International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES)
Impact Factor: 5.22 (SJIF-2017), e-ISSN: 2455-2585
Volume 5, Issue 04, April-2019

STABILIZATION OF BLACK COTTON SOIL USING SUGARCANE BAGASSE ASH

Prof, Ms R.V Badiger[1], Abujar Rajput [2], Mustafa Bagawan [3],
Mujammil Mulla[4] , Sabir Pendari[5]

[1,2,3] *Assistant Professor, Dept, of civil Engineering JAGMIT, Jamkhandi- 587301*
[4,5] *BE Student, Dept, of civil Engineering JAGMIT, Jamkhandi- 587301*

ABSTRACT - Black cotton soil is the expansive soil because of Montmorillonite mineral present in it. Hence construction on this soil is critical. Usually black cotton soil found in Madhya Pradesh, Karnataka, Maharashtra, Andra Pradesh in our country. Soil will get effect because of existence of water so many of engineering properties of black cotton soil get affect from it. in our work we are enhancing engineering properties of black cotton soil such as permeability ,optimum moisture content ,maximum dry density ,unconfined compressive shear strength. By using baggase ash in varying percentage. The properties of black cotton soil can be modified by stabilizing the soil with the use of additives or by mechanical means. The scarcity and rising cost of traditional stabilizers like Lime and Cement has led to the research into clay soil stabilizing potential of bagasse ash that is cheaper, readily available and environmental friendly and has a serious disposal problem. aim is to economically improve the engineering properties of the black cotton soil such that the structure built on this soil can efficiently withstand applied loads.

Keywords: Black Cotton Soil, Bagasse ash, Liquid limits, plastic limits, optimum moisture content, maximum dry density.

1. INTRODUCTION

The foundation of a building is an essential part of construction. Because it transfers the super structure loads to the sub soil effectively. The properties of soil has large impact on foundation design. The expansive soils are examples of weak soils, which encountered in foundation engineering for bridges, highways, buildings and embankments. Expansive soil undergoes volume changes when they come in contact with water. They show alternate swelling and shrinkage properties. It expands during rainy season and shrinks during summer season. Expansive soil covers nearly 20% of the land mass in India. In Maharashtra region the expansive soils are identified by name "Black Cotton" soil. Typical behavior of soil results into failure of structure in form of settlements cracks etc. Therefore it is important to remove the existing weak soil or treat the weak soil by stabilization.

II. OBJECTIVES

To explore the effectiveness of Bagasse Ash as a stabilizer for black cotton soil, the following objectives are planned:

- To improve the engineering properties of soil by addition of different percentages of Bagasse Ash.
- To arrive at the optimum dosage of Bagasse Ash.
- To evaluate the suitable blend that can be used in the stabilization of Black cotton soil.

III. LITERATURE SURVEY

1) Kiran R. G and Kiran. L, **"Analysis of Strength Characteristics of Black Cotton Soil Using Bagasse Ash and additives as Stabilizers",** "International Journal of Engineering Research & Technology" (IJERT), Vol. 2, Issue 7 ISSN: 2278-0181 - (2013). In this paper used material black Cotton Soil + Bagasse Ash. Test carried out : Atterberg's limit, Compaction, California Bearing Ratio (C.B.R.) and Unconfined Compressive Strength. This paper was based on study of behavior of black cotton .soil using bagasse ash and additives as stabilizing agent. Under this study laboratory experiments are carried out for different percentages (4%, 8% and 12%) of bagasse ash and additive mix proportions. It was observed that by the addition of bagasse ash for black cotton soil, the density has no significant changes. But the CBR and UCS values have been increased with the addition of 8% bagasse ash. Addition of bagasse ash gave probable increase in strength values but with the blend with cement and lime gave more increased strength values. Hence 8% of bagasse ash can be used with soil to increase the strength.

