

**COMPARATIVE STUDY USEING LIME, RICE HUSK ASH & BAGGASH
ASH IN BLACK COTTON SOIL**Karnal Solanki¹, Sidharth Gupte², Khushbu Bhatt³¹Civil Department, Parul University Limda, Vadodara,²Civil Department, Parul University, Limda, Vadodara.³Civil Department, Parul University, Limda, Vadodara.

Abstract- *The Black cotton soil tends to swell and shrinks when come across with various temperature so its undesirable in terms of engineering consideration. The main objective of the investigation is to Study between lime & different percentage of rice husk ash & baggash ash in black cotton soil and assess the usefulness Of agricultural and industrial waste as a soil admixture, and focused to improve the engineering properties of soil to make it capable of lower layer of road construction. This investigation describes the behavioral aspect of soils mixed with industrial waste materials viz. Lime, rice husk ash (RHA) & agricultural waste material Baggase ash (BA) to improve the load bearing capacity of the soil.*

Keywords- *Black cotton soil, Rice husk ash(RA), Baggash Ash(BA),Lime, Increase engineering Properties.*

I. INTRODUCTION

India produces an enormous amount of different types of waste materials as by-products from different sectors like industrial, agricultural, etc. These waste materials if not deposited safely it may be hazardous. The amount and type of waste generated increases with increase in population. These wastes remain in the environment for longer duration since it is unused. The waste disposal crisis arose due to the creation of non decaying waste materials. One solution to this crisis lies in recycling waste into useful products. Research into new and innovative uses of waste materials is continually advancing. In India, research is currently underway to examine the potential for use of some locally available wastes in road construction.

II. MATERIALS USED FOR STUDY

Material used for study are Lime and agriculture material like baggash ash, Rice husk ash. This are environment friendly, cheap and easily available material in Indian condition. Lime is known as good stabilizer for soil.

III. PROBLEM DEFINITION & OBJECTIVES OF STUDY

The wide spread of the black cotton soil has posed challenges and difficulties in the construction activities because of its shrink-swell behaviour and low strength. It forms Cracks and Settlement of Pavement.

Main Objectives of Study

1. To Improve the strength of Sub-grade Soil.
2. To determine engineering properties of Black Cotton Soil by laboratory tests and find out change in properties of soil by the addition of Material i.e., Rice Husk ash, Baggash ash, & Lime and also identify the maximum proportion of Material to be added in the soil for getting the required strength that improve the problems of construction of road pavement in Black Cotton Soils.

IV. METHODOLOGY

After Study Problem Summary in Black cotton soil. Soil sample is taken for laboratory analysis like

1. Sieve Analysis
2. Consistency Test
3. Modified Proctor Test
4. California bearing ratio Test
5. Unconfined Compressive Strength

IV. ANALYSIS OF DATA AND RESULTS

Sr. No.	Test Parameters		Unit	Test results	Test Methods
1	Particle Size Analysis	a)Gravel b)Sand c)Silt d)Clay	%	1.4 8.2 90.4	IS 2720(part 4)
2	Consistency Properties	a)Liquid limit b)Plastic limit c)Plasticity Index	%	52.93 26.06 26.87	IS 2720(part 5)
3	IS Classification		%	CH	IS 1498-1970
4	Modified Compaction	a)MDD b)OMC	Gm/cc %	1.866 16.810	IS 2720(part 8)
5	CBR	a)Unsoaked b)Soaked	%	3.898 3.0178	IS 2720(part 16)
6	Triaxial	Cohesion/UCS	Kg/cm2	1.12	IS2720(part 11)1993

Table1: Results of Untreated Soil

Sr. No	Black Cotton Soil + Stabilizers	Consistency Properties			Modified Compaction		California Bearing Ratio		UCS
		LL	PL	PI	MDD	OMC	Unsoaked	Soaked	
		%	%	%	gm / cc	%	%	%	Kg/cm2
1.	Soil	52.93	26.06	26.87	1.866	16.81	3.89	3.01	1.12
2.	Soil+ Lime 5%	52.76	26.55	26.11	1.720	18.81	4.71	3.58	1.15
3.	Soil+ Lime 5% + RHA 4%	54.50	29.37	25.14	1.630	22.48	4.71	8.58	1.34
4.	Soil+ Lime 5% +RHA 8%	56.45	26.84	29.61	1.600	22.570	5.84	11.88	1.39
5.	Soil+ Lime 5% +RHA 12%	57.21	28.94	30.12	1.597	22.69	6.12	12.87	1.48
6.	Soil+ Lime 5% +RHA 16%	58.21	29.12	29.09	1.581	23.57	6.32	13.24	1.51
7.	Soil+ Lime 5% +RHA 20%	60.12	25.64	34.48	1.574	23.87	7.01	13.89	1.54
8.	Soil+ Lime 5% +BA 4%	59.98	36.58	23.40	1.650	20.69	7.48	12.82	1.58
9.	Soil+ Lime 5% +BA 8%	63.97	40.14	23.83	1.610	21.30	8.17	13.86	1.72
10.	Soil+ Lime 5% +BA 12%	65.87	41.23	24.64	1.582	22.14	5.81	9.87	1.41
11.	Soil+ Lime 5% +BA 16%	67.83	41.87	25.96	1.577	23.08	4.86	8.74	1.32
12.	Soil+ Lime 5% +BA 20%	65.31	39.87	25.44	1.594	22.17	4.52	7.21	1.14

