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A Review Paper on Fly Ash and Bagasse Ash using as a Sub-Grade Stabilizing Material

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Abstract: ***This study focus on determining the effect of fly ash & bagasse ash on properties of expansive or black cotton soil. This soil is very active soil and it shrinks and swells with change in moisture contents. It is very dangerous soil to the structures foundation. Foundation is lower most part of the structure and foundation should be strong enough of all structures, buildings, and pavements. In this research stabilize the expansive or black cotton soil to make strong and stable with the use of the stabilizer. There are various papers studied and there are various stabilizers are used by the researcher, but in which some are economical and some are expensive. In this study use of fly ash and bagasse ash which industrial wastage so these are economical stabilizer and it result in the form of changes in expansive or black cotton soil properties will be good for our structures and pavements. And the biggest problem of disposal wastage is eliminated***
In this study Black cotton or active soil will stabilize by the different-different proportion of fly ash and bagasse ash individually and combination of optimum value of both stabilizer mix with active soil and result would be found.
Keywords: Expansive Soil, Bagasse Powder Ash, Fly Ash, Soil Stabilization, Bearing Capacity, CBR value.

I. INTRODUCTION

Soil may be defined as sediments particles or other addition of minerals which is produced by the chemical or physical disintegration of rocks adding the water, air and other organic matter included. Soil uses as a foundation and sub grade material, it should be capable to bear the load. Expansive soil is active soil due to montmorillonite (it is a clay mineral), that expansive in nature, it swell and shrink in change of moisture contents. To bring change in characteristics of expansive or active black cotton soil a process adopted which is stabilization of soil or soil stabilization. However there are several areas where the base is not good, it means the base below the ground surface is weak, not sufficient to bear the load that is why a deep foundation will be required. But sometimes the soil properties is poor even a great depth so where the properties of active soil is not good the structure will not construct there. In such type of cases various techniques to improve the active soil properties. Stabilization is one of technique from these. Now the stabilizer which are using in stabilization of active BC soil are Fly Ash and Bagasse ash, there are various stabilizers available like cement, chemical stabilizer, bituminous stabilizer but these are not economical. Fly ash (FA) and Bagasse ash very cheap material because these are industrial wastage.

Fly ash is a wastage of thermic power plant and flue gases of furnaces fired with coal. Fly ash (or bottom ash of thermal power plant) is the course granular material, and it is the by-product which is produced from thermal power plant. Its particles can fly in ordinary air. At one time its disposal was considered a subject of trouble but now-a-days it is used as a useful material for stabilizing soil & manufacturing bricks and to improving workability of concrete. Fly ash has a siliceous property like cement.

Bagasse ash or sugarcane waste is an industrial wastage of sugarcane industries. Wastage will dry and then it will pulverized in powder form, it has also siliceous property. That is why it used in the form of stabilizer. In active soil stabilization method from bagasse ash powder ash the CBR value increased and stability of active soil will also increased. Due to Stabilization of soil the engineering properties of expansive soil will improve and soil will become suitable to use as foundation.

II. RESEARCH NEED

A. Improvement of properties of active or black cotton soil.
B. Reduce permeability and swelling pressure.
C. Increase stability, bearing capacity.
D. Reduce cost of stabilizer by using wastage material.
E. Disposal of wastage material Fly ash (FA)and Bagasse ash.

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III.REVIEW LITERATURE

Kate J.M. et.al. (2005), In these exploration fly slag was utilized as stabilizer material with or without lime and result was found. By the fly fiery remains enhance the quality of soil and volume change conduct. Broad soil treated with fly fiery debris (0 to 20%) and fly slag lime (0 to 3%) admixtures. In these test outcome show adequacy of fly cinder diminishing the extensive nature. Be that as it may, quality don't change quick following 7 days curing a striking increment in their quality.

Kumar Arvind et.al. (2007), In this research to study the effect of polyester fibres inclusion and lime stabilization on the properties of fly ash- active black cotton soil mixtures. Fly ash was mixed with active black cotton soil in different-different proportions. In this paper fly ash (FA) and lime mix with expansive (BLACK COTTON) soil at ranges from 1 to 10% and 1 to 20% respectively. The effects of this experiment soil properties changed & CBR value increased.