2) Kavish S. Mehta*, Rutvij J. Sonecha (et al), Student, Department of Civil Engineering, L.T.I.E.T, Gujarat Technological University, Rajkot **"Analysis of Engineering Properties of Black Cotton Soil & Stabilization Using By Lime",**."Journal of Engineering Research and Applications" ISSN: 2248-9622, Vol. 4, Issue 5(Version 3), May 2014, pp.25-32. In this paper used material black Cotton Soil + Lime. From laboratory test results we get value of C.B.R at different readings. for design of flexible pavement as per I.R.C 37-2001,value of C.B.R is very poor is less than 4% And the swelling pressure is 9 kg/cm2. As per the Atterberg"s limit we determined the liquid limit , plastic limit , plasticity

index , activity of soil.We get the value of that by the experiments and which is prosperity of the black cotton soil. Due to those properties soil is highly clay and highly plasticity. So we cannot construct any structure or pavement design and need to stabilization. So we stabilized that soil by lime, sisal fibre or sand. So we need to improve the black cotton soil by various methods.

IV. METHODOLOGY

Bagasse ash

It is a pozzolanic material which is very rich in the oxides of silica and aluminum and sometimes calcium (Guilherme et al, 2004). Pozzolans usually require the presence of water in order for silica to combine with calcium hydroxide to form stable calcium silicate, which has cementitious properties.

Fig (1) Bagasse Ash

V. TEST RESULTS

TABLE NO. (1) THE RESULTS OF VARIOUS TESTS ON BLACK COTTON SOIL ARE AS FOLLOWS:

Sl.No	TEST	RESULT
1	Grain size distribution Cc	1.0315
	Cu	4.7360
2	Specific gravity	2.3
3	Liquid limit	61%
4	Plastic limit	30%
5	Optimum moisture Content (OMC)	20%
6	Maximum dry Density (MDD)	15.55kN/m^2

TABLE NO. (2) VARIATION IN ATTERBERG LIMITS

% of bagasse ash	Liquid limit	Liquid limit	Plasticity index
0	61.00%	30.00%	31.00%
10	63.00%	27.00%	36.00%
20	56.50%	25.00%	31.50%
30	61.50%	23.50%	38.00%
40	56.00%	22.50%	33.50%

Fig (2) Variation in atterberg's limits

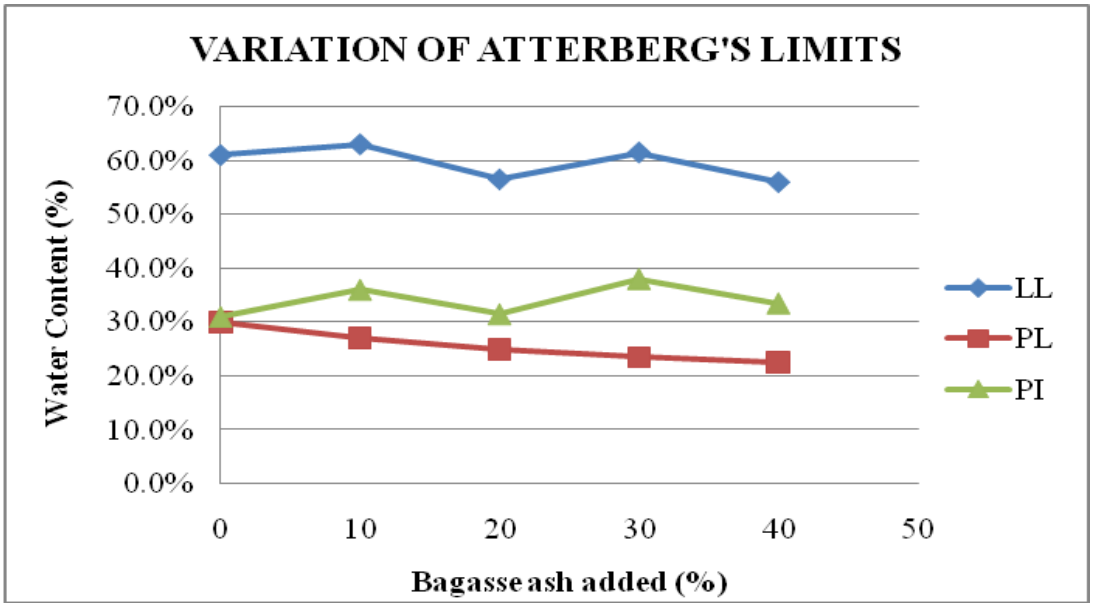

TABLE NO. (3) VARITION IN COMPACTION FACTOR TEST

Water content	0% ASH	10% ASH	20% ASH	30% ASH	40% ASH
10	13.19	12.34	12.15	11.86	10.6
20	15.55	14.622	13.69	13.47	11.31
25	14.76	14.365	13.86	13.34	12.128
30	13.75	12.98	13.05	12.54	11.61

