tests.

- The property of black soil is improved by the addition Coconut tree leaf ash.
- The maximum MDD Is 2.032 % & OMC is 12%
- The maximum CBR value is obtained as 4.9%.

- By Addition of ash Liquid & Plastic limit both are Decreasing

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