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### EFFECT OF RICE HUSK ASH AND LIME ON BLACK COTTON SOIL

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**Abstract:** The object of this paper is to upgrade the clayey soil as a construction material using RHA with Lime. The sample of black cotton soil from Nagpur city. The soil was stabilized with different percentage of RHA and Lime. The Atterberg limit, OMC, MDD, CBR and free swell index test were performed on raw and stabilized soil. Series of laboratory tests like soaked and un-soaked CBR; compaction has been performed to evaluate the effects of the foreign materials on virgin soil. Result showed that only use of RHA decreases the strength whereas in addition of RHA with soil, a very little amount of lime improves the soil property to a great extent. Subsequently, result shows that for the mix, the optimum moisture content (OMC) increases and the maximum dry density (MDD) decreases

**Keywords:** Clay soil, Rice Husk Ash, Lime, OMC, MDD, CBR



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## INTRODUCTION

Clays exhibit generally undesirable engineering properties. Soils expand when they are wetted and shrink when dried. These soils are called as expansive soils or swelling soils. Construction on these soils is always a great problem for civil engineers. Severe damages to the structure occur because of its peculiar cyclic swell shrink behavior due to change in moisture content. As a good stabilizing agent, RHA-Lime is extensively applied in stabilization of foundation soil or road bed. Although the use of RHA- lime effectively improves many engineering properties of soil like decrease in swell potential, increase in strength, increase in modulus of elasticity, and increase in fatigue strength etc., however splitting tensile strength of soil decreases due to the RHA –Lime stabilization. Hence for enhancing soil strength, to increase the splitting tensile strength, and to reduce swelling pressure, an attempt has been made to add randomly distributed polypropylene fiber into RHA –Lime stabilized expansive soil. On the other hand RHA and Fly ash are produced in abundance globally and poses risk to health as well as environment. Thus their effective, conducive and eco-friendly utilization has always been a challenge for scientific community..

## MATERIALS USED:

### SOILS:-

The properties of the expansive clay used in this investigation. As per the USCS classification system, the soil is a CH soil. A plasticity chart showing the location of the soil is shown in fig

### RICE HUSK ASH:-

The RHA a product derived from rice for milling. As regards to availability of RHA, it is clarified that Bhandara and Gondia district in Maharashtra has a fame of producing rice on large scale. There are no's of rice mill in Bhandara and Gondia that produce RHA in huge quantum. As the product RHA is cheap, easily available on large, the cost of the project may be economical.

### LIME:-

The lime used in this study was obtained from the local market (Nagpur)

## OBJECT OF STUDY:

In Nagpur city the most of area is covered by Black cotton soil i.e. 75% of area is covered by clay soil. This soil is notorious as far as the construction is concerned as it has the properties of swelling and shrinking due to the interaction of water with it there by loses the strength of soil.

If the construction is carried out directly on the soil, it is likely to fail the structure, because of its low strength. To safe guard the structure, it is prominently required to improve soil by introducing such agent which may achieve the required strength.

