Retraction

Retraction: Performance Analysis of Jute Fiber As A Micro Reinforcement (IOP Conf. Ser.: Mater. Sci. Eng. 1145 012064)

Published 23 February 2022

This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

Retraction published: 23 February 2022
Performance Analysis of Jute Fiber As A Micro Reinforcement

Badavath Naveen¹, J Logeshwari²

¹PG Student, Civil department, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, India 600062.

²Assistant professor, Civil department, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, India 600062.
naveennani83672@gmail.com

Abstract. Soil is a base of the construction, which serves to upholds the design from underneath and to appropriates the heap successfully. Creating strength of sub-level has consistently been a huge perspective in highway and geotechnical designing fields. Clay soil has designing properties like low bearing limit and high compressibility. The improvement of soil properties is fundamental. There are numerous stabilizers to improve the strength of soil. In our daily life, it can be seen that the underlying foundations of vegetation (roots) balance out the close surface soil that has low shear strength, basically due to low compelling pressure, on both level and inclining grounds. To improve the strength of subgrade soil, the utilization of characteristic Jute fiber is a high-level technique and they are modest, locally accessible, and biodegradable. This current examination utilizes jute fiber as a stabilizer. Based on experimental data, it is determined that the unconfined compressive strength (UCC) strength of soil increases with adding jute and maximum dry density (MDD) of soil decrease and optimum moisture content (OMC) of the soil increases. It is found that jute fiber mixed with soil layer-wise gives better strength as compared to core and random mixing.

Keywords: Soil stabilization, Natural jute fiber, UCC strength, Maximum dry density, Optimum moisture content.

1. Introduction

For Land-Based designs, establishment is vital and must be solid to help the whole construction. All together for the establishment to be solid, the soil around it assumes a basic part. Along these lines, work with soils need to have appropriate information about the properties and elements which influence their conduct [1-5]. The properties of soil adjustment help to accomplish the necessary properties in the soil required for the development work. From the start of development work, the need of improving soil properties has gone to the light. Old Civilizations of the Chinese, Romans, and Incas used different strategies to improve soil strength, and so forth, a portion of these techniques was successful to the point that their structures streets actually exist. In India, the advanced time of soil adjustment started in the mid-1970s, with an overall lack of petrol and totals, it got vital for the designers to see intends to improve soil other than supplanting the helpless soil at the structure site. Soil Stabilization was utilized yet because of the utilization of outdated strategies and furthermore because of the nonappearance of appropriate methods, soil adjustment lost kindness [6]. Lately, with...
the increment in the interest for the framework, crude materials, and fuel, soil adjustment has begun to take another shape. With the accessibility of better exploration, materials, and gear, it is arising as a famous and savvy technique for soil improvement. At the point when the development work is executed on the clayey soil, it shows different issues to maintain a strategic distance from those issues in the event that we supplant this kind of soil, it turns out to be exorbitant. So, to expand the limit of clayey soil we add unique kind of stabilizers subsequently makes the expense less regardless of supplanting such sorts of soils, we added jute and came to realize that the soil properties have been changed. Asphalt configuration depends on the reason that base indicated underlying quality will be accomplished for each layer of material in the instalment framework [7-10]. Each layer should oppose shearing, maintain a strategic distance from extreme redirections that cause exhaustion breaking inside the layer or in overlaying layers, and forestall unreasonable lasting distortion through densification [11-12]. As the nature of a soil layer is expanded, the capacity of that layer to appropriate the heap over a more prominent zone is by and largely expanded so decrease for necessary thickness of soil and surface layers might be allowed.

2. Literature Review

The adjustment of soils has been recognized before the Christian time started and performed for centuries. Numerous antiquated societies Chinese, Romans, and Incas used different procedures to strengthen soil appropriateness some of were powerful to the point that large numbers of the structures and streets they developed actually exist today, and some areas yet being used. The Romans, Mesopotamians independently found that was conceivable to strengthen the capacity of pathways to convey traffic by blending frail soils in with settling specialist like pounded limestone or calcium.

