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Department of Civil Engineering

Research Activities of the Faculty Members

Year	No. of SCOPUS Publications	No. of Conference Proceedings	No. Of UGC-CARE Publications	No. of Text Books Published
2023-2024	6	2	0	3
2022-2023	3	2	1	3
2021-2022	0	2	2	0
2020-2021	1	2	1	0
Total	10	8	4	6

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List of Publications

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
2023-24						
1.	Dr. M. Chittaranjan	Ecofriendly, Low Cost Biodegradation of Plastics-Research Study	European chemical bulletin	2023	2063-5346	Scopus
2.	Dr. M. Chittaranjan/V R Sai Devayani	Experimental Investigations on Self Compacting Concrete Using Polymeric Waste	Corrosion and Protection	2023	1005-748X	Scopus
3.	Dr. K. Praveen	Assessment of Environmental flow by using Hydrological Methods in the Gandak River, Bihar- A Case Study	Indian Journal of Environmental Protection	Feb-2024	0253-7141	Scopus
4.	G. Anusha	Experimental Investigations on Self Compacting Gangue based Pavement Concrete	European chemical bulletin	Nov 2023	2063-5346	Scopus
5.	G. Anusha	A Comprehensive Review on Mechanical and Microstructural Properties Of Geopolymer Concrete	Material Science and Technology	Jan 2024	1005-0299	Scopus

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6.	Muniswamy	Experimental Investigations On Hybrid Fiber Reinforced Self Compacting Light Weight Concrete	Material Science and Technology	Jan 2024	1005-0299	Scopus
7.	Gnana Prasanna	An Experimental Study On Effect Of Geotextile Reinforcement On Soil Subgrade For Flexible Pavements	Conference Proceedings	2023	-	-
8.	Gnana Prasanna	Improvement Of Soft Soils Using Geotextile Encased Stone Columns	Conference Proceedings	2023	-	-
9.	T Sravani/G Anusha	Construction Planning and Management	Textbook	2023	978935757894	
10.	V R Sai Devayani	Building Materials & Technologies	Textbook	Dec 2023	935850742X	
11.	A Usha	Highway Materials and Testing	Textbook	Dec 2023	9358508310	
2022-23						
1.	Dr. M Chittaranjan	Production of Probiotics from Environment	Journal of Pharmaceutical Negative Results	2023	0976-9234	Scopus

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
2.	Dr. M Chittaranjan	Experimental Investigations On Bacterial Based Self-Healing Concrete With Bacillus Subtilis	Corrosion and Protection	2023	1005-748X	Scopus
3.	Dr. K Praveen	Assessment of Meteorological Drought Indices for Monitoring Drought Condition in the Sone Command Area, Bihar, India-A case study	Journal of Survey in Fisheries Sciences	March 2023	2368-7487	Scopus
4.	Dr. M Chittaranjan	Introduction to Environmental Engineering and Science	R. K. Publishers (Textbook)	2023	978-81-19140-19-0	-
5.	Dr. M Chittaranjan	Construction Project Management	R. K. Publishers (Textbook)	2023	978-81-19140-08-04	-
6.	Dr. M Chittaranjan	Irrigation Engineering	R. K. Publishers (Textbook)	2023	978-81-19140-01-05	-
7.	G Anusha	Experimental Study on structural Behaviour of self compacting fibre reinforce concrete using HybridFibres	Emerging Research in science, Engineering & Management (Conference Proceedings)	2023	-	Proceedings
8.	G Anusha	A Simulation Approach to	Innovative Development in	2023	-	Proceedings

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
		Investigate the Impact of Crossing Pedestrians on Traffic Characteristics at Undesignated Urban Midblock Crossings	Engineering Advances (Conference Proceedings)			
9.	V Mahesh	Assessment of Groundwater Quality for drinking and Irrigation Purposes in Tirupati Town	Innovative Development in Engineering Advances (Conference Proceedings)	2023	-	Proceedings
2021-22						
1.	Dr. M. Chittaranjan	Effect of Sugarcane press mud on the Geotechnical Properties of an Expansive Soil	International Journal of Engineering Research and Applications (IJERA)	July 2021	2248-9622	UGC
2.	Dr. M. Chittaranjan	Effect of Water treatment plant sludge on the Geotechnical Properties of an Expansive Soil	International Journal of Engineering Research and Applications	June 2021	2248-9622	UGC
3.	J Harish	An Experimental Study on	Recent Trends and Innovations in Civil &Agriculture	April 2022	-	Proceedings

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
		Partial Replacement of Cement by Ferrock	Engineering			
4.	C M Prakash	An Experimental Study On Stabilization Of An Expansive Soil By Using Waste Ceramic Dust And Lime Powder	Recent Advances in Modelling and Simulation Techniques in Engineering and Sciences	2022	-	Proceedings
2020-21						
1.	Dr. M. Chittaranjan	Effect of Poly Com Admixture on Geotechnical Properties of Black Cotton Soil	International Journal of Recent Technology and Engineering	Jan 2020	2277-3878	Scopus
2.	A Usha	An Experimental Study On The Influence Of Pedestrians On Traffic	Sustainable Development And Circular Economy In Civil Engineering	Dec 2021	-	Proceedings
3.	V Mahesh	An Experimental Study on Hybrid Fiber Reinforced Concrete	Sustainable Development And Circular Economy In Civil Engineering	Dec 2021	-	Proceedings

