



# REVIEW ON STABILIZATION OF BLACK COTTON SOIL BY USING GROUNDNUT SHELL ASH

Shriyanka Prajapat<sup>1</sup>, Permanand Meena<sup>2</sup>, C.D.Prasad<sup>3</sup>

<sup>1,2</sup>M.tech Scholar, <sup>3</sup>Associate Professor, Civil Engineering Department,  
UCE, Rajasthan Technical University, Kota, Rajasthan (India)

## ABSTRACT

Groundnut shell fiery remains is an agrarian waste item gotten from the processing of groundnut. Osinubi, K.J.(1997). 'Soil adjustment utilizing phosphatic waste.'4th local meeting on geotechnical engineering, GEOTROPIKA'97, johon bahru, Malaysia, 11-12 November, 225-244. The unconfined compressive strength (UCS) at 7 days is lower than the 1034.25KN/m<sup>2</sup> assessment measure suggested by TRRL(1977) for sufficient adjustment. The developing expense of conventional settling specialists and the requirement for the practical use of modern and rural waste for gainful building purposes has provoked an examination concerning the balancing out capability of groundnut shell ash (GSA) in exceedingly far reaching mud soil (black cotton soil). The need to cut down the expense of waste transfer and the developing expense of soil stabilizers has lead to serious worldwide research towards monetary use of squanders for designing purposes.

**keywords:** Black Cotton soil, GSA, engineering properties, atterberg's limit, California bearing ratio.

## I INTRODUCTION

Groundnut Shell Ash (GSA) is a rural waste item gotten from the processing of groundnut. Groundnuts are found widely in the Kota (303.67 Area, Production 481.33, Cumulative % = 99.9) where they are developed. Amid and after the collect of groundnut, the shells are viewed as waste which when aggregated in extensive amounts in a specific region will establish a natural risk. In this way, the use of GSA as a conceivable stabilizer will go far in diminishing the expense of adjustment of the lacking soil and furthermore reduce the natural issue related with the amassing of the GSA in a huge amount in a specific area. The utilization of locally accessible added substances (like Groundnut Shell Ash – GSA) for soil adjustment helps condition from various perspectives, for example, legitimate transfer and the executives of squanders. As waste ill-advised transfer and the executives dependably lead to troublesome results on natural environment which as a rule prompts infections. Expansive soils cause more damage to structures than any other natural hazard including earthquakes and floods (Jones and Holtz, 1973). In India nearly about 16-20% of land is covered by expansive soil deposits.

## II. LITERATURE REVIEW

To understand these engineering properties of soil, knowledge of major factors and parameters affecting it are required. According, this literature review will have a momentous spotlight on black cotton soil (BCS).



**Jones and Holtz, (1973)** Analyzed ,The soil cause more damage to structure, particularly light building and pavement, than any other natural hazard, including earthquake and floods.

**Chen, (1975)** Showed that the expansive soils are normally encountered in foundation engineering design for highways, embankments, retaining walls, backfills etc.

**Alabadian et al., (2005)** Developed on Groundnut shell ash has been used in concrete as a partial replacement material for cement with a measure of success achieved.

**Recent research work** Osinubi,(1997); Osinubi, (2000a,b); Cokca, (2001); Medjo and Riskowski, (2004); (2000a,b); Moses, (2008).

**III Materials and test included :**Materials used in this investigation

are: 1. Black cotton soil,

2. Ground nut shell ash

**3.1 Black cotton soil:-**"Expansive soil is regularly known as Black cotton soil as a result of their shading and their appropriateness for developing cotton." It begins swell too much because of increament in moisture content. Its common properties are listed below:

**Table 1 Properties of Black cotton soil**

Moisture content		26.04
Liquid limit		55%
Plastic limit		16.92%
Plasticity index		38.08%
Linear shrinkage		35.01%
pH		7.2
Colour		Greyish black
CBR unsoaked		26.02
CBR soaked		1.43

**3.2 Groundnut shell ash:-** Groundnut or shelled nut is generally called the poor man's nut. Today it is an essential oil seed and sustenance edit. The plant name for groundnut, 'Arachis hypogea Linn', is gotten from two Greek words, 'Arachis meaning a vegetable and hypogea importance subterranean, alluding to the arrangement of units in the dirt. It is commonly dispersed in the tropical, sub-tropical and warm calm zones. Groundnuts are not just wealthy in proteins which are effectively absorbable and thusly, a higher natural esteem, but at the same time are wealthy in B-complex nutrients.