[13] Conducted a Study on Locally accessible Soil Stabilized with Jute Fiber. Blended Jute Fiber in with Red Soil just as with Black Cotton Soil. The Percentage of Jute Fiber for each dirt is taken as 0.5%, 1%, and 1.5%. Standard Proctor Test Conducted to decide Optimum water Content and Maximum Dry Density. By result reasoned that by expanding Jute Fiber Content Percentage dry density diminishes and optimum water content increments. Jute additionally expands the Bearing Capacity of Soil. [14], Studied impact of Jute Fiber Reinforcement on CBR properties of sweeping soil with support of jute layers between soil. Metal strips, Synthetic Geotextiles, Geogrid sheets, regular geotextiles, arbitrarily appropriated, engineered, and common strands are utilized as supporting materials to soil. Jute packs were cut fit as a fiddle with a normal of thickness 2mm and about 0.4 % and 0.8 % by weight of soil for 2-Layer and 4-Layer Jute Reinforcement. It was seen that incorporation of jute Geotextile layer into soil builds the unconfined compressive strength and CBR worth and this increment is most extreme relating to 4 layers of jute geotextile layers. [15], Describes idea of utilizing discrete haphazardly circulated filaments in soil. In this both regular (Coir, sisal, Palm, Jute and so forth) and manufactured strands (PP, PE, PET, Nylon, Glass and steel) that are utilized to support soil were researched. Strands of 0.2-4% by weight are added and blended into brace, Clay, Sand or lime. It inferred, Strength of fiber supported soil increments with increment in perspective proportion, fiber content, fiber modulus and soil fiber surface cooperation. Direct shear test, Unconfined Compression Tests and Triaxial Compression Tests have shown that shear strength is expanded and post-top strength misfortune is diminished when strands are blended in with soil. [16], A trial study was led on Locally accessible soil built up with Jute fiber. In this investigation soil tests were set up at its greatest dry thickness comparing to ideal dampness content in CBR shape with and without Reinforcement. The level of jute fiber by dry load of soil was taken as 0.3%, 0.6%, 0.9% and 1.2%. The Length of Fiber was taken as 15mm and 30mm and two widths (4mm and 8mm) were considered for every fiber Length. California bearing proportion Test and Modified Proctor Test was led. It is presumed that Jute fiber Reinforcement decreases Maximum Dry Density and expands Optimum Moisture content. The CBR estimation of soil increments when viewpoint proportion diminishes for same level of Jute fiber. [17], The goal of the examination introduced are to research systems for improving the strongest attributes of broad soil and to determine jute strands supporting
impacts comparable to a few significant boundaries known as to control the viability of fiber-built up extensive soil. The investigation presents conversation identified with fiber content, fiber length, fiber direction, water substance, and dry thickness. Test investigation of direct shear and triaxial pressure tests are conveyed. They presumed that the immediate shear strength, union, strength proportion (Rf) increments with expanding fiber content. The interior contact point remains almost unaltered for different fiber content and their increment in shear strength with an increment in fiber length was noticed

**Summary of literature:** From the writing, realize that this investigation assesses the capability of utilizing haphazardly circulated Jute filaments to develop shear strength of soil. In light of Direct Shear test, Triaxial Compression Test, and Standard Proctor Test the examination likewise looks at the impacts and instruments of jute fiber Content, Length, Orientation, moisture content, Dry Density on the commitment of Fiber for fortifying soil.

**3. Methodology**

In this investigation, the filaments were cut into layer of 1 cm and were blended in with soils at 3 rate incorporation of jute by soil weight to build up them. The water content during test arrangement was the ideal dampness substance of the dirt. The example arranged by consideration of jute will be layered insightful, centre blending and haphazardly. For each example, Unconfined pressure test and standard delegate test were directed according to IS-2720 1985.

**3.1 Collection of materials:**

**3.1.1 Jute**

Jute fiber used in this work is collected from the Guntur district. The fiber was taken from jute plant. Mechanical tensile properties of jute fiber is determined in laboratory. Figure 1 shows the jute fiber used for reinforcing soil in this work and table 1 shows characteristics of jute fiber.