## EXPERIMENTS

CBR, compaction and Free swell index tests were conducted

### Laboratory Test results:

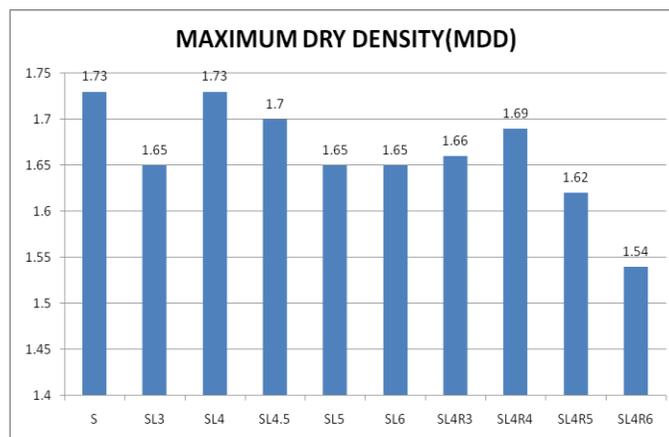
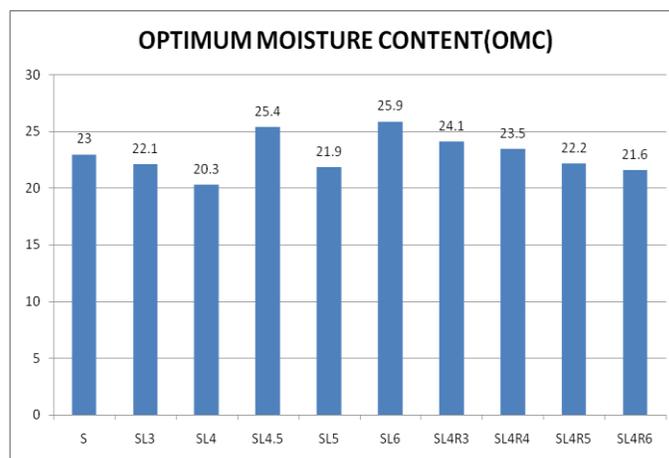
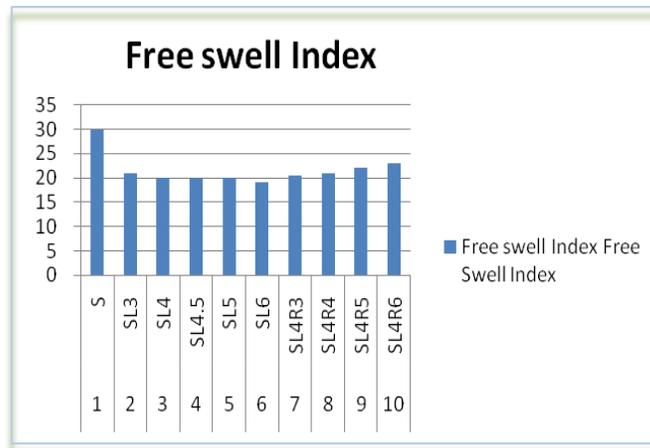
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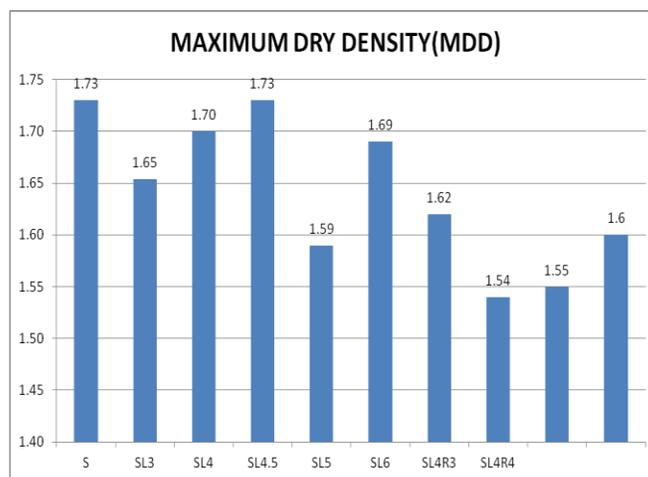
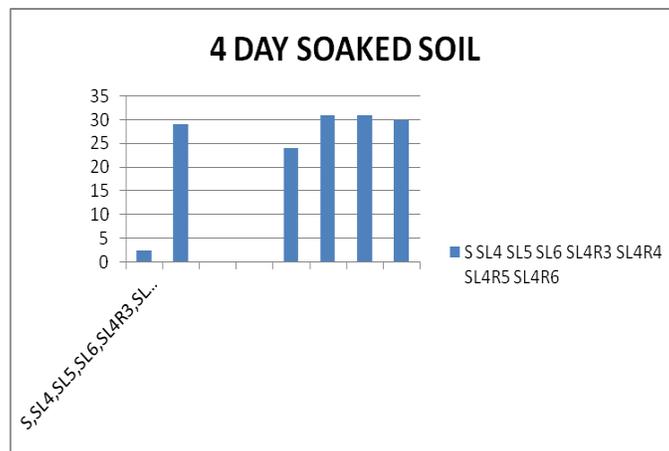
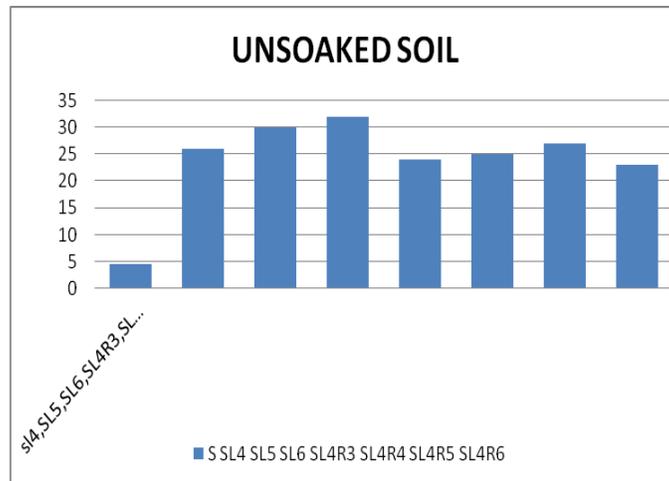
## NOTATION

### Notations For Admixture

| Sr No. | Particulars             | Notations |
|--------|-------------------------|-----------|
| 1      | Plain Black Cotton Soil | S         |
| 2      | Soil+3%Lime             | SL3       |
| 3      | Soil+4%Lime             | SL4       |
| 4      | Soil+4.5%Lime           | SL4.5     |
| 5      | Soil+5%Lime             | SL5       |
| 6      | Soil+6%Lime             | SL6       |
| 7      | Soil+4%Lime+3%RHA       | SL4R3     |
| 8      | Soil+4%Lime+4%RHA       | SL4R4     |
| 9      | Soil+ 4%Lime+5%RHA      | SL4R5     |
| 10     | Soil+ 4%Lime+6%RHA      | SL4R6     |

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## CONCLUSIONS

Based on the experimental findings of this research the following conclusions can be outlined

1. In case of soil lime mixes, maximum dry density decreases & optimum moisture content increase with increase in lime content.
2. In case of soil lime RHA mixes maximum dry density increases and optimum moisture content decreases with increase in RHA content for a particular lime content considered.
3. Optimum lime content is obtained as 5% lime & optimum RHA is obtained as 4%. Thereby considerably increases the strength as well as CBR.
4. It is concluded that MDD increases with increase in the lime content, as far as the CBR is concerned; it falls with increase in lime. It is therefore recommended as 4% lime for better results.
5. The swelling of expansive soil decrease with the addition of 6% lime.

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