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2023-24

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11.	A Usha	Highway Materials and Testing	Textbook	Dec 2023	9358508310	-

ECOFRIENDLY, LOW COST BIODEGRADTION OF PLASTICS- RESEARCH STUDY

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ABSTRACT

A low-cost, environmentally acceptable approach of plastic biodegradation is something that this research study intends to investigate. One of the main environmental concerns is plastic garbage, and conventional disposal techniques like landfilling and incineration have shown to be ineffective and damaging to the environment. A viable alternative to disposal is biodegradation, in which waste plastic is broken down into harmless components by microbes. The study will look into many aspects of the biodegradation process, such as temperature, moisture level, and the kind of plastic utilised. The efficiency of several microorganisms in degrading the polymers will be evaluated, and the ideal biodegradation circumstances will be found. By estimating the cost of production and contrasting it with conventional disposal options, the study will also look at the method's economic viability. This technique's potential for expansion for industrial usage will also be investigated. The results of this investigation will aid in the creation of a long-term plastic waste management strategy and assist in minimizing the negative environmental effects of plastic trash. In our research study we collected various waste materials from different sources and subjected to microbial degradation and detected waste degradation using ecofriendly methods.

Keywords: Waste; Ecofriendly; Bacteria; Fungi; Biodegradation.

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EXPERIMENTAL INVESTIGATIONS ON SELF COMPACTING CONCRETE USING POLYMERIC WASTE

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Abstract: Each year, industry and consumers fail to properly dispose of domestic appliances, which results in massive amounts of polymeric waste (PW) being produced. Therefore, there is more interest in using PW again in civil construction. A potentially effective remedy for the improper disposal of this waste is the creation of new cementitious materials, such as concrete containing PW. In this work, polymeric waste (PW) from the recycling of refrigerators was used to partially replace the coarse aggregates in self-compacting concrete (SCC). Portland cement, silica fume, sand, gravel, and superplasticizer were included in the SCC reference combination. In addition, the study divided the gravel into replacement levels of 5%, 10%, 15%, and 20% PW. The samples were examined using the following tests: electrical resistivity, spreading, viscosity, passing ability, compressive strength, tensile strength, microstructure, elastic modulus, specific gravity, and voids index. The homogeneity and viscosity of the SCC observed were sufficient and remained within the acceptable limits. The specific mass ranged from 1870 to 2260 kg/m3, the elastic modulus ranged from 34 to 14 GPa, and the electrical resistivity ranged from 319 to 420 ohm.m. The mechanical resistance was above 20 MPa. The SCC with PW can be utilized for structural purposes and heavily reinforced structures like pillars, beams, and foundation elements because to the mechanical resistance.

Keywords: concrete; mechanical properties; polymeric waste; recycled aggregates; recycled concrete aggregate;

1. Introduction

The amount of self-compacting concrete produced exceeds the rate of natural resource recovery, which created an environmental issue. Because of this, recycled components from alternate sources must be employed in concrete [1]. Electronic items play a significant role in people's

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MATERIAL SCIENCE AND TECHNOLOGY

EXPERIMENTAL INVESTIGATIONS ON HYBRID FIBER REINFORCED SELF-COMPACTING LIGHT WEIGHT CONCRETE

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Abstract: This research aims to investigate the effects of two commonly used fiber types and lightweight porous perlite aggregate on the mechanical and physical characteristics, frost durability, and microstructure of self-compacting lightweight concrete (SCLC). Tests on cubes and prismatic samples of SCLC and fiber-reinforced SCLC with varying contents ranging from 0.5 to 1% of basalt fibers (BF) and/or 0.5% of steel fibers (SF) comprised the experimental inquiry. Two different fine perlite aggregate contents—5% and 15%—were employed in this investigation. Workability in fresh state SCLCs (slump-flow and t500 values) has been completed. Numerous data were collected and analyzed regarding frost resistance, the microstructure, including the interfacial transition zone (ITZ), and compressive and flexural tensile strength in bending behavior. In comparison to SCLC without fibers, the hybrid fiber-reinforced SCLC with perlite aggregate exhibited a more ductile behavior. During a test of flexural tensile strength, fibers span fractures. Porous SCLC was effectively shielded from frost assault by BF, whereas SF was damaged.

Keywords: self-compacting concrete; basalt fibre; steel fibre; perlite; frost resistance; microstructuremechanical properties; interfacial transition zone

1. Introduction

An rising number of research on the subject [1–5] indicates that self-compacting concrete (SCC) has garnered attention in recent years. Because of its exceptional flowability and resistance to segregation, SCC may completely enclose the reinforcing parts inside the mold without experiencing mechanical compaction [4,6, 7]. Reducing the water/binder ratio, increasing the volume of cement paste, regulating the total volume of coarse-grained aggregate, regulating its maximum grain size, and applying high-quality superplasticizer with multiple admixtures modifying viscosity in order to ensure balance between formability and stability are some of the guidelines that were determined for the SCC design [6–9]. A self-compacting concrete mixture should have a workability that is sufficiently stable for transportation and concreting, a relatively low yield strength, and an average viscosity that provides the right resistance to bleeding and segregation. As there is no longer a requirement for mixing vibration, SCC has several advantages over regular concrete, including a reduction in construction time, labor, equipment utilization, and noise at building sites [8]. Additionally, SCCs with lightweight aggregates (LWA), like Pollytag, are becoming more and more common. According to Kaszyn´ska, M. and Zielin´ski, A. [10–12], LWA permits interior cure by the progressive release of water from presaturated LWA, balancing interior moisture content. Rubber granules [13], lightweight expanded clay aggregates [14], sugarcane bagasse ash [4], oil-palm-boiler clinker (OPBC)—a solid waste from the oil palm industry [15]—pumice, volcanic tuff, and diatomite, as well as recycled modified polypropylene (PP) plastic particles—are just a few of the lightweight aggregates that SCLC uses. According to Yang, S. et al., a higher plastic content results in less slump loss and an improvement in slump flow value. When plastic

