Effect of Bagasse Ash as a Cementitous material on Soil properties

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ABSTARCT

This paper contains laboratory testing perfomed on bagasse ash at Cecos university of engineering and technology Peshawar . Bagasse ash is the fibrous matter that remains after sugarcane stalks are crushed to extract their juice. The goal of the research was to focus on effect of bagash ash as Cementious material to soil properties for improvement of subgrade properties as local stabilizer material .

The subgrade soil sample was collected from local aera of Jamalgarhi, Mardan, was fond clayey and the average natural moisture content of the soil was found to be more than 25%.

Keywords: subgrade% ,bagasse ash, California Bearing Ratio stabilizersAdditives.

I. INTRODUCTION

Bagasse ash is currently used as a bio fuel and in the manufacture of pulp and paper products and building materials. For each 10 tons of sugarcane crushed, a sugar factory produces nearly 3 tons of wet bagasse which is a by-product of the cane sugar industry. Bagasse ash is the residue obtained from the incineration of bagasse in sugar producing factories. Research works have been carried out on the improvement of geotechnical characteristics of soils using bagasse ash.

Mohammed Abdullahi, Federal University of Technology, Civil Engineering Department, Minna[1], Nigeria Conducted experimental study on determining the "Plasticity and Particle Size Distribution Characteristics of Bagasse Ash on Cement Treated Lateritic Soil". In this study Lateritic soil was treated with 1-4% cement contents and was admixtured with 2-8% bagasse ash content. It was observed that liquid limit and plasticity index reduced while plastic limit increased to almost zero. However the recommended percentage of bagasse ash should be between 4% -6%.

II. TESTING PROCEDURE

2.1 Sample collection:

Sample were collected from two sites in mardan. One was collected from Jamalgarhi and other was collected from Qaziabad. According to AASHTO classification both of these soil samples were clayey soil and was expected to lie under the category of A-6 or A-7 soil.

2.2 Tests on soil sample:

After collection of soil samples the soil sample was mixed with 1%, 2%(dry cured and normal) bagasse ash and properties was determined. Moisture Content, Atterberg's Limits (Liquid limit, plastic limit, shrinkage limit),Modified proctor test were performed. California bearing ratios were found and the relation between water content and number of blows for 10,30,and 65 values of soil added with for bagasse ash upto 2% was developed.

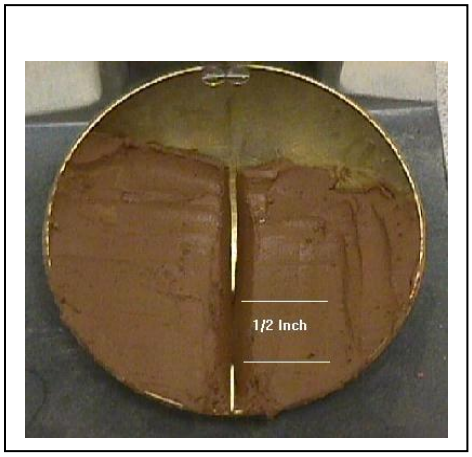

Fig 2.1(Liquid Limit Apparatus)

III. RESULTS AND DISCUSSION

After performing the tests graph between water content and number of blows corresponding to 25 no of blows soil sample, maximum dry density and water content, and other data developed from research summarized as shown.

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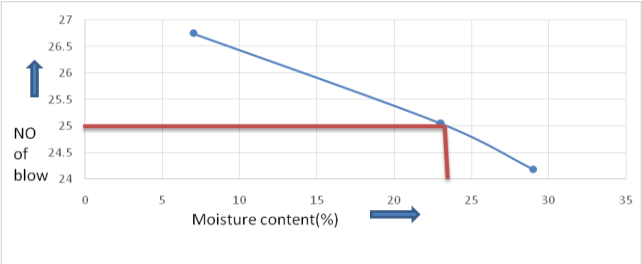

Fig III.1Graph between no of blows and moisture content soil sample

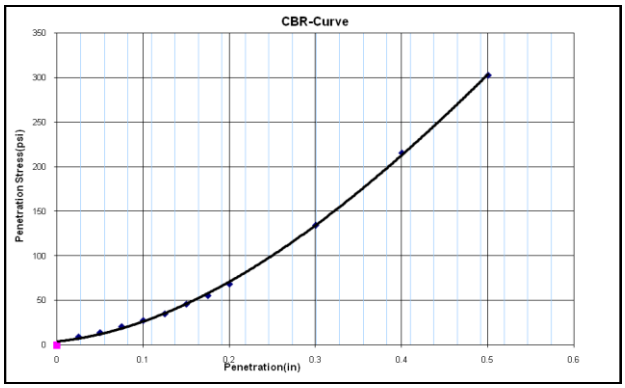

Fig III.2 CBR Curve for Soil with 2% bagasse ash as additive (65 blows)

Table III.1 shows Results of soil with 2% bagasse ash as additive

MDD from Proctor Test (g/cc)		1.852	
MDD from Proctor(pcf)		115.64	
NO. of Blows	Dry density (g/cc)	%compaction	%CBR
10	104.000	78.914	6.3037
30	106.900	81.115	8.8615
65	112.000	100.000	18.687

Table 3.2 soil Results of test performed on virgin soil

Properties	**Virgin soil (0% additive)**
Liquid limit	24.80
Plastic limit	8.97
Plasticity index	15.83
O.M.C	10.1
C.B.R	2.3

Table3.3 Results of test performed after adding 1% Bagasse ash as additive

Properties	**1% Bagasse ash (as additive)**
OMC (%)	11.78
Max.Dry Density (lb/ft^3)	113.87
Percent swell (%)	0.15
CBR	15.2

Table3.4 Results of test performed after adding 2% Bagasse ash as additive

Properties	**2% Bagasse ash (as additive)**
OMC (%)	15.60
Max.Dry Density (lb/ft^3)	112.80
Swelling (%)	0.51
CBR	6.3

Table3.4 Results of test performed after adding 2% bagasse ash (dry cured) as additive

Properties	**2% Bagasse ash (as additive)**
OMC (%)	16.89
Max.Dry Density (lb/ft^3)	111.20
Swelling (%)	0.56
CBR	5.4

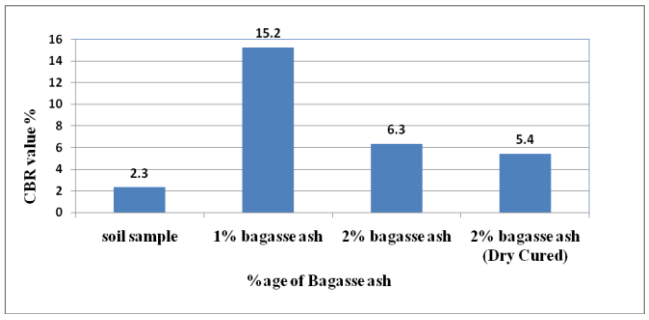

Figure 3.3 Comparison of percentage of Bagasse Ash with soil vs CBR values

CONCLUSION

From the analysis it was concluded:

I. The bagasse ash which was collected by simple burning of sugarcane residue greatly improve the engineering properties of the weak sub-grade material at 1% proportion by weight.

II. When the sugarcane residue burnt at very high temperature in the sugar mills resulted in bagasse ash which slightly increases the engineering properties of weak subgrade material even at 2% proportion by weight.

III. The dry cured bagash ash show less value as compare to 2%.

IV. Thus increasing bagash ash result in burning effect causing cementitious properties to detoriate.

V. The burning the sugarcane residue at high temperature results in the loss of the cementitious properties of the bagasse ash.

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