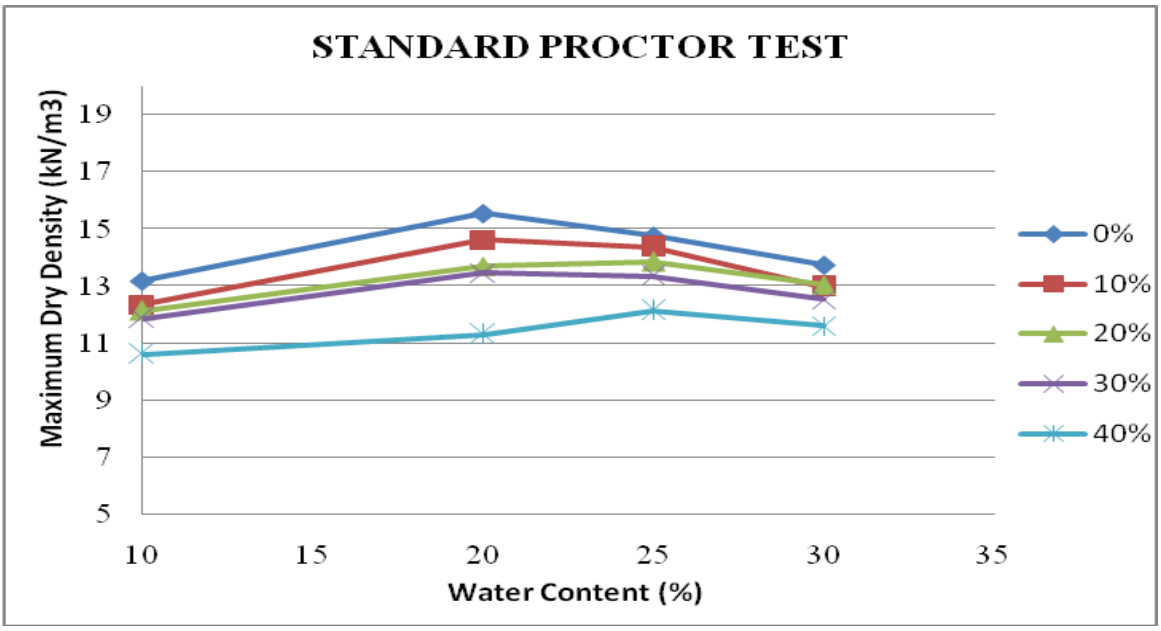

Fig (3) Variation of MDD and OMC

TABLE NO. (4) UNCONFINED COMPRESSION STRENGTH TEST

%OF BAGASSE ASH	UCS KN/m^2
0	60.02
10	98
20	136.1
30	152.9
40	170

Fig (4) Variation in unconfined compression strength

TABLE NO. (5) VARITION PERMEABILITY OF TEST

Average	% OF ASH
1.24	0
1.8	10
2.07	20
3.76	30
6.07	40

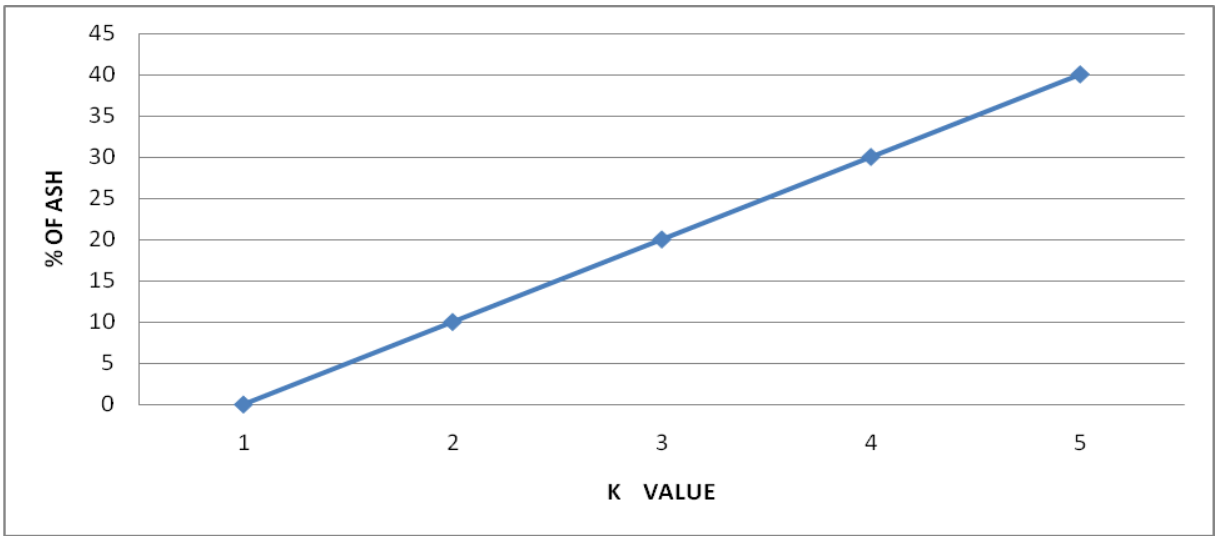

Fig (5) Variation of coefficient of permeability

VI. CONCLUSION

Soil stabilization by using waste product bagasse ash successfully improves the existing poor and expansive black cotton soil in significant manner. Bagasse ash being low cost material and available locally and also decreases swell potential of Black Cotton Soils. By replacing some of the volume previously held by expansive clay minerals and by cementing the soil particles together. On treatment with bagasse ash, plastic nature of soil decreases and contributes to gain in strength.

VII. REFFERENCE

1) Kiran R. G and Kiran. L, "Analysis of Strength Characteristics Of Black Cotton Soil Using Bagasse Ash And Additives as Stabilizers", "International Journal of Engineering Research & Technology" (IJERT), Vol. 2, Issue 7 ISSN: 2278-0181 - (2013).

