

COMPARATIVE STUDY OF STRENGTH BETWEEN LIME & DIFFERENT PERCENTAGE OF RICE HUSK ASH AND BAGGASH ASH IN BLACK COTTON SOIL

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Abstract Black cotton soil is expansive type of soil that expands suddenly and starts swelling once it comes in contact with water. The strength of the soil is very poor due to its physical properties. Expansive soils exhibit improved response in behaviour with different types of stabilizers. Stabilization with admixtures is found to be an effective technique to improve the strength properties of the black cotton soil. During this study the potential of lime, rice husk ash and bagasse ash are found to be useful admixtures to improve the strength properties of the expansive soil. The rice husk is an agricultural by-product from rice milling and bagasse ash is a sugarcane waste from sugar industry.

In this research an approach is made to improve the properties of black cotton soil with combination of lime, bagasse ash and rice husk ash. The results show substantial improvement in engineering properties of black cotton soil with the admixtures.

1. INTRODUCTION

For any land based, the motivation is amazingly to help the entire design, so concerning the motivation to be concentrate on the dirt around it play actually a fundamental role. Black cotton soil creates many issues to street. Around 20% of the dirt found in India is extensive in nature. In blustery season dark cotton soil retains water which results into enlarging and

relaxing of soil. Notwithstanding this it likewise turns out to be effectively compressible. Dark cotton soil has inclination to enlarge because of wet condition. In summer season, it psychologically and produces breaks. Subsequently, because of this dark cotton soil experience the ill effects of early disappointments in asphalts with lopsidedness trenches, waves and grooves are shaped.

Much of the time, soils can't be utilized straightforwardly as street administration layers, establishment layers and as a development material; consequently the properties of those dirt ought to be changed. Broad soils are one of those sorts of soils whose volume change happens while it interacts with water. It grows during the stormy season because of admission of water and psychologically during summer season. The wetting and drying cycle of a subgrade layer made out of dark cotton (BC) soil result into disappointment of asphalts in type of settlement and breaking. Thusly, before development of a street on such subgrade, it is significant either to eliminate the current soil and supplant it with a non-sweeping soil or to further develop the designing properties of the current soil by adjustment. Creation of huge amount of Horticultural squanders all around the world deals with difficult issues of taking care of and removal. Safe removal of Rural squanders without unfavorably influencing the climate and the huge stockpiling region expected to dump the waste are main pressing issues.

The removal of Rural squanders makes a possible adverse consequence on the climate causing air contamination, water contamination at long last influencing the nearby environments, consequently safe removal of Farming squanders becomes testing task for engineers. In our undertaking work an endeavor has been made to use rural waste

(sugarcane bagasse debris) to balance out powerless subgrade soil. Bagasse is the stringy matter that remaining parts after sugarcane stalks are squashed to separate their juice. It is as of now utilized as a bio fuel and in the production of mash and paper items and building materials. For every 10 tons of sugarcane squashed, a sugar manufacturing plant delivers almost 3 tons of wet bagasse which is a result of the pure sweetener industry. Bagasse debris is the buildup gotten from the cremation of bagasse in sugar creating production lines. Research works have been done on the improvement of geotechnical attributes of soils utilizing bagasse debris.

It is proposed to concentrate on the reasons for disappointment on dark cotton soil. Average way of behaving of these dirt under various climatic condition has made the developments and asphalts of streets costly as well as troublesome. The dark cotton soil is exceptionally poor and inconsistent subgrade material. Consequently, the fundamental issues to treat the subgrade of soil itself with the end goal that the unfortunate qualities are altered by soil adjustment. Adjustment is the method involved with further developing the designing properties of the dirt and making it more steady. In this review, Lime, modern waste from sugarcane industry "Bagasse Debris" and agrarian waste from rice development "Rice Husk Debris" to balance out the dirt.

Black cotton soil

Black cotton soil has a huge problem of volume changes as swelling due to excessive amount of water mainly on rainy days and shrinkage due to evaporation mainly on summer days. To reduce these problems in particular seasons or have a permanent solution to such a problem the soil has to stabilize.



Fig 1:Black cotton soil

Bagasse Ash

Bagasse is a by-product or waste from the sugarcane industry that is burned to some temperature and formed sugarcane bagasse ash. This bagasse ash is used for different purposes. The bagasse ash contains a large amount of silica, potassium, calcium, iron, alumina, and carbon which are similar to the chemical composition of traditional stabilizers (cement or lime). So it can be used as a replacement for cement or lime. It is also beneficial to the environment because the amount of production of bagasse is increased nowadays.



