

Test Investigation Ahead Soil - Coal Powder Blend Fortified With Bambusa Vulgaris

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Abstract— Those principle center of the display worth of effort may be to move forward those quality about soil toward utilizing coal powder with bambusa vulgaris Similarly as a reinforcing agenize in the soil. Will attain this, those soil need main supplanted eventually coal powder done four distinctive proportions fluctuating starting with 5% with 40 % by weight about dirt. Secondly, those coal powder mixture, Hosting secondary CBR esteem from those past aspect, may be further strengthened toward utilizing bambusa vulgaris to a grid type for opening 3cm x3cm measurement in a three distinctive position. Those test ponder reveals to a sensible expansion to CBR esteem about virgin soil toward utilizing bambusa vulgaris. Those most extreme CBR quality for coal powder –Soil blend test is discovered the point when 10% soil may be perusing coal powder. Further for this sample, fortified for bambusa vulgaris done square grid structure with opening measurements from claiming 3cmx3cm, those CBR esteem may be 9.6 i.e. an expansion from claiming 263% with admiration to the soil utilized.

Key words: CL-ML soil, Reinforced Bambusa Vulgaris, Coal Ash, California Bearing Ratio

I. INTRODUCTION

An country's status over reality may be for the most part measured As far as social Also prudent improvement. Around its Different parameters an far reaching and beneficial personal satisfaction street organize may be a standout amongst the major parameters. Typically those streets Hosting helter CBR strength, those way development may be not difficult and prudent Anyway when soil have exact poor quality over it may be exceptionally troublesome with build way asphalt. However, Now and again it may be key with develop street in this condition Also therefore, Different systems would utilized to build those quality for such streets. For India, over 110 million tons from claiming coal powder for every annum will be prepared Concerning illustration An waste material in the coal based warm force stations. The utilization for this coal powder in extensive amounts may be exactly obvious On roads, airfields What's more embankments. The utilization for coal powder as an elective material is also expanded because of service about surroundings & woodland Also service for street transport Also roadway guided that at its organizations which will be utilization coal powder to the sum street bank development and structural fills worth of effort inside a span of 100 km from warm control plant as for every IRC specification, national roadway power from claiming India (NHAI) likewise using coal ash looking into massive scale. Also this, it will be likewise important should expand the quality of asphalt further, the coal ash-soil mixture need on make further checked some other suitability waste item viewed as. A far reaching expositive expression Audit infers that

bambusa vulgaris (Bamboo) might a chance to be particular case such reinforcing waste material Around Different accessible. Around those Different investigations available, a portion major Look into worth of effort finished in the range as of late need been talked about underneath.

Bandyopadhyay K. et. al. (2009) concluded based on fly ash studies, in context of the road sub-grade and embankments, that CBR decreases with decrease in MDD and increase in OMC, under both dynamic and static compaction. Asaduzzaman M. and Islam M.I. (2014) concluded that the load bearing capacity of soil increases when the bamboo reinforcement placed within the depth of failure envelope. In multi-layer reinforcing system, settlement considerably decreases with the increase in number of reinforcing layers. Khosrow G. (2014), concluded that bamboo can substitute steel satisfactorily for construction of structures. The focus of this paper was to present a concise summary of information about the range of material to be chosen, which are locally available for construction of concrete structural elements. Rajakumar. C. and Meenambal. T. (2015) concluded that by addition of coal ash in cohesive soil, the percentage increase in the soaked CBR value is 383.44%, 316.933%, 383.62% for respective combinations under light compaction condition.. Mohanty S. et al. (2015), observed that pond ash has great potential to use as a material for geotechnical applications like embankment construction, backfill material, filter material etc. In the present paper based on literature survey, the suitability of reinforcing coal ash - soil mixture with Bambusa Vulgaris (Bamboo) has been kept in mind and on experimental work has been conducted. The selection of Bambusa Vulgaris (a waste product) has been considered to utilize this without harming the environment. Based on literature summary as discussed above , the main focus of the present work is,

- 1) To study the change in strength behavior (CBR) of the soil under soaked condition and analyzing replacing soil by coal ash in different proportions i.e. 4,6,8,10 (% by weight wt. of soil).
- 2) Further, the sample having maximum CBR value from (i) is analysed by reinforcing it by using Bambusa Vulgaris square grid form 3 cm x 3cm in dimension and placing it at suitable location (1/3 and 2/3 from top of mould) based on literature available.