2) Kavish S. Mehta*, Rutvij J. Sonecha (et al), Student, Department of Civil Engineering, L.T.I.E.T, Gujarat Technological University, Rajkot "Analysis of Engineering Properties of Black Cotton Soil & Stabilization Using By Lime",."Journal of Engineering Research and Applications" ISSN : 2248-9622, Vol. 4, Issue 5(Version 3), May 2014, pp.25-32.

3) Piyush .V. Kolhe, Rushikesh .V. Langote, Assistant Professor, PRMIT & R, Badnera, Amravati, India) "Performance of Black Cotton Soil Stabilized With Rubber Tyre Shreads","Journal of Geotechnical Studies Volume 2 Issue 2",-2017.

4) Prakash Chavan and Dr.M.S.Nagakumar, Department. of Civil Engineering R .V. College of Engineering , Bangalore. "Studies on soil stabilization By using Bagasse

5) S.D.R.L.PAVANI[1] AND V.A.MANGAMMA, Department of Civil Engineering, Dadi Institute of Engineering & Technology, "Stabilization of Black Cotton Soils Using Fly ash & Egg Shell Power" International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 04, Issue 12, [December– 2017]

6) Sujit Vaijwade [1], Prasad Paithane[2], Adesh Dandge[3], Shaikh Meraj[4], Shaikh Mohtasim Farhan[5], Baig Adil[6]. Lecturer, Department of Civil Engineering, MGM's Polytechnic, Aurangabad, Maharashtra. "Stabilization of Black Cotton Soil by Using Stone Dust and Plastic Glass Strips" International Journal of innovative Research in Science Engineering and Technology Vol. 7, Issue 5, May 2018.

7) Soil Mechanics and foundations by B.C.Punmia, Sixteen Edition.