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TO STUDY THE EFFECT OF LIME AND RICE HUSK ASH ON CBR PARAMETERS OF BLACK COTTON SOIL

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Abstract - *Every structure in black cotton soil has Some problems in foundation like shrinkage, swelling, When exposed to moisture content and hence have been Found to be troublesome from engineering considerations. black cotton soil is an expansive soil, it has been Challenging to overcome with its problems. The black Cotton soil can be stabilized using various methods But sometimes it becomes so tough and costly which is not Economical .Hence our aim is to improve the strength by using Rice husk ash and lime with the varying percentage of mix. In order to introduce new material to reduce the cost and increase The strength of black cotton soil a review is made on rice husk ash Rice husk is waste material of paddy crop. After burning it gives the Rich amount of silica which may be used as chemical stabilizer for Soil stabilization. Another one stabilizer is lime which is easily And cheaply availiable in market .It has very good binding property Which increases soil strength Hence we are using both this materials Lime and Rice husk ash as stabilizers for increasing shear strength of Soil keeping percentage of lime constant throughout tests as 8%And changing RHA with 5%,10%,15%,20%. With this mixtures We are attending CBR test on each sample to check its strength.*

Key Words: *Black cotton soil, lime, Rice Husk Ash (RHA), CBR test.*

INTRODUCTION

Stabilization is one of the methods to improve the shear strength of soil . There are chemical stabilization, mechanical stabilization, Bio enzaymatic soil stabilization , etc but some of its are very tough, Costly hence it better to adopt method which is economical. Hence By using waste product like RHA and lime we are conducting CBR Test with various percentages of RHA and lime.Since RHA contain High content of silica , which is highly chemically active material. It acts as a good binding agent which keeps void filled and posses Good bond between soil particals. Also Lime is chemically active agent Used for increasing stability . Both the mixture will gives us good Shearing and bearimg capacity. Hence it helps us to decrease settlement Of soil.CBR test is conducted on soil samples having lime and RHA with the8% lime as constant percentage reffering research papers .And RHA hasVarying percent as 5%, 10%. 15%, 20%. This soil samples gives us Results using CBR test . Shear strength of soil is increases with the Lime and RHA .Also it gives us settlement results .

OBJECTIVES

In present experimental program the performance of Black Cotton Soil blended with lime and Rice Husk Ash is studied for the improvement in strength. The experimental program is planned to study the following objectives.

1. To study the compaction properties of Black Cotton Soil with varying percentage of rice husk ash from 5 to 20% at an interval of 5% and constant percentage of lime as 8 %.
2. To evaluate the feasibility of using Rice Husk Ash with lime as soil stabilization material.
3. To find out optimize proportion of lime and RHA to achieve maximum strength.

CBR TEST (IS 2027.16):

The mould containing the specimen, with the base plate in position but the top face exposed, shall be placed on the lower plate of the testing machine. Surcharge weights, sufficient to produce an intensity of loading equal to the weight of the base material and pavement shall be placed on the specimen. If the specimen has been soaked previously, the surcharge shall be equal to that used during the soaking period. To prevent upheaval of soil into the hole of the surcharge weights, 2.5 kg annular weight shall be placed on the soil surface prior to seating the penetration plunger after which the remain- der of the surcharge weights shall be placed. The plunger shall be seated under a load of 4 kg so that full contact is established between the surface of the specimen and the plunger. The load and deformation gauges shall then be set to zero (In other words, the initial load applied to the plunger shall be considered as zero when determining the load penetration relation). Load shall be applied to the plunger into the soil at the rate of 1.25 mm per minute. Reading of the load shall be taken at penetrations of 0.5, 1.0, 1.5, 2.0, 2.5, 4.0, 5.0, ….. 10.0 and 12.5 mm (The maximum load and penetration shall be recorded if it occurs for a penetration of less than 12.5 mm). The plunger shall be

raised and the mould detached from the loading equipment. About 20 to 50 g of soil shall be collected from the top 30 mm layer of the specimen and the water content water content of the whole specimen is desired, water content sample shall be taken from the entire depth of the specimen. The determined according to IS : 2720 (Part 2)-1973*. If the average undisturbed specimen for the test should be carefully examined after the test is completed for the presence of any oversize soil particles which are likely to affect the results if they happen to be located directly below the penetration plunger.