II. PHYSICAL PROPERTIES OF MATERIAL USED

The materials used for the present study work includes soil coal ash and bambusa vulgaris (bamboo) .The properties of these are discussed as follows:

A. Bambusa Vulgaris

The bambusa vulgaris are acquired from market Sultanpur. Bamboo is quickest developing plant and neem seed oil is

utilized as preserver for bambusa vulgaris (bamboo).The shade of bambusa vulgaris is light green and yellow, the thickness and dampness substance is 4-5mm and 15% to 20% individually.

B. Coal Ash

Coal fiery remains test has been gathered from Panki Thermal Power Station, Kanpur, Uttar Pradesh. The particular gravity of this coal fiery debris is 2.68.

C. Properties of soil used

An characteristic sub-grade soil might have been chose in the available ponder Furthermore might have been gathered starting with Kunda, Pratapgarh. Those soil properties need been dictated in the soil Laboratory, civil building Department, KNIT, Sultanpur What's more need aid recorded for Table-1. Every last one of tests directed in the exhibit study are Similarly as for every the system depicted in the pertinent IS codes.

S.no	Soil Properties	Value
1	Specific Gravity	2.60
2	Grain Size Analysis	
	Gravel	4.13%
	Sand Content	6.45%
	Silt	58.54%
3	Clay	30.88%
	Atterberg's Limit	
	Liquid Limit	30
	Plastic Limit	22
4	Plastic Index	8
	Soil Classification	CL-ML

Table 1: Properties of soil used

The soil has been classified as CL-ML i.e. Silty Clayey soil with specific gravity 2.60.The particle size distribution for the soil is shown in Figure-1.

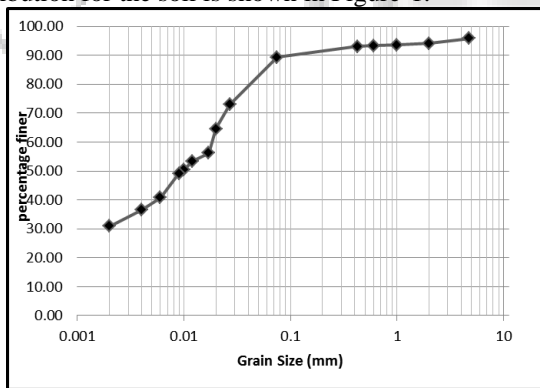


Fig. 1: Particle Size Distribution of soil used

III. EXPERIMENTAL DATA COLLECTED & ANALYSIS

The accompanying test information ie. OMC, MDD and CBR under doused state will be further gathered for the following:.

- 1) Soil utilized.
- 2) Soil blended for coal powder in distinctive proportions.
- 3) Coal ash-Soil mixture fortified for bambusa vulgaris put at 1/3 What's more 2/3 from highest priority on mould.

For this, primary OMC What's more MDD were found to each case. Thereafter, for CBR determination, those testing specimens were ready with best possible compaction Furthermore dampness content equivalent to OMC (using

standard Proctor compaction test). The data collected is discussed in the following paragraphs:

A. Soil Used

The experimental values for OMC and MDD for the soil (CL-ML) obtained by Standard Proctor Test are 15.7% and 1.75 gm/cc respectively. The CBR value obtained is 3.65.

B. Soil added with Coal Ash

The trial information is after that gathered to OMC, MDD Furthermore CBR qualities to soil displaced with coal powder included in distinctive proportions.i.e 2% should 10% (by wt.) of soil. Fig-2 indicates the OMC variety to coal ash-soil blend. The Figure-2 demonstrates decrease in OMC till 10% Furthermore further reinstatement from claiming soil towards coal powder till 40% reveals to an gradual increment On OMC esteem.

MDD acquired from coal powder remains blend is shows in fig: 3 It can be effectively observed that up to 10% coal cinder supplanted, MDD is marginally expanding, then it decreases with further increment in percent of coal slag supplanted with soil till 40%. In this way, it appears when all is said in done a complementary connection amongst OMC and MDD with increment in supplanted coal ash in soil.