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MATERIAL SCIENCE AND TECHNOLOGY

A COMPREHENSIVE REVIEW ON MECHANICAL AND MICROSTRUCTURAL PROPERTIES OF GEOPOLYMER CONCRETE

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Abstract: The most energy-intensive building material, Portland cement (PC), is thought to be responsible for 10% of global warming. It worsens climate change and global warming, both of which have detrimental effects on the ecosystem. In an effort to replace PC concrete, sustainable and green concrete is being produced. It is now essential to create a more sustainable plan and use environmentally friendly materials in place of regular concrete. several studies on geopolymer concrete—which is stronger and more durable than regular concrete—have been carried out for this reason by several researchers. A clean technical option for long-term growth, geopolymer concrete (GPC) has been created as a potential new building material to replace traditional concrete. Because it makes use of industrial wastes as its basic material, geopolymer concrete has been studied as a viable green building material that can lower CO2 emissions in recent decades. Because of its comparable strength to conventional cement concrete and its workability, GPC has shown to be beneficial for structural applications. The engineering characteristics and microstructure of GPC are covered in this review paper, which also demonstrates the material's benefits for use in building applications. The study concludes with recommendations and guidance for the academic and industrial communities. Additionally, as this literature review shows, GPC's mechanical qualities are on par with—and occasionally even superior to—those of PC concrete. Furthermore, the microstructure of GPC differs greatly from that of PC concrete and is subject to a variety of influences.

Keywords: geopolymer composites; clean technology; flexural strength; compressive strength

1 Introduction

Because of its affordability, strength, durability, and capacity to be made in any form or size, concrete is employed in the building industry globally [1–2]. It is also regarded as the most commonly used material in construction. One of the most energy-intensive construction materials used in reinforced concrete applications is PC, whose yearly production is expected to increase by 5% and reach 2.60 billion tonnes (BT) worldwide at present. Utilizing a calcination temperature of 1450 •C and inputs such as limestone, clay, and other raw materials, PC is produced by the "two grinding and one calcining" process. The Chinese cement industry uses around one billion tonnes (BT) of limestone, 180 MT of clay, 50 MT of iron powder, 100 MT of coal, and 60 B KWh of electricity every year [3]. When cement is made, a lot of carbon dioxide is emitted into the atmosphere (about one ton of CO_2 is released for every tonne of cement produced). Approximately one tonne of carbon dioxide is emitted into the atmosphere during the cement making process, resulting in extremely high levels of CO_2. As a result, it contributes around 7% of all produced CO_2 emissions. Furthermore, the expanding cement output trends worldwide. Significant CO_2 emissions are produced during the calcining of limestone and when a rotary kiln fueled by fossil fuels is used to produce high heat; this is a major problem when utilizing the PC. Using geopolymers as a partial or total cement alternative is one of the most promising solutions [5,6].

Davidovits used the name "geopolymer" in 1979 to describe a class of mineral binders with amorphous microstructure and chemical composition that are comparable to zeolites [8]. The Roman Empire formerly made use of this

Experimental Investigations on Self Compacting Gangue based Pavement Concrete

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[4]*Assistant Professor, Department of Civil Engineering, Manav Rachna International Institute of Research and Studies, Faridabad, Haryana-121004, India.*
[5]*Associate Professor, Department of Civil Engineering and Applied Mechanics, Shri G. S. Institute of Technology and Science, Indore, Madhya Pradesh-452003, India.*
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Abstract: Gangue production has expanded more quickly in recent years due to the coal mining industry's rapid growth, although its utilisation has remained comparatively low. There is a significant environmental issue as a result of the vast amount of gangue that has accumulated. In order to increase the rate at which waste gangue is utilised and to address the secondary environmental issues brought on by gangue pollution, research was done in this study on an affordable and ecologically friendly self-compacting concrete made from gangue. The moisture content of gangue and limestone were compared in this study using aggregate industrial-analysis procedures, and it was discovered that gangue has a 39% greater moisture content than limestone. The study examined the fluidity, compressive strength, splitting strength, and abrasion resistance of self-compacting gangue using orthogonal experimental techniques. The optimal replacement rate of gangue for coarse aggregate is approximately 30%, the optimal replacement rate of fly ash for cement is approximately 30%, the optimal addition of polycarboxylate superplasticizer is approximately 0.5% of the mass of cementitious materials, and the optimal rate of shear steel fibres is approximately 1% of the concrete capacity, according to this study. In addition, the interfacial transition zone (ITZ) of the aggregate-cement slurry was examined, and it was discovered that the ITZ.