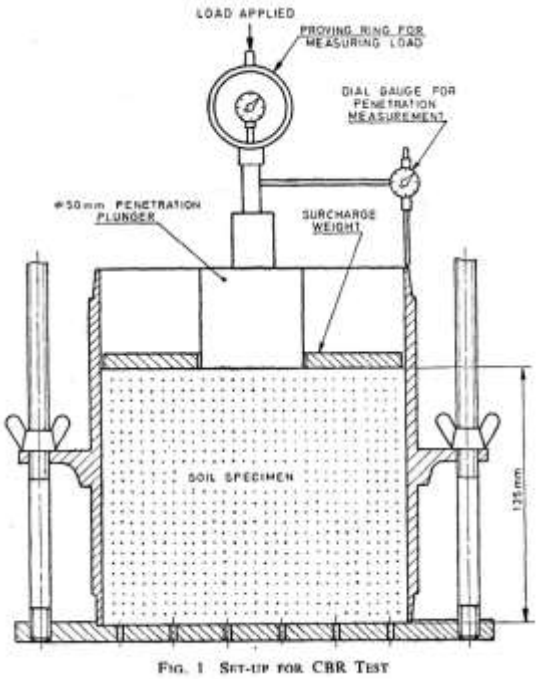


FIG. 1 SET-UP FOR CBR TEST

Fig -1

MATERIAL

- **Black Cotton Soil**

The black cotton soil used in this study was collected from Jaysinngpur.

- **Lime**

Lime used in this study was purchased from Kolhapur.

- **Rice Husk Ash**

Rice husk ash used in this study was collected from Shri Krishna Rice Mill, Gargoti, Tal-Bhudargad, Dist- Kolhapur.

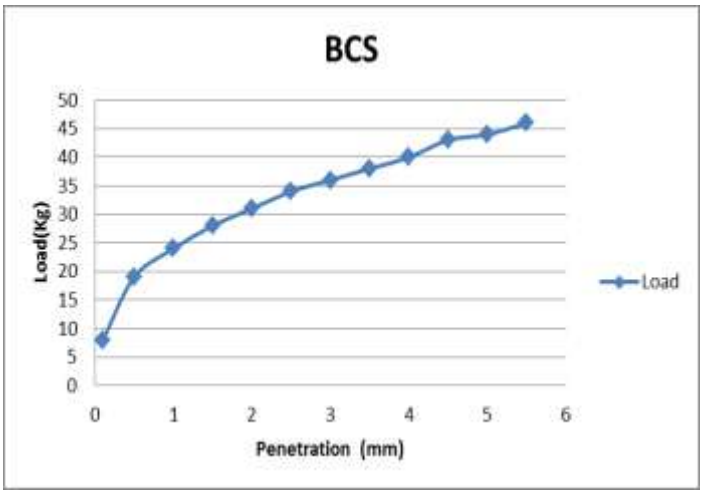
MIX PROPORTIONS

BCS -Black Cotton Soil
SAM0 –Black Cotton Soil+8% lime
SAM5 –SAM0+ 5% Rice husk ash
SAM10 –SAM0+10% Rice husk ash
SAM15 –SAM0+15% Rice husk ash
SAM20 –SAM0+20% Rice husk ash

RESULTS AND DISCUSSION

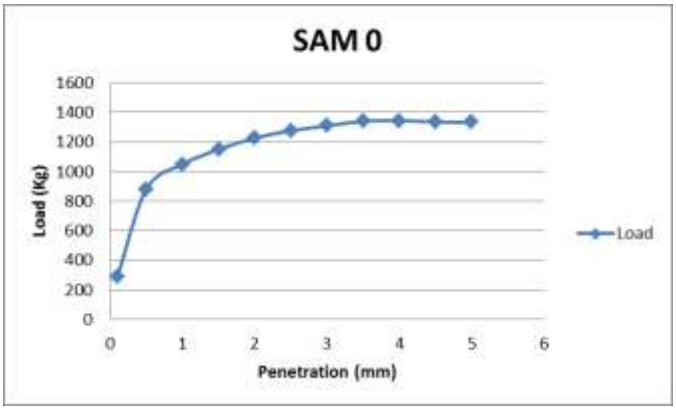
1.BCS – Black Cotton Soil

Penetration (mm)	Load(Kg)	Penetration (mm)	Load(Kg)
0.1	5	3	36
1.5	19	3.5	38
1	24	4	40
1.5	28	4.5	43
2	31	5	44
2.5	34	5.5	46



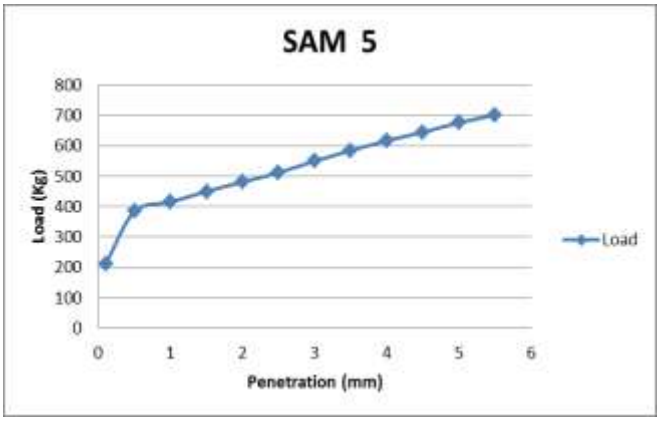
2. SAM0- Black Cotton Soil+8% Lime

Penetration (mm)	Load(Kg)	Penetration(mm)	Load(Kg)
0.1	291	3	1310
0.5	881	3.5	1340
1	1050	4	1345
1.5	1150	4.5	1336
2	1227	5	1334
2.5	1277	5.5	-



