International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

A REVIEW -- COMPARATIVE EXPERIMENTAL STUDY ON CONVENTIONAL CLAYEY SOIL AND CLAYEY SOIL WITH RICE HUSK AND LIGNOSULPHONATE

Ashangbam Inaoba Singh[1], Kshitij Jassal[2]

[1]ME Research Scholar, Chandigarh University, Mohali 140413, Punjab India
[2]Assistant Professor, Department of Civil Engineering, Chandigarh University, Mohali 140413, Punjab India

---

Abstract : Soil stabilization is a process to treat a soil to maintain or improve the performance of the soil as a construction material. The stabilizing agent improves the strength parameters of soil. The objective of this paper is to review the applications of different stabilizing agents such as lignosulphonate, rice husk for clayey soil by performing laboratory test like moisture content, liquid limit,plastic limit, standard proctor test and CBR test. The performance of the soil stabilizer for stabilization by means of strength will be highlighted in this study. The use of these stabilizing agent may provide economical and advantage in construction process.

Keywords: Rice husk, Lime.

1. INTRODUCTION

In this study, clayey soil will be taken into consideration and compare the strength parameters of the conventional clayey soil and modified clayey soil. In modified clayey soil, two stabilizing agents like rice husk and lignosulphonate will be mixed with soil. Several test will be performed in the lab such as optimum moisture content, liquid limit, plastic limit, standard proctor test and california bearing ratio CBR test. Thus the result will be compare between the conventional clay and modied clay and conclude as well as dicuss the result for the future purpose. The process of modifying the soil properties for better purpose is called soil stabilization. Soil stabilization aims at improving soil strength and increasing resistance to softening by water through bonding the soil particles together, water proofing the particles or combination of the two. Usually, the technology provides an alternative provision structural solution to a practical problem. The simplest stabilization processes are compaction and drainage (if water drains out of wet soil it becomes stronger). The other process is by improving gradation of particle size and further improvement can be achieved by adding binders to the weak soils. Soil stabilization can be accomplished by several methods.

.1.1 MATERIALS USED

Rice Husk: Rice husk ash is resulting from burnt rice husk, which is an abundantly available agricultural by-product material. the production of rice husk is about 20% by weight of the rice. When rice husk is burnt, removed leaving behind silica ash. A number of researchers have studied physical and chemical properties of rice husk ash. Chemically, rice husk ash consists of 82–95% silica under condition of controlling burning temperature. it was considered that

rice husk ash cannot be used alone for stabilization of soil because it lacks cementitious properties. Based on pozzolanic activity, recent research studies found that rice husk ash could be a potential material for soil improvement. The research results obtained indicate a general decrease in the maximum dry density (MDD) and increase in optimum moisture content (OMC) with increase of the RHA content. At the same time, the effect of RHA stabilized soils on the plasticity limit (PL), liquid limit (LL), and plasticity index (PI) was analysed. There was also slight improvement in the CBR and UCS with increase of the RHA content.

Fig:1 Rice husk ash

Lignosulfonate: Lignosulfonate(LS) is an environmentally friendly waste product generated from wood and paper industries having excellent potential for soil improvement application, usually for cohesive expansive soil where the change in chemical composition is not a big issue. It is a cross linked lignin-based amorphous polymer with a net negative charge which can form a coordination bond with the metal ion. When mixed with soil, it compacts soil and increases amorphousity, thereby reducing the water-absorbing capacity.

Fig:2 Lignosulphonate

2. LITERATURE REVIEW

Vikash Kumar Gautam et al. in 2017 analysed the soil stabilization by improving soil properties by blending and mixing bituminous materials. Soil is used sub base and base material, If strength of soil is poor, then stabilization is usually required. Subgrade is sometimes stabilized or changed with solider soil .Soil could be black cotton or as fly ash which could fly in interaction with air. There are many stabilizers used for stabilizing the soil such as , cement, lime, bitumen, fly ash etc., in this paper bitumen as stabilizer. Bitumen mixture is expensive material in road construction. So it's quantity play vital part to stabilize the soil. It increases the stability of soil mechanically.