Keywords: self-compacting concrete; gangue; mixing ratio; interface transition zone (ITZ)
DOI: 10.48047/ecb/2023.12.11.38

1. Introduction

Management of solid waste has long been a major worldwide issue. In a study titled Global Waste Management Outlook, published on September 6, 2015, the United Nations Environment Programme (UNEP) and the International Solid Waste Association (ISWA) urged nations to act right away to increase resource recycling. According to China's "Guidance on the Comprehensive Utilisation of Bulk Solid Waste in the 14th Five-Year Plan," which was published on March 18, 2021, the rate of complete utilisation of bulk solid waste, including coal gangue and fly ash, should be 60% [1,2]. With over 10 trillion tonnes of reserves, coal is

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IMPROVEMENT OF SOFT SOILS USING GEOTEXTILE ENCASED STONE COLUMNS

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Abstract. Soft soils are regarded as problematic soils because of their compressibility and compressive strength characteristics. Soft soils are common around lakes, ponds, and other bodies of water, making construction challenging. It has been demonstrated that using stone columns to improve the low strength soil's capacity to support loads is an effective technique. The capacity of native soft soils to provide circumferential confinement is the primary determinant of the stone column bearing capacity. In this study, a diameter of 40 mm stone columns with and a length to diameter ratio of three undergo laboratory testing. Both geotextile-encased reinforced stone columns and unreinforced stone columns were subjected to testing. The investigation of the influence of reinforcement on the soil's load-bearing characteristics via the use of vertical geotextile-encased stone columns has been contemplated. The primary aim of this study is to assess and evaluate the efficacy of geotextile wrapped stone columns, measuring 40 mm in diameter and 120 mm in length, under identical circumstances to unconfined stone columns. This evaluation will be conducted for both single and triple group column configurations. The results indicate that the stone column enhances the bearing capacity of the soft soils, and this effect is further amplified by the geotextile encasement. Additionally, the use of geotextiles has been seen to result in a reduction in lateral bulging.

Keywords: Soft soil, Geotextiles, Stone columns, Encased stone columns, Lateral bulging.

1 Introduction

Soft soils being one of the problematic soils has many disadvantageous characteristics like high settlements, less permeability, low shear strength need special attention for construction of various structures. Stone columns are much beneficial in reducing the settlements, increasing the rate of consolidation and improves the load bearing capacity of soft soil. Stone columns are now widely used for construction of heavy struc-

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AN EXPERIMENTAL STUDY ON EFFECT OF GEOTEXTILE REINFORCEMENT ON SOIL SUBGRADE FOR FLEXIBLE PAVEMENTS

Gnana Prasanna G[1, a)], Mahesh V[2, b)], Dinesh Kumar Reddy N[3, c)], Srikanth T[4, d)], Tharun Kumar Maddileti [5, e)]

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Abstract. The use of geo-synthetics, such as geotextiles, has the potential to augment the inherent engineering and geotechnical properties of subgrade soils that exhibit poor conditions. The use of geotextiles in pavement construction has many advantages, including enhanced subgrade strength and the ability to construct flexible pavements that are both efficient and cost-effective. This is achieved via the reduction of pavement thickness. The significance of this is considered crucial in the context of civil engineering endeavors. In the realm of flexible pavement system development, the significance of subgrade soils and their inherent characteristics, including permeability and strength, is well acknowledged. The study included conducting experiments to investigate the use of geo-textiles on substandard subgrade soils under varying moisture conditions. Geotechnical tests including grain size analysis, Atterberg limits, California bearing ratio test, and compaction tests, were conducted. CBR tests and UCS tests were conducted by placing the geotextiles in a singular arrangement at various depths and subjecting them to either soaked or unsoaked conditions to assess the soil's strength. The results demonstrate that the use of geosynthetic reinforcement in the soil effectively enhances the strength of the subgrade across various soil types. The optimal performance of geo-synthetics in relation to their placement inside the CBR mold was found to be at a distance of 1/3 of the mold's height from the top. This placement outperformed the alternative distances of 1/2 and 2/3 of the mold's height.

Keywords: - Geotexiles, CBR Value, UCC, Flexible Pavements

INTRODUCTION

The soil reinforcing technique is a frequently used methodology in efforts to improve the condition of degraded soil. Various reinforcing materials, including metal strips, synthetic geotextiles, geo grid sheets, geosynthetic membranes, natural geotextiles, and randomly scattered synthetic and natural fibers, are being used to enhance the stability and resilience of soil. Furthermore, the act of reinforcing the soil leads to a significant enhancement in various properties such as tensile strength, shear strength, and other relevant characteristics. Additionally, it also contributes to an improvement in the bearing capacity and overall cost-effectiveness. The presented approach offers a viable means of enhancing the subgrade, exhibiting significant potential as a cost-efficient and effective solution for a diverse range of geotechnical challenges.