Dr. M.Brook Robert et.al. (2009), In this study, the motto of this paper is to upgrade properties of active Black Cotton (BC) soil using stabilizer rice husk ash (RHA)and fly ash (FA). In this study RHA content increased from 0-12% so unconfined compressive strength (UCS) of failure stress increased by 105% & strain increased 50% and CBR improved by 45%. Due to this fly ash 25% and RHA 12% recommended strengthening of active black cotton or active sub grade soil.

Rao. A. Sreerama et.al. (2011), This examination in view of the adjustment of soil with modern wastage. Asphalts established in far reaching soils experience trouble due to exchange swelling shrinkage as for the adjustments in the dampness content. While variety in soil dampness content is inescapable over the life of an asphalt, the execution of sweeping sub-evaluations can be enhanced by receiving reasonable measures. In these concentrated granulated impact heater slag and fly fiery debris are the results of steel plants and warm power plants separately. Nitty gritty lab tests were completed, utilizing these materials for padding over extensive mud beds. The ground granulated impact heater slag or fly fiery remains, as a pad, has been set over soil overnight boardinghouse hurl estimated. The outcomes decrease in hurl was taken note. CBR test were additionally directed on the pad soil framework, their outcomes demonstrate a critical increment in the soaked CBR esteem. This examination focuses to the utility of these two waste materials for use in sub-bases of adaptable asphalts.

Ms. Patel V Arpita et. al. (2011), in this research paper the study shows that environment polluted by human and its works. Land is also polluted by various contaminated, oil is main contaminant of soil. In this research paper saw dust using as a stabilizer material to the black cotton soil. Oil affect largely soil properties (physical and chemical) and take 5%, 10%, 15% of contaminant castor oil & after this the effect is observed on black cotton soil. At 15% of castor oil greatly affect the BC soil and the effect of stabilizer increases the unconfined compressive strength on 70.5% of saw dust. The cohension value maximum at 5% and minimum at 10% of saw dust, the maximum CBR value at 12% of saw dust.

R. Modak Pankaj et.al. (2012), In this study the process of stabilization of expansive or active soil used fly ash & lime. BC soil is very active and very expansive soil due to its montmorillonite clay mineral. The characteristics of this soil changes with change in water content, all properties of active BC soil (plasticity, compressibility, dry density, OMC, CBR) can be improved by using stabilizer. Different proportion of fly ash and lime percentage are added to the expansive (BC) soil and all test performed on these soil mixtures. The result concluded that using of fly ash & lime increased CBR values, that is the soil strength of soil to a great scale.

D Rao Koteswara et.al. (2012), This paper shows that the main issue of failure of pavement is sub grade condition and material. Poor sub grade material and expansive sub grade are responsible for pavement failure, to prevent from this problem there are various wastage using as a stabilizer form & soil stabilization can be done and improve sub grade soil properties. In this research used wastage saw dust which is by product of timber. It has little cementitious properties. So in this research improve sub grade soil properties and to make industrial wastage.

Mehta K. S. et.al. (2014), In this research paper the properties of expansive or active BC soil analysis by the stabilization technique and the stabilizer is used lime. By the mixing of lime in expansive soil with different –different proportion and result was found. Soil engg. properties of soil (black cotton) improved. Since lime has a siliceous property and it has more fineness due to this soil voids filled completely & density increased.

Joseph jose et.al. (2014), In this study phosphogypsum using as a stabilizer material and phosphogypsum and bottom ash or fly ash are industrial wastage by product of thermal power plant. In this paper study adding phosphogypsum & fly ash with expansive soil, the experiment conducted of soil with individually stabilizer (bottom ash and phosphogypsum) as well as both. Determine all engineering properties of active & expansive treated soil like liquid limit(LL), plastic limit(PL), CBR value, swelling pressure. Result shows all properties of BC soil improved. Result shows improvement on swell, plasticity and bearing capacity of expansive or black cotton soil.

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Sadeeq, J. A. et.al. (2015) In this research paper the researcher determine the effect of bagasse ash on stabilized soil with lime. In this study lime works same as a stabilizer already but the outcome of bagasse ash was good on engg. properties of soil. Soil properties improved more when bagasse ash mix with lime stabilized soil. CBR value increased and maximum dry density (MDD) also increased. It results good on lime proportion at 8% and bagasse ash at 6%.