Fig 21:Bagasse ash

Rice husk ash

It is also a by-product of rice from rice milling in the rice production areas. The rice husk ash contains approximately 65- 90% of silica, which is highly chemically reactive. It is also used as a replacement for traditional stabilizers.



Fig 3:Rice husk ash

Objectives of the study

- [1]. To examine the physical and engineering properties of black cotton soil.
- [2]. To compare the improvement of stabilization of black cotton soil with

different percentage of lime, bagasse ash and rice husk ash.

- [3]. To determine the best proportion of lime, rice husk ash and bagasse ash for various tests and identify its practical applications.

2. LITERATURE SURVEY

Sant, Shubham, Jain, Rahul Meena (2016)

This paper contains the examination on dark cotton soil with bagasse debris. Bagasse debris fills in as stabilizer for the dark cotton soil. It is a side-effect of sugarcane after the burning. Various blends of debris with soil are viewed as here to get the greatest solidness, most extreme dry thickness, ideal dampness content, California bearing proportion and unconfined compressive strength.

Akanksha Gautam and S.K. Mittal (2018)

In this paper, they have analyzed the idea of dark cotton soil and what their property means for the construction. The settlement, breaks, and so forth, are the reasons of disappointment of the design. To enhance the dependability of dark cotton soil, they have introduced the answer for it. They utilized financially savvy material called "Bagasse" which is side-effect of sugarcane and for the impromptu creation of clayey soil's property they utilized "Coin Fiber". Additionally, they have directed different tests to the legitimate outcomes.

Jay Prakash, Kusum Kumara, Vijay Kumar (2017)

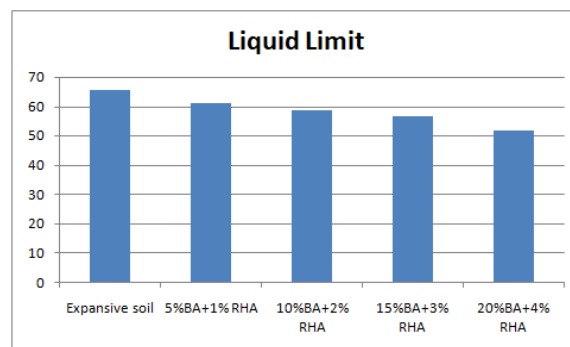
They have introduced a review which gives the concise about soil adjustment utilizing rice husk debris. Concentrated on the synthetic adjustment utilizing concrete, lime and so forth. Realizes that they are hurtful for climate as well concerning soil. In the wake of examining the elements of synthetic adjustment, they come particle the answer for soil adjustments 'Rice Husk'. The material 'Rice Husk' isn't costly additionally it is squander material from paddy crop. The rice husk debris contains great measure of silica which is one substance who balance out the dirt.

3. METHODOLOGY ADOPTED

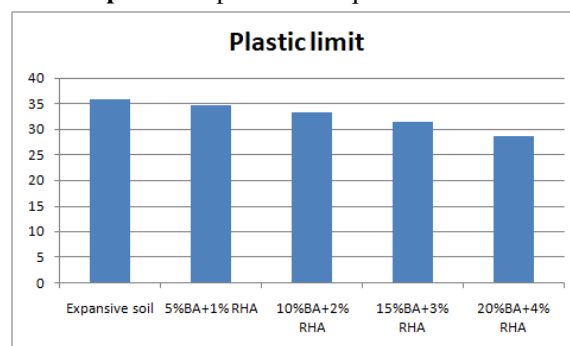
To assess the impact of baggage ash and rice husk ash as a balancing out added substance in far reaching soils, arrangement of tests, where the substance of baggage ash in the sweeping soil was differed in estimations of 5% to 20% (products of 5) and 1% to 4% rice husk ash by weight of the all out amount taken. The Indian Standard codes were pursued during the conduction of the accompanying analyses:

1. Standard proctor test – IS : 2720 (Part 7) - 1980
2. Unconfined compressive strength (UCS) test – IS : 2720 (Part 10) - 1991
3. California bearing ratio (CBR) test – IS : 2720 (Part 16) - 1987
4. Liquid & Plastic limit test – IS 2720 (Part 5) - 1985