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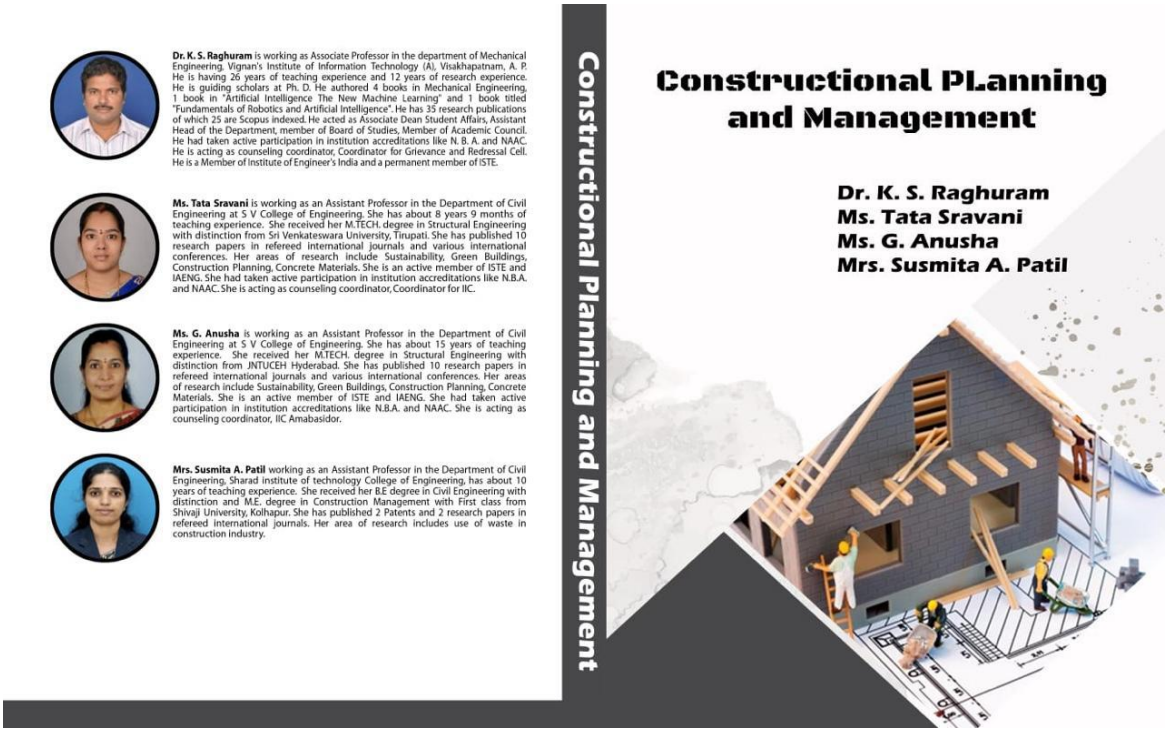