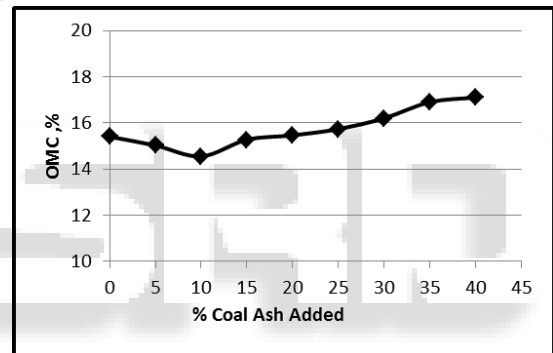


Fig. 2: Variation of OMC with different percentage of Soil-Coal Ash Mixture

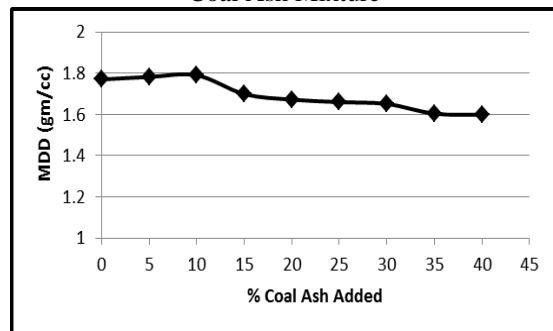


Fig. 3: Variation of MDD with different percentage of Soil-Coal Ash Mixture

Figure-4 demonstrates CBR qualities got tentatively to coal powder – soil mix. It could be unmistakably seen starting with the figure, that coal powder –soil mixture attains most extreme CBR quality for 6.30 during 10% powder included previously, soil What's more it afterward lessens for expansion in percent coal powder displaced.

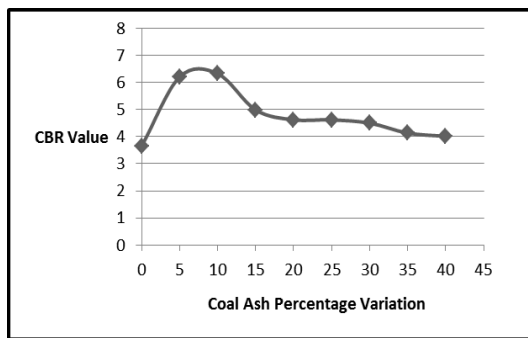


Fig. 4: Variation of CBR of Soil-Coal Ash Mixture

Hence, it is decided to further conduct CBR test for the soil sample with 10% coal ash reinforced with *bambusa vulgaris* square grid form with aperture dimensions of 3cm x 3cm.

C. Coal Ash-Soil mix reinforced with *Bambusa Vulgaris*

The trial estimation of CBR is additionally acquired for soil supplanted with 10% coal slag having most extreme CBR esteem as examined above and fortified with *bambusa vulgaris* of square network frame with opening size 3cm x 3cm put at 1/3 and 2/3 positions from top of the form. The CBR esteem for this case is observed to be 9.6.

Figure -5, demonstrates a similar investigation of increment in quality of CBR attributes for every one of the blends as talked about above. It can be seen from figure under splashed conditions.

- 1) The CBR esteem acquired from soil is 3.60 and for coal fiery debris soil blend at 10% is 6.30 i. e. an expansion of 173% when contrasted with unique soil.
- 2) Facilitate, when coal fiery remains – soil blend strengthened with *bambusa vulgaris* in matrix type of gap size 3 cm x 3 cm, put at 1/3 and 2/3 from top of shape, the CBR esteem is 9.6 i.e. an expansion of 263% regarding virgin soil. The relative increment in CBR esteem for this is around 183% regarding coal powder – soil blend.

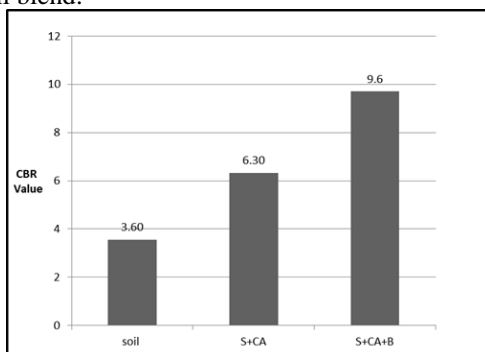


Fig. 5: Comparative CBR values for coal ash Soil mix with reinforced *Bambusa Vulgaris*

IV. CONCLUDING REMARKS

In view of the above test information gathered and examination accomplished for soil (CL-ML), coal ash –soil blend (0 to 40%) and this strengthened with *Bambusa Vulgaris* of 3cm x3 cm gap measure put at 1/3 and 2/3 from top of shape, the accompanying conclusions might be drawn:

- [1] For Coal slag Soil blend with various extents, complementary connection amongst OMC and MDD exists with increment in supplanted coal powder in soil.

- [2] The most extreme CBR esteem for Coal fiery remains – Soil blend test is found when 10% soil is supplanted by coal powder. This chose test is additionally strengthened with *bambusa vulgaris* square network shape with gap measurements of 3cm x 3cm. For this case, the CBR esteem is 9.6 i.e. an expansion of 263% as for virgin soil and relative increment in CBR esteem is around 183% regarding coal fiery debris – soil blend.

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