

# INFLUENCE OF LIME, RHA & COIR FIBRE ON STRENGTH PROPERTIES OF SUBGRADE SOIL

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**Abstract** - In India, one-fifth of our territory zone is secured by black cotton soil which is otherwise called extensive soil. These soils are generally found in parched and semi-dry regions. These soils are seen as profoundly dangerous in constructional exercises. It makes serious harm to the structure in view of its substitute swelling and shrinkage nature. This occurs because of exchange drying and wetting of soil. To evade these conditions, soil must be stabilized and strength should be expanded. Transfer of strong waste on the land fill can be limited if the waste is having attractive properties with the end goal that they can be used for different geotechnical application viz. land recovery, development of bank and so forth. There are a few techniques utilized for improving geotechnical properties of tricky soils that incorporates densification, seepage, considerations, and stabilizations. In view of literature, lime, rice husk ash and coir fiber are more affordable and compelling to soil stabilizations.

**Key Words:** Extensive soil, Lime, Rice husk ash, Coir fibre

## 1. INTRODUCTION:

Expansive soils need treatment before use as a building material. These treatments are commonly ordered into two procedure, viz. soil modification and soil stabilization. Soil modification is the adjustment procedure where improvement in some property of the soil yet doesn't bring about a noteworthy increment in soil quality and strength. Soil stabilization is being utilized for an assortment of designing works, the most widely recognized application being in the development of street and airport pavements, where the primary target is to build the quality or strength of soil and to decrease the development cost by utilizing locally accessible materials. Stabilization is derived by thermal, mechanical, chemical or electrical means. Thermal and electrical is infrequently utilized and less information is accessible about these two. Mechanical adjustment strengthens the soil by the utilization of machine-like vitality. Changing the physio-chemical characteristics of small grained soil with chemical stabilization is a more powerful type of long-lasting stabilization than compression.

Stabilization improves the properties of development materials and gives the accompanying qualities like;

1. After immersion with water significant extent of their strength is held.
2. Resistance to disintegration.
3. Surface avoidance is decreased.
4. The elastic modulus of layers built above stabilized out layer is expanded.

## 2. Literature review

- Alhassan (2008) worked on use of RHA for soil stabilization. It was found that soil was clayey. MDD got decreased and OMC got added on with addition of RHA amount. Also CBR got improved for both soaked and unsoaked sample. Also UCS got added on with addition of RHA amount.
- Chaple & Dhatrak (2013) worked on performance of coir fiber reinforced clayey soil. It was observed that ultimate bearing capacity got increased with increase in fiber content up to 0.5%, then decreases with further addition of fiber.
- Shrivastava et al. (2014) worked on effect of lime & RHA on index characteristics of black cotton soil. It was found that with increase in RHA specific gravity of soil decrease. Liquid limit decreased when 5% lime was added but got increased when 5-20% RHA was added. Plastic limit got increased, also shrinkage limit got increased but plasticity index got decreased. Inclusion of RHA to lime stabilized soil decreased the swelling behavior of soil to a large extent.
- Devdatt et al. (2015) worked on soil stabilization using coconut coir fiber. Soil was found to be expansive. It was viewed that addition of coconut coir fiber into expansive soil has changed the compaction parameters. The OMC of soil got decreased and MDD got incremented with addition of coir fiber. Soaked CBR value got increased significantly with addition of coir fiber amount. Addition of 1% of coconut coir fiber into soil, increased CBR value from 3.9 to 8.6.

- R.P.Abhijit (2015) worked on effect of coconut fiber on CBR strength of soil subgrade .In this review; it was found that optimum percentage of fiber obtained was 5% of total weight of sample. The use of coir fiber also increased subgrade strength and improved pavement life.
- Oviya & Mnikandan (2016) worked on soil stabilization using RHA and lime. Soil used was an expansive soil. It was found that liquid limit & plastic limit got increased with increment in RHA amount. MDD got increased and OMC got decremented with increment in RHA amount .CBR & UCS got incremented to great limit at an ideal value of 5% of RHA and 2% of lime.
- Subramani & Vdayakumar (2016) worked on stabilization of clay soil using coir fiber. It was seen that strength of soil-coir mix got incremented with increment in percentage of fiber. Max improvement in UCS and CBR value were observed when 0.5% of coir was mixed with soil. 0.5% of coir fiber in this soil was optimum percentage of material having max soaked CBR value.
- Jha & Tiwari (2016) worked on outcome of lime & RHA on engineering characteristics of black cotton soil. It was found that specific gravity of soil got increased by 0.3% when RHA was mixed with it. So, strength also got increased as strength of soil is exactly equivalent to specific gravity of soil. Liquid limit & plastic limit got decremented with addition in RHA amount. It was detected that adjoining of RHA intensify not only strength advancement but also persistence of lime stabilized soil.
- Malik & kaur (2018) has worked on influence of lime sludge on the compaction and strength characteristics of soil when blended with RHA & polypropylene fiber. It was found that the addition of RHA improved the geotechnical properties of parent soil. On addition of lime sludge by proportion of and RHA, OMC increased and MDD decreased. Lime sludge was added by proportion of 2%, 4%, 6%, and 8%. Specific gravity was found to be increased and plasticity was found to be decreased. Not only the strength of the clay soil increased but, it enhanced the durability of soil as well.
- Venkatesh et al. (2019) worked on experimental investigation on expansive soil stabilization using coir fiber. It was observed that MDD and OMC of soil increased with addition of fiber. Also UCS of soil increased with addition of fiber. Also liquid limit and shrinkage limit increased and plastic limit decreased.

### 3. CONCLUSION

Exceptional relative investigations of the current researches indicate that utilizing different admixtures can develop the geotechnical characteristics of expansive soils. There are different mixes of admixtures with which the character of these delicate soils can be controlled. The conducted studies confirmed that, various waste products such as rice husk ash, lime and coir fiber can also be used as a geotechnical admixture. Addition of these admixtures alters the physical and compaction characteristics of cohesive soils. In this manner, it tends to be inferred that the mixes of admixtures and extensive soil improve the CBR worth, UCS and decreasing swelling index of delicate soils to a worthy range. The scope of adoption of Agricultural substantial decay in soil stabilization should be extended. Application of horticultural solid waste in soil stabilization have numerous points of view demonstrated to be viable as they improve designing attributes of soil, decrease natural contamination , increments the range of life of structures built on settled soil and also are viewed as very cost compelling.

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