A STUDY OF EFFECT ON GRID BAMBUSA VALGARIS ON SILTY SOIL

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ABSTRACT

In this paper we are presenting a study of effect on grid bambusa valgaris on silty soil. In India coal/lignite based thermal power plants account for more than 55% of the electricity installed capacity and 65% of electricity generation. The ash content of the coal used at the thermal power plants ranges from 30-40%, with the average ash content around 38%. Since low ash, high grade coal is reserved for metallurgical industries. Fly ash is a very fine material produced by burning of pulverized coal in a thermal power plan. In consequence of the consumers choosing industrialized products, among other effects, activities are suppressed in rural areas or even in small towns, and renewable materials are wasted and causing permanent pollution. In this sense, it becomes obvious that ecological materials satisfy such fundamental requirements, making use of agricultural by-products such as rice husk, coconut fibres, sisal and bamboo and therefore minimizing energy consumption, conserving non-renewable natural resources, reducing pollution and maintaining a healthy environment. The present study is to investigate the suitability of coal ash and bamboo with soil and check the load bearing and settlement behaviour of coal-ash material through CBR characteristics.

Keyword : - *Coal, Bamboo, Wasted, Ash, Soil etc.*

1. INTRODUCTION

World over for production of power pulverized coal fired boilers are extensively used. In India also 80% power is produced by pulverized coal fired boilers in National Thermal Power Plants. A very huge amount 200 million tons of ash is produced from thermal plants. The quality of ash varies from plant to plant and from coke to coke depending on source of supply and type combustion. Fly ash is a very fine material produced by burning of pulverized coal in a thermal power plan. Fly ash is a general name used for the residual products of combustion that rise with flue gas. Fly ash, also known as flue ash, it is one of the residues generated in combustion, and comprises the fine particles that rise with the flue gases. In an industrial context, fly ash usually refers to ash produced during combustion of coal. It is carried by the flue gas and is collected by the electrostatic precipitators or cyclones. Chemically and physically, fly ash can have many forms like C-fly ash and F-fly ash depending upon the type of fuel burned and handling methods. A typical fly ash contains a significant amount of silicon dioxide and calcium oxide, which make it frictional and abrasive. Usually, fly ash has a fine particle size distribution with most less than 100 microns. Given the fine particle size, frictonal nature and high temperature, fly ash can be a difficult material to handle reliably. Quantity does pose challenging problems, in the form of land usage, health hazards, and environmental dangers .In India coal/lignite based thermal power plants account for more than 55% of the electricity installed capacity and 65% of electricity generation. The ash content of the coal used at the thermal power plants ranges from 30-40%, with the average ash content around 38%. Since low ash, high grade coal is reserved for metallurgical industries. The thermal power plants have to use high ash, low grade coal. The thermal power plants ash generation has increased from about 40 million tonnes during 1993-94, to 120 million tons during 2005-06, and is expected to be in the range of 210 million tons per year 2012.

Table -1 Coal Ash Generation And Utilization Statistics (2012)

S.no	Country	Annual Ash Production(MT)	Ash utilization %
1.	India	112	38
2.	China	100	45
3.	U.S.A	75	65
4.	Germany	40	85
5.	U.K	15	50
6.	Australia	10	85
7.	Canada	6	75
8.	France	3	85
9.	Denmark	2	100

Of the total Solid Waste generated in India, approximately 25% isresidue from coal combustion. These residues include fly ash, bottom ash and boiler slag.The amount of CCR (coal combustion residue) released by factories and thermal power plants has been increasing throughout the world, and their disposal has become a serious problem due to the large land requirement. The best way to reduce ever increasing land acquisition problem due to unabated CCR generation is to utilize CCR after converting it into a non-hazardous material. CCR can be used economically as construction materials, structural fill materials, etc.

2. TYPES OF SOIL

The soil of India broadly classified into six major types [Figure-1]

i. Alluvial Soil
ii. Black Soil (Regur)
iii. Red Soil
iv. Laterite Soil
v. Desert Soil
vi. Mountain Soil