Jute is a long, fragile, shimmering vegetable fiber that can turn into coarse, strong strings. It made from plants in assortment Corchorus, which was masterminded with family Tiliaceae even more actually with Malvaceae, and has now renamed as having a spot with the family Sparmanniaceae. The fundamental wellspring of the fiber is Corchorusolitorius, notwithstanding, is seen as inferior contrasted with Corchoruscapsularis. Jute the name of a plant or fiber that can be used to make burlap, Hessian, or gunny texture. Jute is conceivably most moderate standard fiber and it is second to cotton in the entirety conveyed a grouping of vocations of vegetable strands. Jute strands are made fundamentally out of the plant materials cellulose and lignin. It falls into the bast fiber class (fiber assembled from bast, the phloem of the plant, to a great extent called the skin) close by kenaf, current hemp, flax (material), ramie, etc the cutting-edge senior jute fiber

| Parameters     | Values |
|----------------|--------|
| Length of jute fiber | 10 mm  |
| Diameter of fiber     | 1 mm   |
| Color               | Brown  |
| Specific gravity     | 1.3    |
| Tensile strength     | 91 Mpa |
The soil example utilized in this work was gathered from the Chennai area. The different list characteristics and compaction properties (most extreme dry thickness and ideal dampness content) of soil were resolved in the research centre as demonstrated in table 2. As far as possible and plastic restriction of the dirt example was acted as per (ASTM-D4318).

Table 2. Characteristics of soil

| Characteristics          | Value            |
|--------------------------|------------------|
| Maximum dry density      | 16.78 kN/m³      |
| Optimum water content    | 13%              |
| Plastic limit            | 26%              |
| Liquid limit             | 50%              |
| Plasticity index         | 24%              |
| Type of soil             | High plasticity clay |
| Specific gravity         | 2.65             |
| Shrinkage limit          | 11.69%           |
3.2 Sample preparation

All tube-shaped examples were set up with the greatest dry thickness and ideal water content. To plan tests initially the essential ideal water content was resolved and blended in with soil. The soil and the fiber were partitioned into four sections and compacted in the shape. jute fiber bundles were cut in the necessary length of 10mm and the distance across of jute fiber is 1mm. The test was directed at a fiber substance of 3%. Fiber content is communicated as the proportion of the heaviness of fiber to the heaviness of dry soil. Blending of jute with soil test by three diverse blending layer by layer, irregular, centre. Figure 2 shows the sample without jute, Figure 3 shows the sample with jute layer blending. Figure 4 shows the sample with irregular blending. Figure 5 shows the sample with centre blending. Figure 6 shows the sample with core mixing.

Figure 2. UCC sample without jute

Figure 3. UCC sample after failure

Figure 4. UCC sample with jute layer mixing

Figure 5. UCC sample with jute random mixing
4. Results and discussion.

Liquid limit test result: liquid limit of soil sample is determined in laboratory using Casagrande apparatus and plotted and shown in below Figure 7. Figure 8 shows the plasticity chart. Figure 9 shows the procotor comparison test.

Figure 6. UCC sample with jute core mixing

Figure 7. Liquid limit graph
Figure 8. Plasticity chart

Standard proctor test results:

Figure 9. Proctor compaction test graph

Results of proctor compaction test for the sample of adding 3% jute maximum dry density decreases and development in optimum moisture content and it shown in below Figure 10.
Figure 10. Standard proctor test with 3% jute graph

Figure 11. Difference in Standard proctor test with and without jute graph

From the above Figure 11 it shows that adding increases moisture content and reduces maximum dry density. Soil properties are developed when adding of jute fiber.

Unconfined compressive strength: It is seen that soil with no support, nearly can take an extremely less measure of burden. Be that as it may, when the fiber is blended in with soil the soil can take more load, on the grounds that the fiber goes about as support. It is seen that UCC test estimations of the fiber-built-up example higher than without fiber test. In examination, example made with 3% jute fiber had the option take more stress. Jute is blended in with the soil by layer-wise, arbitrary, and centre. The example arranged with jute by blending layer-wise will invigorate more when contrasted with others. Figure 12 to Figure 17 shows the UCC test results with a different blending of jute to the soil.
Figure 12. UCC test without jute graph

Figure 13. UCC test with jute layer wise mixing graph

Figure 14. UCC test with jute random mixing graph
5. Conclusion

The outcomes from the experimental tests directed on soil example with and without jute are examined and finished up underneath.

➢ Adding of jute fiber to soil there is the improvement of strength qualities in soil.
➢ It is seen that considerations of jute fiber, lesser dry density 16.78 kN/m$^3$ to 15.8 kN/m$^3$ and increment ideal water content 13% to 16%.
➢ In the UC strength test, because of expansion of the jute unconfined compressive strength esteems increment.
➢ In UCC test, adding of jute to soil specimen by Layer wise gives more strength as compared to randomly mixing and core mixing.