Osinubi juwonlo Kolawole et.al. (2015), This research paper based on pulverized coal bottom ash (PCBA) which is obtained from coal industry, using of these waste and stabilized the active black cotton(BC) soil, Cement is also taken as an another stabilizer. Coal bottom pulverized and add with the expansive soil in the proportion of (5,10,15,20,25, and 30%) cement were also mixed in the proportion of 2, 4, 6, and 8% by weight of the dry soil. Experiment conducted on all proportion and the result found that the optimum value of all properties (UCS and CBR) of soil at high peak value 5% of PCBA concentration.

Butt Wajid Ali & Jha J.N. et.al. (2016), In these paper saw dust used in stabilizing as an ash. Saw dust is a waste and it is generate in huge amount due to speedy urbanization. The mixture of saw dust ash and BC soil is taken and tests were conducted. The results shows that Unconfined compressive strength(UCS) and California bearing ratio(CBR) are increased. This study result that SDA, waste form industries is a cheap stabilizing material for sub-grade and sub-base. It can combined with lime, fly ash, cement etc. due to its bonding property.

Argaw Asha Ashango et.al. (2016) In this experimental study the stabilization of Black Cotton(BC) & expansive soil with ,rice husk ash, steel slag and quick lime. The soil properties like shearing strength c, and active engg. properties of stabilized soil have examined. The optimal value of these stabilizers are found in the portion of 60% of BC soil, 20% of steel slag, 5% of lime, 15% of rice husk ash. The UCS test result show the shear strength of tested mixed soil increased about 45% & 90% for uncured & cured samples respectively at 30 days. Lab strain controlled cyclic triaxial tests conducted under uncontrolled drainage conditions to examines the active engineering properties of stabilizing soil for different strain frequencies and amplitudes. The shear strength of soil which is stabilized increased to 60-80% with respect to cohesive soil. This experiment gives the Idea about suitability of stabilized material for sub-grade pavement.

Miao Shiding and Shen Zhaopu et.al. (2017),This research paper shows that the method of geopolymerizing of black cotton soil(BCS) is highly expansive soil that used in sub-grades. The expansive soil is stabilized by alkalis of calcium hydroxide [Ca(OH)2] or potassium hydroxide (KOH) stabilizer are mixed in soil and tested. In these test cementitious geopolymers are produce. Parameters of consistency limits, maximum dry density, optimal water content , unconfined compressive strength, and change in volume in percentage are measured. T

he mixture of volcanic ash and alkalis are also used and it results reduces the plasticity index(PI) greatly (34.8%-14.2%). KOH is found to be more efficient in solidifying the BCS than Ca(OH)2. The change in volume in percentage of BC soil can be decreased from 15.5% to 2.3-4.2%. Strength is increased and the UCS reaches 16.55 MPa after 90 days. In the initial stage due to presence of alkaline solution the soil is fully swelled & the volume shrinkage is irreversible after geopolymerization.

Shawl Zuhaib Zahoor and Er. Kumar Vishal et.al. (2017), In these test Stabilization process changing the compound properties of delicate soils by including stabilizers either in wet or dry conditions to build the quality and firmness sweeping soils. The fundamental goal of the paper was to learn about adjustment of clayey soil utilizing Saw Dust Ash and Lime.

Record properties of parent soil, Atterberg Limits, compaction attributes and UCC of both parent soil and soil treated with saw clean fiery remains and lime were discovered. Every one of the tests were directed by following the Indian measures rules. It was discovered that the usage of the modern wastage like saw tidy cinder is a contrasting option to settle the dirt for different development reason however this investigation unmistakably demonstrates that when an activator like lime is added to the sawdust fiery debris the outcomes are exceptionally reassuring. One can without much of a stretch acknowledge after the outcomes that with little level of activator, SDA a mechanical waste can be proficiently utilized as a part of soil adjustment.

This can lessen development cost of the streets.

IV. CONCLUSIONS

There are various papers were studied, in all papers stabilization of soil is done. In all research various stabilizer are used, in which some are expensive and some are economical, like cement, chemical, bituminous stabilizer are expensive and saw dust, fly ash, rice husk, bagasse ash are cheaper.