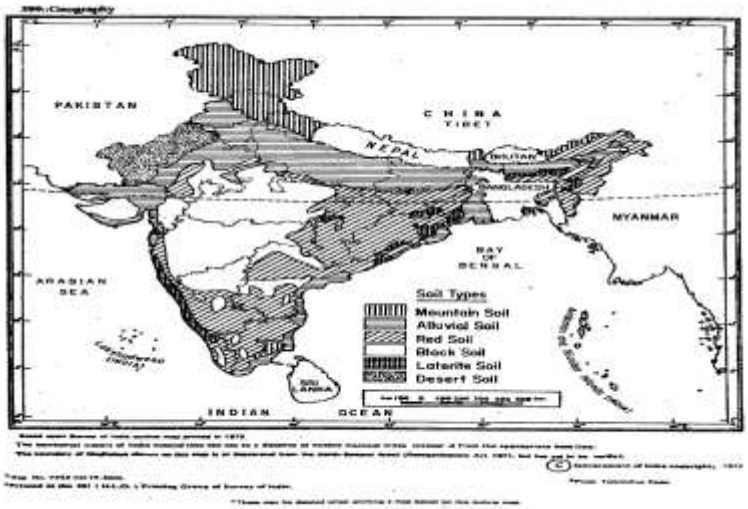

Fig - 1 Major types of soil found in India

3. SOIL WITH COAL ASH

Effect of Coal Ash in the Stabilization of Expansive Soil for the Pavement describes In this paper, laboratory tests were conducted to find the index and engineering properties of soil with addition of coal ash. Index properties of the soil include liquid limit, plastic limit, shrinkage limit, grain size analysis and specific gravity tests. Strength tests related to Unconfined Compressive Strength and CBR were also conducted on the virgin expansive soil and the expansive soil mixed with different percentages of coal ash ranging from 0% to 60% in increments of 10%. Effect of Coal Ash on Strength and CBR Properties of Lacustrine Soil" describes several civil engineering laboratory tests were conducted to study the strength gain when coal ash was mixed with local soil sample. The soil was replaced by coal ash as 10%, 20%, 30%, and 40% by weight. These soil specimens were tested for compressive strength and CBR value for 7 days of age and were compared with normal soil sample without mix. The tests indicate an improved strength and better CBR properties of soil sample when stabilized. Laboratory CBR Values of Fly Ash under Different Conditions" describes In context of the road sub grade and embankments, it can be said that fly ash is a good material for geotechnical application. Laboratory CBR values were determined for fly ash samples to compare the effects of different mode of compaction e.g. static and dynamic, different energy level moisture variations from optimum conditions.

4. REVIEW OF SOIL WITH BAMBUSA VULGARIS

Bamboo as reinforcement in structural concrete elements. The focus of this paper is to present a concise summary of the information about the range of material choices, which are locally available for producing concrete structural elements, reinforced with bamboo. In this sense, it becomes obvious that ecological materials satisfy such fundamental requirements, making use of agricultural by-products such as rice husk, coconut fibres, sisal and bamboo and therefore minimizing energy consumption, conserving non-renewable natural resources, reducing pollution and maintaining a healthy environment. The Potential Use of Bamboo as Green Material for Soft Clay Reinforcement System" This paper presents the results obtained from the monitoring of trial embankments on soft clay using Hydrostatic Profiler (settlement) and Inclinometer (lateral movement). Three embankments had been constructed and monitored; (i) Embankment on Bamboo- Geotextile Composite (BGC) reinforced, (ii) Embankment on High-Strength Geotextile (HSG) reinforced and (iii) control or unreinforced (UR) embankment, constructed without any reinforcement to the soft clay. A comparative study of Bamboo reinforced concrete beams using different stirrup materials for rural construction" This study aims at exploring ways of making the use of bamboo reinforced concrete beams simple, efficient and cost-effective for rural construction. The cheapest and most economical means of providing shear reinforcement for bamboo-reinforced beams was analysed using a performance model developed in this research. For using Coal Ash in future, it is necessary to have basic knowledge about Coal ash and Bambusa Vulgaris particularly on oriented form.

5. CBR WITH BAMBOO ONLY

- Apurture Size: 1*1
- Bamboo Thickness: 3mm
- Mould no:D
- Water Content: 20%

Table-2 CBR of Virgin Soil with Bamboo at different positions 1*1cm Apr Dimension

Penetration	**PROVING RING**			
(mm)	**kg-f**			
	CBR (depth 1/3)	**CBR(depth 2/3)**	**CBR (mid height)**	**CBR (both layers)**
0.5	4	7	6	9

1	6	10	9	12
1.5	9	13	15	16
2	11	16	19	20
2.5	14	20	22	23
3	17	23	25	29
3.5	21	28	28	33
4	24	31	30	37
4.5	27	35	33	41
5	30	39	35	45
5.5	33	43	38	49
6	36	47	41	53
6.5	40	50	44	57
7	43	53	48	60
7.5	46	56	52	63
8	49	59	55	67
8.5	52	62	59	70
9	56	65	62	73
9.5	60	68	66	76
10	63	71	70	79
10.5	67	73	74	82
11	70	76	78	85
11.5	74	79	81	89
12	78	82	84	92

Table-3 Comparison 1*1cmapr grid Bamboo with Virgin Soil

Sno	Soil %	CA %	BAMBOO APR	Distance	CBR VALUE
1	90	0	1*1	1\3	3.65
2	90	0	1*1	2\3	4.74
3	90	0	1*1	mid	3.41
4	90	0	1*1	1\3 & 2\3	5.47