Table 2: : Results of Untreated Soil

VI-CONCLUSION

The use of the Rice husk Ash, Baggash Ash and lime in Black Cotton soil found, to be upgraded to achieve better characteristics necessary in improving road life and quality. As we know pavement based design and thickness of sub-

base depends upon CBR value so increment in CBR value results in reduction of thickness of sub-base, which means materials require for pavements are having less quantity and it also save the construction time
The rice husk ash, baggash ash and lime improves road strength as well as cheap and easily available also.

1. The maximum dry density of soil decreased with the addition of Lime and, value of optimum moisture content of Lime treated soil increased .
2. CBR values of soil increased from **3.01 to 3.58** on addition of 5% Lime, **3.01 to 8.58** on addition of 4% RHA and **3.01 to 11.88** on addition of 8% RHA. 3.01 to 12.87 on addition of 12%RHA, And 3.01 to13.24 on addition of 16% RHA and 3.01 to 13.89 on addition of 20% RHA .Hence it can be concluded that addition of **4% RHA** with constant 5% Lime Can give better CBR values.
3. CBR values of soil increased from **3.01 to 12.82** on addition of 4% B.A, **3.01 to 13.86** on addition of 8% B.A and **3.01 to 9.87** on addition of 12% B.A. 3.01 to 8.74 on addition of 16%B.A, And 3.01 to7.21 on addition of 20% B.A .Hence it can be concluded that addition of **4% B.A** with constant 5% Lime Can give better CBR values. Change Seen here that after addition of 12% of B.A. with constant 5% Lime ,Value of CBR has decreased respectively.
4. .By this study it is shown that CBR value of Black cotton soil increase respectively with addition of 4%,8%,12%,16%,20% rice husk ash and 5%Lime, where with addition of Baggash ash it increase only 4% to 8%,afterthat it decrease.

REFERENCES

- 1 .A K Sabat (2012), "Utilization of Bagasse Ash and Lime Sludge for Construction of Flexible Pavements in Expansive Soil Areas", Electronic Journal of Geo-technical Engineering, Vol.17, Bund.H, pp.1037-1046.
2. R P Nanda (2011), "Effect of Marble Dust on Strength and Durability of Rice Husk Ash Stabilized Expansive Soil", International journal of Civil and Structural Engineering, Vol. 1, No. 4, pp. 939-948.
3. D K Rao, P R T Pranav and M Anusha (2011), "Stabilization of Expansive Soil with Rice Husk Ash", lime and gypsum- an experimental study," International journal of Engineering Science 5. Differential Free Index decreases from 54.3% to 7.1% and Tech-nology, Vol. 3, No. 11, pp. 8076-8085.
4. Basha, E. A., Hashim, R., Mahmud, H. B. and Muntohar, A. S. (2005). Stabilization of residual soil with rice husk ash and cement Stabilization of residual soil with rice husk ash and cement. Construction and Building Materials, Vol. 19, 448 453.
5. Cordeiro, G. C., Toledo Filho, R. D., Fairbairn, E. M. R. (2009). Effect of calcinations temperature pozalanic activity of sugar cane bagasse ash. Construction and Building Materials. Vol. 23, 3301 33.
6. Dhawan, P. K., Swami, R. K., Mehta, H. S., Bhatnagar, O. P., and Murty, A. V. R. S. (1994). Bulk utilization of coal ashes from road works. Indian highways, Vol. 22 (11), 21-30.
7. **Mohammed Abdullahi**, Federal University of Technology, Civil Engineering Department,-"Evaluation of Plasticity and Particle Size Distribution Characteristics of Bagasse Ash on Cement Treated Lateritic Soil"- Leonardo Journal of Sciences, January- Nigeria- June 2007
8. **Douglas O. A. Osula**, Sr. Lect., Dept. of Civil, Auchu Polytechnic,- "Evaluation of Admixture Stabilization for Problem Laterite" – Journal of. Transportation