

A Review on Application of Rice Husk Ash for Soil Stabilization

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ABSTRACT

Black soils are good for agriculture but they are not suitable for foundation of building or subgrade for road pavement. On such soil suitable construction practices and sophisticated methods need to be adopted. In this experimental work the soil was stabilized with Rice Husk Ash in proportion of 10%, 20% and 30%. Following test are conducted on Soil sample, soil Consistency limits, Specific gravity, Unconfined Compression test, etc. When addition of Rice Husk ash, it shows that the Index and Mechanical Properties of soil has improved.

Keywords:- Rice Husk Ash, Soil Stabilization, concertation (10, 20 and 30%)

INTRODUCTION

India is major producer of Rice and the by-product generated along with it is called husk which is burn in rice mills and residue is rice husk ash, it is waste product disposed out in open lands. Making use of this as a stabilizer for expansive soil to improve their properties, increase strength and bearing capacity. There have been multiple studies done in India and abroad for utilization of rice husk ash and other waste products like fly ash plastic waste.

Rice husk ash is collected from Shri. Datta Rice mill. About 60000 tons of rice husk is generated annually in the India. Hence, use of RHA for upgrading of soil should be encouraged. The studies and research with RHA have shown that it has good potentials for improving the engineering properties of soils for sub-grade purposes. Thus, our experimental work is focused on use of RHA for practical purposes through the observation of effect of RHA on some geotechnical properties of soil which we are using for sub-grade soils. However, the RHA can only be used as a partial replacement for the more expensive stabilizing agents like cement and lime

because it lacks the cementation property required to bind the material to a satisfactory durability.

LITERATURE REVIEW

1] Veeresh A. Salimath , Farooq Ahmed Maniyar (2019).

RHA can be utilized in all respect adequately in the laying with the soil just as making the subgrade of the streets as it is being lighter in weight and if lime can be it will have water sealing property also. CBR value increased by 2.89 occasion 4% lime and 40 % RHA. The maximum density of soil decrease as RHA content increased. The OMC of soil increases as the RHA content increase in the soil. The curing period increases the strength mix well increase.

2] Fetra Venny Riza (2017).

Black uncontrolled burnt Rice Husk Ash (RHA) obtained from the boiler of rice mill is a waste product which usually causing air and water pollution. As a waste, RHA has very little value and commercial use. Hence this study examined the pozzolanic potential of RHA as a cement replacement in the

Compressed Stabilized Earth Brick (CSEB) production. This is an experiment-based study that characterized the raw materials used to produce CSEB samples. In the characterization of raw materials, the XRD analysis found that the burning temperature of the RHA in the rice mill boiler was around 700-800 C.

3] Leonardo Behak (2017).

RHA of no-controlled rice husk incineration in conventional ovens and of laboratory burning at controlled temperatures were used. The alkaline reactivity of the RHA was studied through X-ray diffractometry analysis and loss on ignition tests.

4] Rathan Raj Banupriya &Dharani. (2016).

In this research liquid limit and FSI of soil decrease with increasing percentage of RHA. Author has studied the alluvial soil, the liquid limit decreased from 59% to 19.2% for the same quantum of RHA. Decreasing free swell index was 59% to 13.6%, Shrinkage limit of soil increased, maximum dry density increases from 16.39Kn/m³ to 20.95Kn/m³. In case of 80% RHA. Angle of internal frictional value increased from 17 degrees to 39 degrees. CBR value of soil increased from 3.2 to 12%.

5] Aparna Roy (2014).

The common soil stabilization techniques are becoming costly day by day due to the rise of cost of the stabilizing agents like, cement, lime, etc. The cost of stabilization may be minimized by replacing a good proportion of stabilizing agent using RHA. It will minimize the environmental hazards also. Soil sample taken for the study is clay with high plasticity (CH) which truly requires to be strengthened. The soil is stabilized with different percentages of Rice Husk Ash and a small amount of cement.

Observations are made for the changes in the properties of the soil such as Maximum dry density (MDD), Optimum moisture content (OMC), California bearing ratio (CBR) and Unconfined compressive stress (UCS).

6] Gregory Paul Makusa Luleå tekniska universitet, 2013

The full information in soil stabilization has analyzed written, practicing and consulting engineers in the field of geotechnical engineering. This review brings up to date trends in stabilization practice with the main focus in stabilization methods and materials, this review discusses the effect of various binders on stabilized soils. Other part describes stabilization methods and equipment.

7] George Uwadiogwu Alaneme, Kennedy Onyelowe, Michael Onyia, Oyagbola Ismail 2009.

In this research study, fuzzy logic modelling technique was adapted for the prediction of the plasticity, consistency and swelling characteristics of clayey soil-QARHA mixture. The additive QARHA gotten from agricultural waste helped to improve the swelling properties of the problematic expansive clayey soil; this helps to encourage the recycling and re-use of solid wastes and its derivatives for engineering development.

The clayey soil was treated with varying proportions of QARHA from 0% to 12% and the experimental responses obtained in terms of their consistency and swelling properties; the data obtained from this experimental program was utilized for the fuzzy logic model development as its system knowledge base. The fuzzy logic essentially handles the complex issues of vagueness and imprecision of well-defined parameters for better assessment of the system.

8] EB Oyetola and M Abdullah (2006).

The Work was focused on perfect amount of RHA for uses of the soil stabilization. Soft clayey soil were studied and effect of RHA was analyzed unless addition of binders like Cement or lime RHA alone cannot shows satisfactory result.

9] R Hasin HB Mohammad (2005).

This paper presents a research on soil stabilization by means of industrial waste and agricultural waste such as Glass Powder and Rice Husk Ash(RHA). So, efforts have been made using glass powder and rice husk ash (RHA) in this research to revamp, intervene the quality of the soil. The main objective of the soil stabilization is to increase the shear strength and decreasing the compressibility of the soil. Soil Stabilization is the process which improves the physical properties of soil, such as increasing shear strength, bearing capacity, etc

10] Ali F Haji, A Adnan and Chew K C (1992).

Rice husk ash (RHA) is a promising pozzolanic material produced by burning rice husk (RH). It can be used to replace cement as a binder in concrete. The main component of RHA, which is responsible for its cementing behavior is amorphous silica. The amorphous silica in RHA is a pozzolanic material, which means that it reacts under moist conditions with calcium hydroxide to form compounds with cementing properties. Among the various pozzolanic materials, RHA is categorized to be the most reactive.

CONCLUSION

This experimental study was conducted on clayey soil. Different mixture proportions of RHA is taken. (I.e. 10%, 20% and 30%). Were used to treat the parent soil. Observations were made for variations in index (i.e. liquid limit, plastic limit, plasticity index, specific gravity, standard

proctor test, sieve analysis, etc.) and mechanical properties (i.e. compressibility and shear strength) of treated soils soon. It was found that properties of soil increases when Dosage of RHA increases RHA. As we can see details listed below. It could be identified that RHA was capable of improving index and mechanical properties of soil, positively.

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