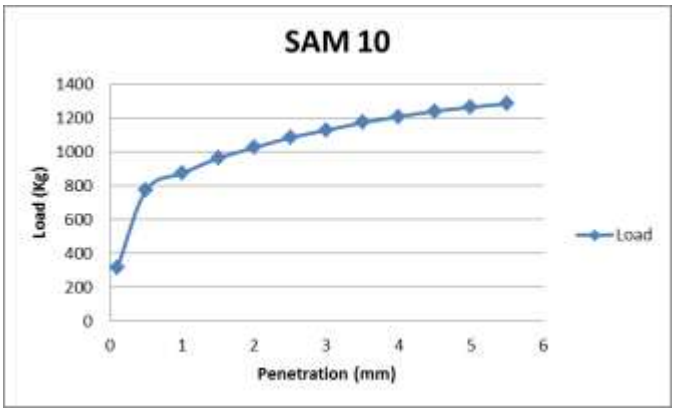
3.SAM5- SAM0+5% Rice Husk Ash

Penetration(mm)	Load(Kg)	Penetration (mm)	Load(Kg)
0.1	211	3	550
0.5	384	3.5	585
1	415	4	617
1.5	450	4.5	645
2	481	5	676
2.5	512	5.5	702



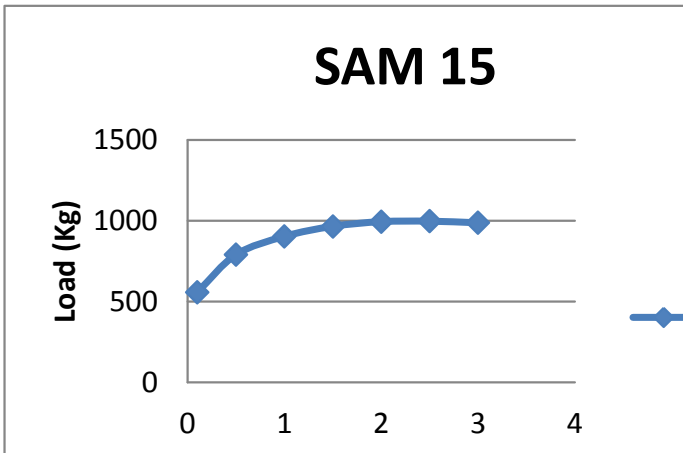
4. SAM15-SAM0+10% Rice Husk Ash

Penetration(mm)	Load(Kg)
0.1	559
0.5	791
1	904
1.5	966
2	995
2.5	998
3	988



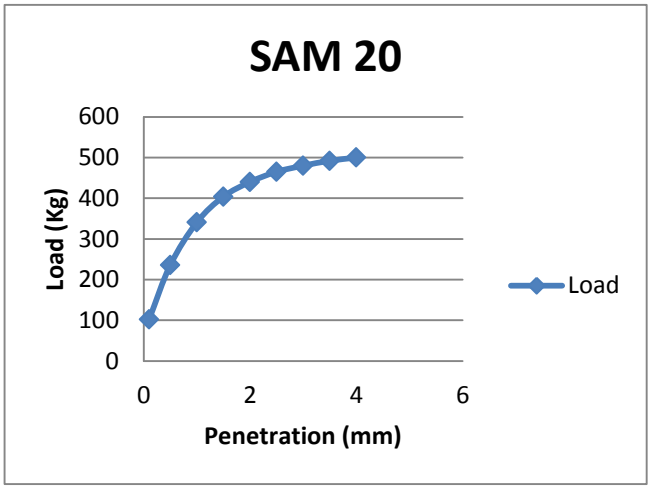
4.SAM15- SAM0+15% Rice Husk Ash

Penetration(mm)	Load(Kg)	Penetration (mm)	Load(Kg)
0.1	315	3	1128
0.5	774	3.5	1172
1	874	4	1208
1.5	962	4.5	1240
2	1025	5	1264
2.5	1084	5.5	1284



6. SAM 20- SAM0+20% Rice Husk Ash

Penetration (mm)	Load(Kg)	Penetration (mm)	Load(Kg)
0.1	102	3	480
0.5	236	3.5	492
1	341	4	500
1.5	404	4.5	508
2	440	5	-
2.5	465	5.5	-



Result Summary:

Sr.No.	Sample	CBR @ 2.5 mm Penetration	CBR @ 5 mm Penetration
1	BCS	2.47	2.13
2	SAM0	92.93	64.72
3	SAM5	37.26	32.79

4	SAM10	78.88	61.32
5	SAM15	72.62	-
6	SAM20	33.84	24.88

CONCLUSIONS

The following conclusions can be derived from the present investigation:

[1] Lime is better stabilizing material than RHA.
[2] The addition of RHA along with constant percentage of lime to the soil resulted in decrease in the value of CBR
[3] The decrease in CBR values due to the addition of RHA may due to low density and high moisture absorption capacity

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