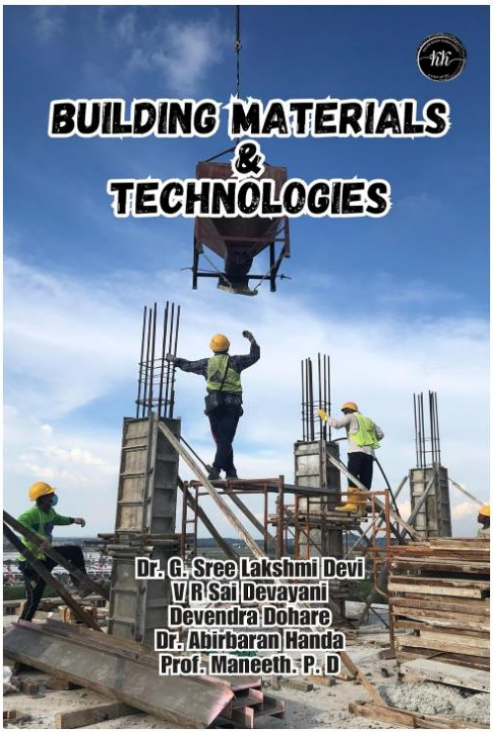

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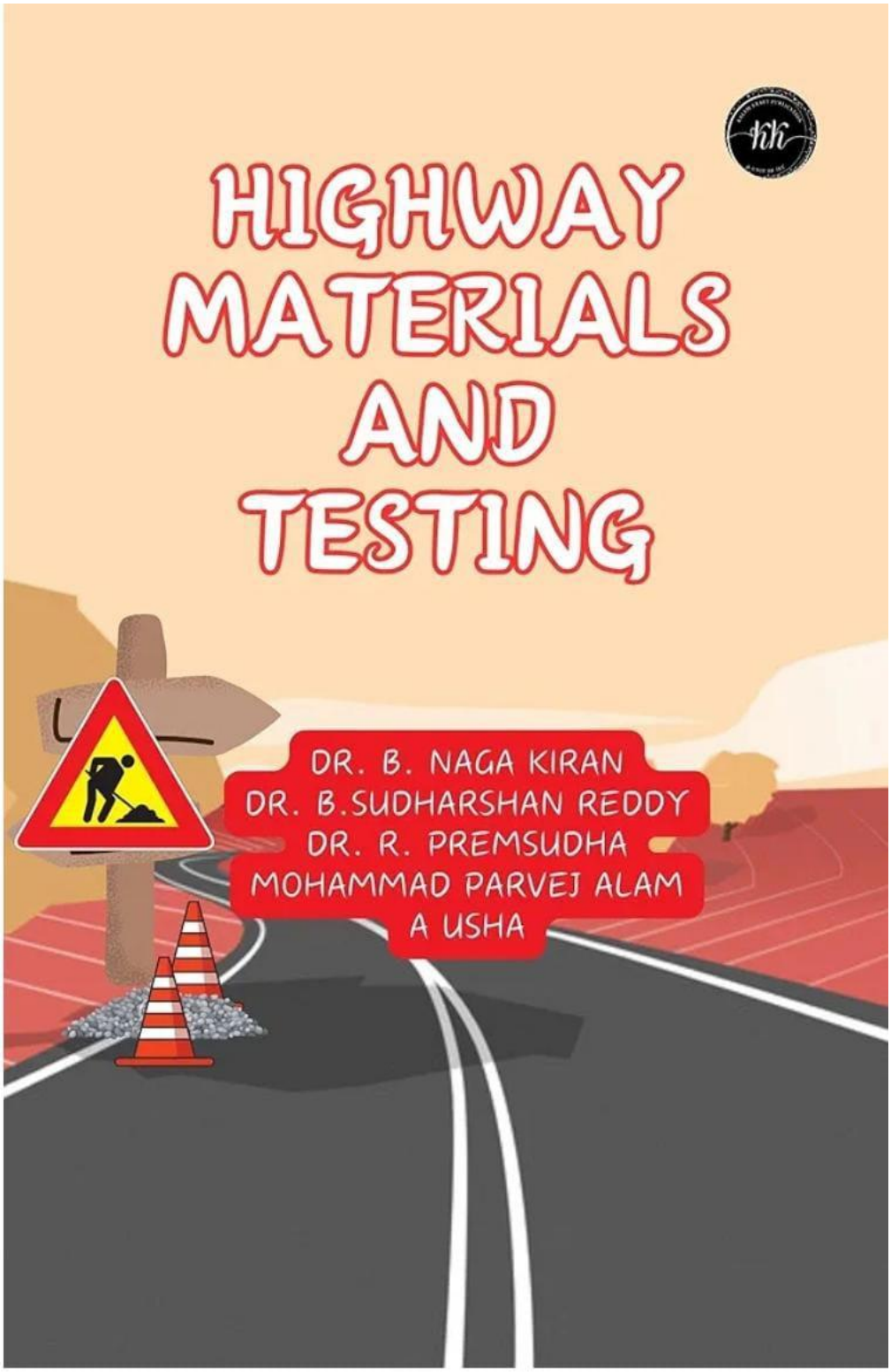

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2022-23

List of Publications

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
2022-23						
1.	Dr. M Chittaranjan	Production of Probiotics from Environment	Journal of Pharmaceutical Negative Results	2023	0976-9234	Scopus
2.	Dr. M Chittaranjan	Experimental Investigations on Bacterial Based Self-Healing Concrete With Bacillus Subtilis	Corrosion and Protection	2023	1005-748X	Scopus
3.	Dr. K Praveen	Assessment of Meteorological Drought Indices for Monitoring Drought Condition in the Sone Command Area, Bihar, India-A case study	Journal of Survey in Fisheries Sciences	March 2023	2368-7487	Scopus
4.	Dr. M Chittaranjan	Introduction to Environmental Engineering and Science	R. K. Publishers (Textbook)	2023	978-81-19140-19-0	-
5.	Dr. M Chittaranjan	Construction Project Management	R. K. Publishers (Textbook)	2023	978-81-19140-08-04	-
6.	Dr. M Chittaranjan	Irrigation Engineering	R. K. Publishers (Textbook)	2023	978-81-19140-01-05	-
7.	G Anusha	Experimental Study	Emerging Research in science, Engineering &	2023	-	Proceedings

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
		on structural Behaviour of self compacting fibre reinforce concrete using HybridFibres	Management (Conference Proceedings)			
8.	G Anusha	A Simulation Approach to Investigate the Impact of Crossing Pedestrians on Traffic Characteristics at Undesignated Urban Midblock Crossings	Innovative Development in Engineering Advances (Conference Proceedings)	2023	-	Proceedings
9.	V Mahesh	Assessment of Groundwater Quality for drinking and Irrigation Purposes in Tirupati Town	Innovative Development in Engineering Advances (Conference Proceedings)	2023	-	Proceedings

Original Article

Production of Probiotics from Environment

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Abstract

Bacillus sp. are widely used for isolating these protease enzymes. In this project, organisms were isolated from the soil sample was identified by morphological and biochemical characterization as *Bacillus sp*. The bacterial isolates were sub-cultured in Casein agar plates by quadrant streaking. Large amount of the enzymes was produced using fermentation process.Enzyme crude extract was prepared by centrifuging the fermented broth at 4500 rpm for 15 minutes at 4ºC. The precipitation method using ammonium sulphate was used to complete the crude enzyme partial purification. Partial purified enzyme showed maximum zones., when compared to the crude activity of the enzyme..The protein content was estimated by Bradford assay and was found to be 7.0µg/ml and 13.0µg/ml for crude and partially purified enzyme respectively.

In this review reported that bacteria from soil environment, bacillus sps. Which acted as a source of protease.

Keywords: Proteases, *Bacillus sp.,* Casein agar plate, Partial purification, Mass production

I. INTRODUCTION

Using Modified biotechnological methods, various industrially important enzymes are extracted from economically important microbes. Proteases cleaved the large protein molecules into smaller fragments, In food and leather industry, these enzymes as signal molecues,use to process various dairy products. The availability of economically and industry useful microbes and its diversity are rich in soil environment.