So in this research the cheap stabilizer are used that is why the project cost is minimize and the result will come in the form of improvement in active or black cotton soil properties, CBR value, stability and bearing capacity of soil will be increased. The disposal problem of these wastage is also eliminated.

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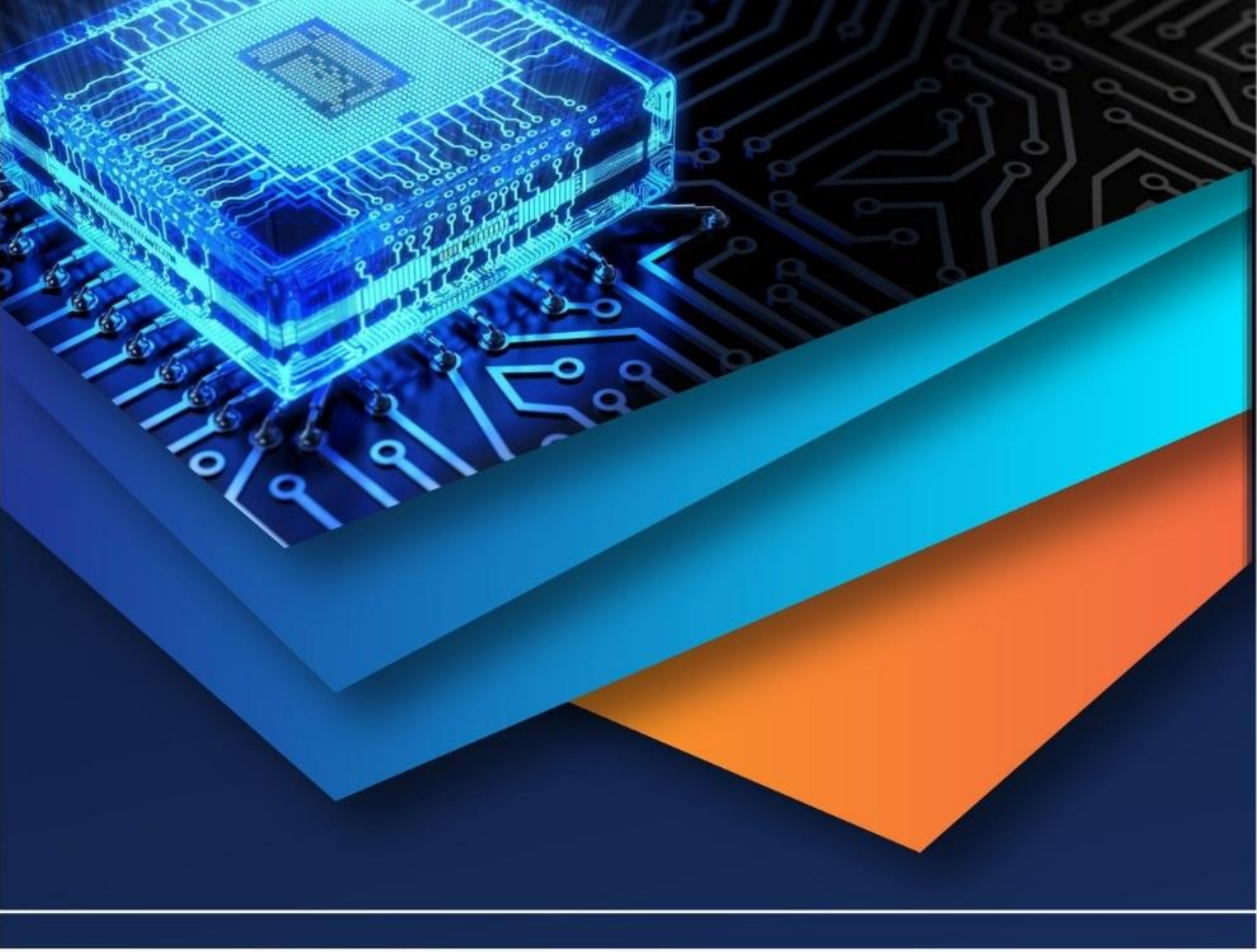

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