References:
[1] Zaidi, A., Khan, M.K. and Hussain, S.M.A., (2016). Enhancement in Engineering Properties of Soil Reinforced with Jute Fiber. Int. J. Emerg. Technol. Eng. Res. 4(4), pp 96-98.
[2] Singh H.P, M. Bagra, august (2013). Improvement in CBR value of soil reinforced with jute fiber. International Journal of Innovative Research in Science, Engineering and Technology. 2(8), August 2013, pp 3447-3452.
[3] Bairiki Harshita, Yadav R.K and Jain R, (2014). Effect of Jute Fiber on Engineering characteristics of Black Cotton Soil. International Journal of Engineering Sciences & Research Technology, pp 705-707.
[4] Jagannatha, G.M., A.M. Harihar, Akash M.R, Ajit P.A, A.D. Badiger (2019), Stabilization of Soil by use of Geo-Jute as Soil Stabilizer, International Journal for Scientific Research & Development, 7(03).
[5] Wang, Y.X., Guo, P.P., Ren, W.X., Yuan, B.X., Yuan, H.P., Zhao, Y.L., Shan, S.B. and Cao, P., (2017). Laboratory investigation on strength characteristics of expansive soil treated with jute fiber reinforcement, International Journal of Geomechanics, 17(11), pp 0401-7101.
[6] Kantha K.R. and Deepthi, K., (2019). An Experimental Study on Stabilization of Loose Soil by Using Jute Fiber, International journal of trend in scientific research and development, 3, issue 5.
[7] Aggarwal, P. and Sharma, B., (2011). Application of jute fiber in the improvement of subgrade characteristics. International journal on transportation and urban development, 1(1), PP 56-58.
[8] Kumar, S., Sahu, A.K. and Naval, S., (2020). Influence of Jute Fibre on CBR Value of Expansive Soil. Civil Engineering Journal. 6(6), pp.1180-1194.
[9] Excel Sultana, T., Islam, M. and Rahman, M., (2017). Improvement of Compressive Strength of Soil by Using Jute Fiber Waste. In Key, Engineering Materials, 751, pp 785-789.
[10] Kulhar, K.S. and Raisinghani, M., (2017). Shear Strength Performance of Sandy Soil Reinforced with Jute Fiber. Journal of Basic and Applied Engineering Research, JBAER, 4(7), pp 624-629.
[11] Kumar, P. and Mir, F.A., (2017). Improvement in Subgrade Characteristics of Soil Reinforced with Jute Fiber. International Journal of Innovative Research in Science, Engineering and Technology, 6(2).
[12] Ramakrishnan, R., Karthik, V., Shruthi, M.R. and Sharma, A., (2018), July. Soil reinforcement and slope stabilization using natural jute fibres. In Civil Infrastructures Confronting Severe Weathers and Climate Changes Conference, pp 130-143.
[13] Haldorai, A. Ramu, and S. Murugan, Social Aware Cognitive Radio Networks, Social Network Analytics for Contemporary Business Organizations, pp. 188–202. doi:10.4018/978-1-5225-5097-6.ch010.
[14] R. Arulmurugan and H. Anandakumar, Region-based seed point cell segmentation and detection for biomedical image analysis, International Journal of Biomedical Engineering and Technology, vol. 27, no. 4, p. 273, 2018.
[15] Wang, Y.X., Guo, P.P., Ren, W.X., Yuan, B.X., Yuan, H.P., Zhao, Y.L., Shan, S.B. and Cao, P., (2017). Laboratory investigation on strength characteristics of expansive soil treated with jute fiber reinforcement. International Journal of Geomechanics, 17(11), pp 0401-7101.
[16] Zaidi, A., Khan, M.K. and Hussain, S.M.A., (2016). Enhancement in Engineering Properties of Soil Reinforced with Jute Fiber. Int. J. Emerge. Technol. Eng. Res, 4(4), pp 96-98.

[17] Shaia, H., Aodah, H.H. and AL-Hameidawi, B.H., (2016). Improvement of Sub-grade Soil using Natural Jute Fiber Sheet at Various Layers. Journal of Kerbela university, 14(3), pp 170-177.

Retracted