In our research study, we identified the soil source to characterization of the protease producing bacteria near madipakam region. Milk agar plate technique employed to screen the bacteria using standard protocol.Azocasein substrate used to detect the Proteolytic activity of protease extract of the bacteria .we observed two colourcolonies(white and yellow) to determine the activity of bacteria. During this process, we maintained the pH 8.5 ,37-degree temperature for yellow colonies and 60 degree temperature for white colonies to check the proteaseactivity. The proteaseactivity was observed at the ofPH 8.5 for both bacteria, but minimum temperature was 37°C for yellow and 60°C for white.

II. AIM AND OBJECTIVE

In this research, we aimed to isolate, identification of the bacteria, protease enzyme and protein estimation from bacillus *sps*.

III. METHODOLOGY

3.1 Collection and Preparation of the Sample:

Various soil samples were collected from various places using air tight container bags and brought to the lab for further research analysis.The samples were labelled, such as Sample-1 from madipakkamSample-2 from keelkattalii, Sample-3 from ponmarand Sample-4 from gudavancheriwere collected and soaked in distilled water overnight. The samples were filtered using filter paper.

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EXPERIMENTAL INVESTIGATIONS ON BACTERIAL BASED SELF-HEALING CONCRETE WITH BACILLUS SUBTILIS

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Abstract:

Recent years have seen the development of bacterial concrete as a repair method for fractures in various types of construction, including bridges, reinforced cement concrete buildings, reinforced cement concrete pipes, canal linings, pavement, etc. The production of cracks is a very frequent occurrence in concrete structures. These gaps allow water and other types of chemicals to enter the concrete and lower its strength. They also have an impact on the reinforcing when they react with water, carbon dioxide, and other chemicals. In order to fix the fissures that had formed in the concrete structures, Henk Jonkers added bacterial concrete to the problem. Experimental research has been carried out in this study to prevent concrete cracks using bacillus subtilis bacteria and calcium lactate. Bacteria are chosen based on how well they can live in an alkaline environment. Bacillus subtilis bacteria with calcite lactate are used in varied amounts, such as 5%, 10%, and 15% of cement weight, for M20 and M40 grade concrete with river sand mixes and crushed stone sand mixes as substitutes of fine aggregate. Experimental research was done on how bacteria affect concrete's compressive strength, split tensile strength, and flexural strength. After 3, 7, 28, and 90 days of curing, cantabro loss was used to evaluate the abrasion resistance of each mix

Key Words: Bacterial Concrete Bacillus subtilis, Calcium lactate, Crushed stone sand, Scanning Electron Microscope, Energy Dispersive X-ray Analysis, Ultrasonic pulse velocity, Abrasion resistance.

1. INTRODUCTION

Following water in terms of global use is concrete. However, it possesses pores and is prone to

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Assessment of Meteorological Drought Indices for Monitoring Drought Condition in the Sone Command Area, Bihar, India- A case study

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[4] Professor, of Civil Engineering National Institute of Technology Patna
Patna, India

Abstract: Drought is a hazard that affects most settled areas occasionally or periodically. Drought is a common natural disaster in India. In India, more than 70 percent of people, primarily depend on agriculture. In the present study, average monthly rainfall data from 1901 to 2002 were analyzed to determine monthly and yearly metrological drought occurrence in the Sone command area of the state of Bihar, India. The average rainfall of the Sone command area is 1100 mm, seven different metrological drought indices, namely IMD method, Decile index, standard precipitation index, reconnaissance drought index, Percent of normal, Aridity index, and moisture adequacy index were selected mainly reflecting metrological droughts. Also, an effort has been made to find out the districts facing the most severe drought conditions. As per the results, the most common kind of SPI was normal to moderately dry and that of IMD Method was moderate drought condition. Index of Aridity and percent of the normal index did not show good results for the drought severity as they have predicted most of the months to have no drought condition. The moisture adequacy index shows disastrous drought every year. RDI and SPI index show the same results. The drought has been monitored by the use of several meteorological indices, and it is clear that the present study area is experiencing normal to moderate drought.

Keywords: Drought, IMD method, Standard Precipitation Index

1. INTRODUCTION

Drought is a complex phenomenon characterized by below-average natural water availability in the form of precipitation, river runoff, or groundwater over a long period and throughout a large geographic area. Drought is a temporary phenomenon, whereas aridity is a permanent component of the climate [21]. Drought is a common occurrence in the climate. It may happen virtually anywhere, however, the way it manifests differs from area to region, making a universal description impossible [2, 5, 28]. Drought in Libya, for example, might be defined as a time with less than 180 mm of annual rainfall, but drought in Bali could be described as only 6 days without rain. Drought is described as a lack of precipitation for an extended length of time, usually, a season or longer, resulting in a water supply shortage for a particular activity, group, or environment. Drought may strike almost any climate in the world, including wet ones. It is the most complicated of all-natural disasters, affecting the most people. It can be as expensive as floods and storms, according to research. The most serious concern in drought-