**Table-2: Composition (%) of Groundnut shell ash relative to ordinary Portland cement (O.P.C)**

oxide	Groundnut Shell ash(%)	OPC(%)
CaO	14.9	63
SiO <sub>2</sub>	26.2	20
Al <sub>2</sub> O <sub>3</sub>	-	6
Fe <sub>2</sub> O <sub>3</sub>	7.3	3
Mn <sub>2</sub> O <sub>3</sub>	-	-
Na <sub>2</sub> O+	-	1
K <sub>2</sub> O		
K <sub>2</sub> O	41.74	-
TiO <sub>2</sub>	1.23	2

After Czernin (1962) vol.17 [2012]

#### IV. TEST INCLUDED:

**i.) Atterberg's limit test:-** This lab is performed to decide the plastic and fluid breaking points of a fine-grained soil. As far as possible (LL) is self-assertively characterized as the water content, in percent, at which a piece of soil in a standard container and cut by a notch of standard measurements will stream together at the base of the score for a separation of 13 mm (1/2 in.) when exposed to 25 stuns from the glass being dropped 10 mm in a standard fluid limit mechanical assembly worked at a rate of two stuns every second. As far as possible (PL) is the water content, in percent, at which a dirt can never again be disfigured by folding into 3.2 mm (1/8 in.) breadth strings without disintegrating.

**ii.) Free swell test:-** The differential free swell record an incentive for the last ideal blend diminished to an estimation of 18% for example it lessens by 68.96%. Additionally, according to Indian standard, the level of the extensiveness of dark cotton soil is high.

**iii.) Modified proctor test:-** The graphical relationship of the dry density to moisture content is then plotted to establish the compaction curve. The maximum dry density is finally obtained from the peak point of the compaction curve and its corresponding moisture content, also known as the optimum moisture content.

**Experimental result:-** Liquid Limit: The liquid limit (LL) is often conceptually defined as the water content at which the behaviour of a clayey soil changes from plastic to liquid.

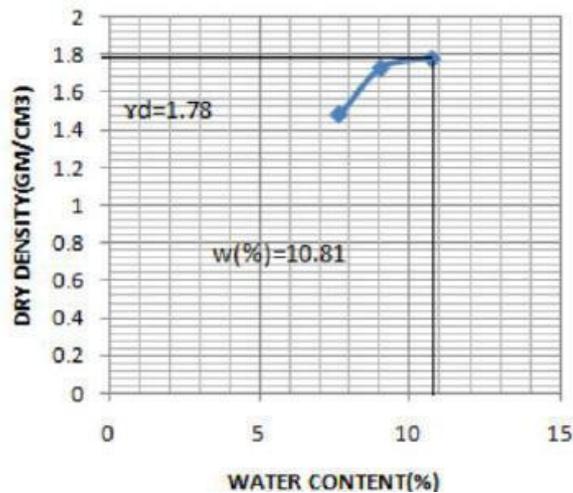
Plastic Limit: The plastic limit (PL) is often defined as the water content at which the behaviour of the clayey soil changes from liquid to plastic

10% sample:-



TEST CONDUCTED	SOIL	GROUNDNUT
LIQUID LIMIT	68	47.51
PLASTIC LIMIT	37.3	40.95
PLASTICITY INDEX	30.7	6.55

Modified proctor result:-



### Strength characteristic

**Unconfined compressive strength:-**The pick 7 days UCS esteem for the SP vitality level is 455kN/m<sup>2</sup> at 4% GSA substance. This esteem missed the mark regarding 1710 kN/m<sup>2</sup> determined by TRRL (1977) as basis for satisfactory adjustment utilizing OPC. The decline in quality at higher groundnut shell fiery debris content was because of inadequate water to convey the pozzolanic response to culmination.

**California bearing ratio:-**For the splashed condition the pinnacle CBR esteems got was at 6 % and 2% GSA substance with a CBR estimation of 4.2 % and 2.3% for SP and was compactive exertion separately.

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### V. CONCLUSION

It very well may be presumed that the by the decline in versatility list and increment in dry thickness enhances the bearing limit of clayey soil. The enhanced PI esteem is because of expansion of groundnut shell cinder as



admixtures to the BC soil. It additionally lessens the water driven conductivity of BC soil. There will be no need of seepage layer after treatment of BC soil. In mix, the admixtures are helpful for lower versatility and higher sediment content soils.

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