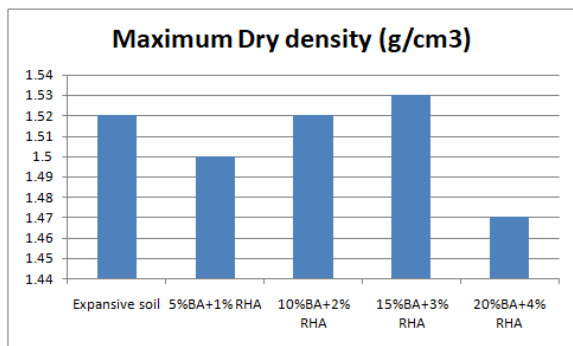
4. EXPERIMENTAL RESULTS



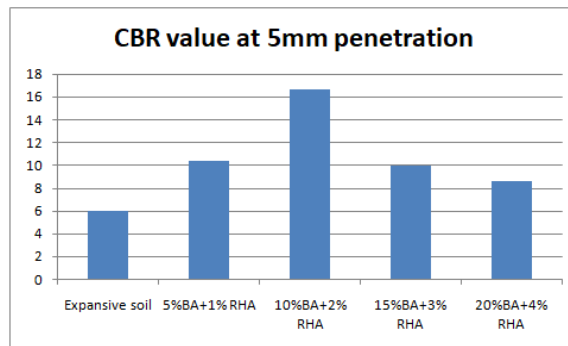
Graph 1: Comparison of liquid limit values



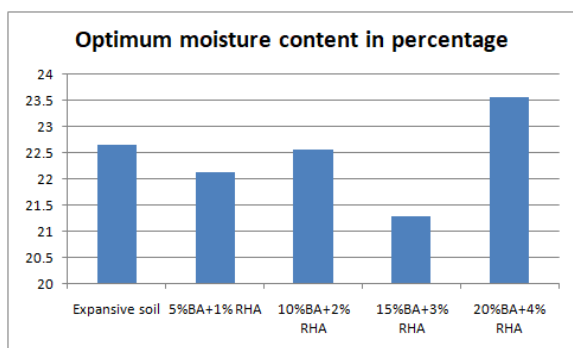
Graph 2: Comparison of plastic limit values



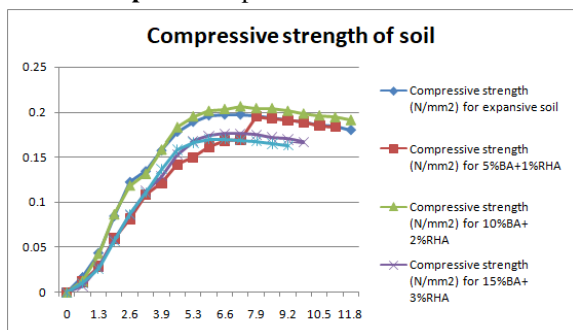
Graph 3:Comparison of maximum dry density values



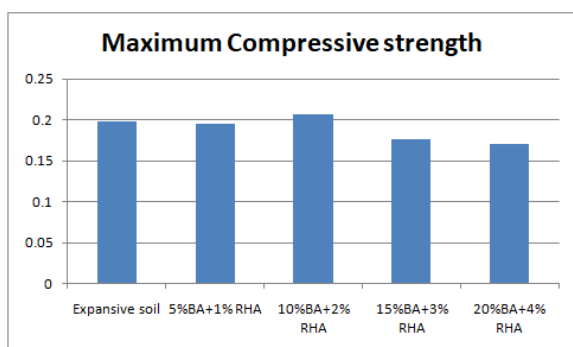
Graph 7:Comparison of CBR values



Graph 4:Comparison of OMC values



Graph 5:Comparison of compressive strength values



Graph 6:Comparison of maximum compressive strength values

5. CONCLUSIONS

This project is focused on the review of performance of Bagasse ash and Rice husk ash as a recycle material in soil. The study suggests that if Bagasse ash and Rice husk if properly mixed and applied, can be used as a great soil stabilization technique .On the basis of this project the following results were obtained.

1. Bagasse ash is used as an excellent soil materials for highly active soils which undergo through frequent expansion and shrinkage.
2. The Bagasse ash as an additive decreases the swelling, and increases the strength of the expansive soils.
3. The higher value of maximum dry density was observed at 15% Bagasse ash and 1% rice husk ash and the maximum value of Optimum moisture content was observed at 20% Bagasse ash and 1% rice husk ash.
4. The optimal value of unconfined compressive strength was observed at 10 % Bagasse ash and 1%rice husk ash.
5. The optimal value of CBR value was observed at 10 % Bagasse ash and 1%rice husk ash.
6. The values of liquid limit and plastic limits decreases with increasing the percentages of Bagasse ash from 0% to 20% with 1% rice husk ash.

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