6. BAMBOO AS AN ENGINEERING MATERIAL

In consequence of the consumers choosing industrialized products, among other effects, activities are suppressed in rural areas or even in small towns, and renewable materials are wasted and causing permanent pollution. In this sense, it becomes obvious that ecological materials satisfy such fundamental requirements, making use of agricultural by-products such as rice husk, coconut fibres, sisal and bamboo and therefore minimizing energy consumption, conserving non-renewable natural resources, reducing pollution and maintaining a healthy environment. Bamboo is one material, which will have a tremendous economic advantage, as it reaches its full

growth in just a few months and reaches its maximum mechanical resistance in just few years. Moreover, it exists in abundance in-tropical and subtropical regions of the globe. The energy necessary to produce $1m^3$ per unit stress projected in practice for materials commonly used in civil construction, such as steel or concrete, has been compared with that of bamboo. It was found that for steel it is necessary to spend 50 times more energy than for bamboo. The tensile strength of bamboo is relatively high and can reach 370MPa. This makes bamboo an attractive alternative to steel in tensile loading applications. Bambusa vulgaris is common in Brazil and presents a high concentration of starch in its composition, attracting insects that reduce its durability for structural applications. When bamboo particles are incorporated in the soil matrix as grid reinforcement with preservation, insects do not have access to the particles Bamboo culms are formed by approximately 50% of fibre tissue, which are responsible for the mechanical strength of the culms. Bamboo particles have been studied for production of composites, oriented strand board, bamboo-cement and, however there is a lack of research about their use as reinforcement. The wide availability of bamboo plants, their rapid growth and lightness are favourable characteristics for use in construction. However, contact with water may increase bamboo fibber volume, due to its hygroscopic characteristics, and accelerate bio-degradation.Properly formulated; however, they can also be used in exposed applications. Bamboo is available in a wide range of forms and materials, each to suit a slightly different end use. These products have a wide range of applications and are currently used in many civil, geotechnical, transportation, geo-environmental, hydraulic, and private development applications including roads, airfields, railroads and embankments, erosion control, sediment control.

7. CONCLUSIONS

In this paper we are presenting a study of effect on grid bambusa valgaris on silty soil In India. We are also showing in this paper CBR and types of soil etc. It was found that for steel it is necessary to spend 50 times more energy than for bamboo. Bamboo as reinforcement in structural concrete elements. The focus of this paper is to present a concise summary of the information about the range of material choices, which are locally available for producing concrete structural elements, reinforced with bamboo. The Potential Use of Bamboo as Green Material for Soft Clay Reinforcement System" This paper presents the results obtained from the monitoring of trial embankments on soft clay using Hydrostatic Profiler (settlement) and Inclinometer (lateral movement). Three embankments had been constructed and monitored; (i) Embankment on Bamboo- Geotextile Composite (BGC) reinforced, (ii) Embankment on High-Strength Geotextile (HSG) reinforced and (iii) control or unreinforced (UR) embankment, constructed without any reinforcement to the soft clay. Effect of Coal Ash in the Stabilization of Expansive Soil for the Pavement describes in this paper, laboratory tests were conducted to find the index and engineering properties of soil with addition of coal ash. Index properties of the soil include liquid limit, plastic limit, shrinkage limit, grain size analysis and specific gravity tests.

8. REFERENCES

[1]. www.google.co.in
[2]. Ranjan das thesis on ―Geo-Engineering Properties of Fly Ash‖
[3]. Soil Mechanics and Foundation Engineering‖ by Dr. K R. Arora.
[4]. Land and Soil Resources in India‖ wikipedia soil resources.
[5]. Md.Ghazali, Prof. O.P Kaushal paper ―Characteristics of Fly Ash from Thermal Power Plants and its Management along with Settling Pond Design
[6]. Kamal Khetarpal, Bharat BhushanJindal (2015) paper entitled ―Effect of Fly Ash on CBR Value of Sandy Soil‖ presents in SSRG International Journal of Civil Engineering (SSRG-IJCE) – EFES April2015. In this paper, California Bearing Ratio (CBR) test has been carried out on sandy soil samples mixed with varying percentage of fly ash in the laboratory.
[7]. BIS code for Bamboo Structure entitled‖ Structural Design Using Bamboo‖ published in November 2009.
[8]. MdAsaduzzaman, Muhammad Iftiarul Islam (2014) paper entitled ―Soil Improvement By Using Bamboo Reinforcement‖ presents in American Journal of Engineering Research (AJER) e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-03, Issue-08, pp-362-368.
[9] Muxing Ding (Aug, 2015) Presents ―Exploring The Use ofBamboo Reinforced Rubberized Concrete (Brrc) As a Sustainable Standard System
[10]. www.wikipedia.com