Santosh Dhakar et al. in 2013 isuued a paper in which the stabilizing agent improves the strength parameters of sub grade of road pavement and leads to strengthening of embankment. The objective of this paper is to review the applications of different stabilizing agents such as lime, fly ash, cement, rice husk, expanded polystyrene geofoam and waste paper sludge for different type of soil.

Hanifi Canakci et al. in 2016 issued a paper in which the work presents an investigation of the effect of waste aluminum beverage cans strips on strength and swelling properties of lean clay. Waste beverage cans (WBC) were cut into 5 mm strips and mixed with soil in 2, 4, 6, 8, and 10 % (dry weight of soil)before use. Three standard tests were carried on the prepared samples: compaction, free swelling, and California Bering Ratio(CBR). Test results showed that WBC significantly affected the compaction characteristics, swelling and strength properties of the Clay.

Baki Bagriacik in 2017 issued a paper in which exhaustive tests have been conducted in the laboratory to investigate the availability of soils with lime, glass fiber and rubber particles for increasing the bearing capacity. Soil samples have been prepared at optimum water content and unconfined pressure tests have been carried out. Soil samples have been prepared at 5% content lime, glass fiber and rubber particles and have been determined effect of choicing of different materials for stabilization. It has seen that the choice of different materials was important for soil stabilizations.

Deepakraja T.G et al. in 2017 issued a paper in which the cement and coir fibre are used here as stabilization additives. The usage of the above coir fibre materials in civil engineering field has led to the development of new techniques particularly in stabilizing the soils. Studies were carried out to evaluate improvement of CBR values by the use of cement and randomly distributed coir fibre separately and the combination of both. The results clearly indicates that, 1.5% cement and 0.5% coir fibre have noticeable influence on CBR value of expansive soils compared to the results obtained on cement, and coir fibre materials used separately. This is due to the change in brittle behaviour of the soil to ductile behaviour.

Brajesh Mishra in 2015 issued a paper in which samples of fly ash compacted to its maximum dry density at the finest moisture content is organized without and with Geotextile layers in the CBR mould. Geotextile sheets equal to the plan dimensions of CBR mould is placed in four distinct layers of different locations in the CBR mould. The CBR (California Bearing Ratio) values of each arrangement of Geotextile, are evaluated in the laboratory and compared with the results of CBR values without and with Geotextile layers.

3. CONCLUSIONS

From this study it concludes that rice husk and lime can be used as admixture of the soil and it can also improve the chemical properties of the soil results in increasing the strength and bearing capacity of the soil. The results are obtained by undergoing several laboratory test like moisture contents, liquid limits, plastic limits, standard proctor test and california bearing ratio(CBR) method.

REFERENCES

1. Vikash Kumar Gautam and Devesh Jaysawal (2017) "A Research Paper On Stabilization Of S2oil By Using Bituminous Material" International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 11 .

2. Santosh Dhakar and S.K. Jain (2015) "Stabilization of Soil: A Review" International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064.

3. Hanifi Canakci, Fatih Celik, Mohammed O. A. Bizne, Media O. A. Bizne (2016) "Stabilization of Clay with Using Waste Beverage Can" World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium 2016 Procedia Engineering 161 (2016) 595 – 599.

4. Baki Bagriacik (2017) "The Experimental Study on Soil Improvement with Additive Materials on Highways"

International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064.

5. Deepakraja T.G, Charumol .S (2017) " A Study on Soil Stabilization using Cement and Coir Fibres" International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 vol 6 issue 2.

6. Brajesh Mishra (2015) "A Study on Improvement and Cost Effectiveness of Pavement Subgrade by Use of Fly Ash Reinforced with Geotextile" International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Volume 4 Issue 10, October 2015.'

7. S.Z. Sharifah Zaliha, H. Kamarudin, A.M. Mustafa Al Bakri, M. Binhussain, M.S. Siti Salwa 'Review on Soil Stabilization Techniques" Australian Journal of Basic and Applied Sciences, 7(5): 258-265, 2013 ISSN 1991-8178.

BIOGRAPHIES

Ashangbam Inaoba Singh, Research Scholar, Chandigarh University, Mohali 140413,