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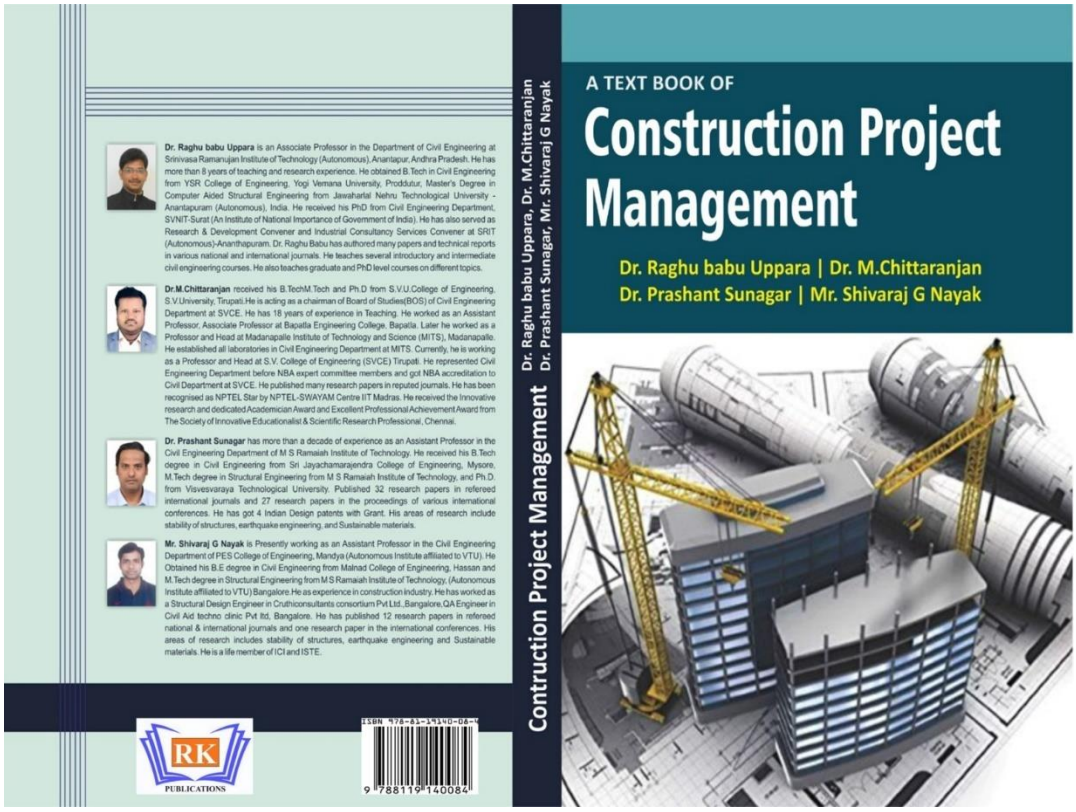

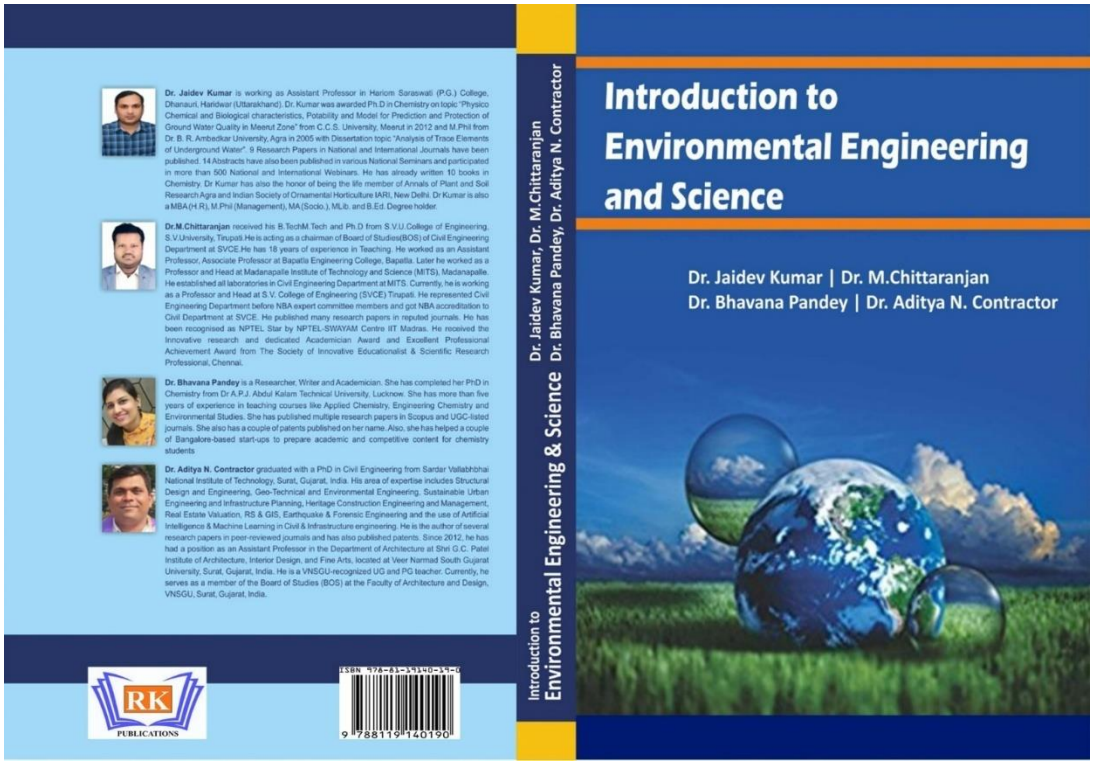

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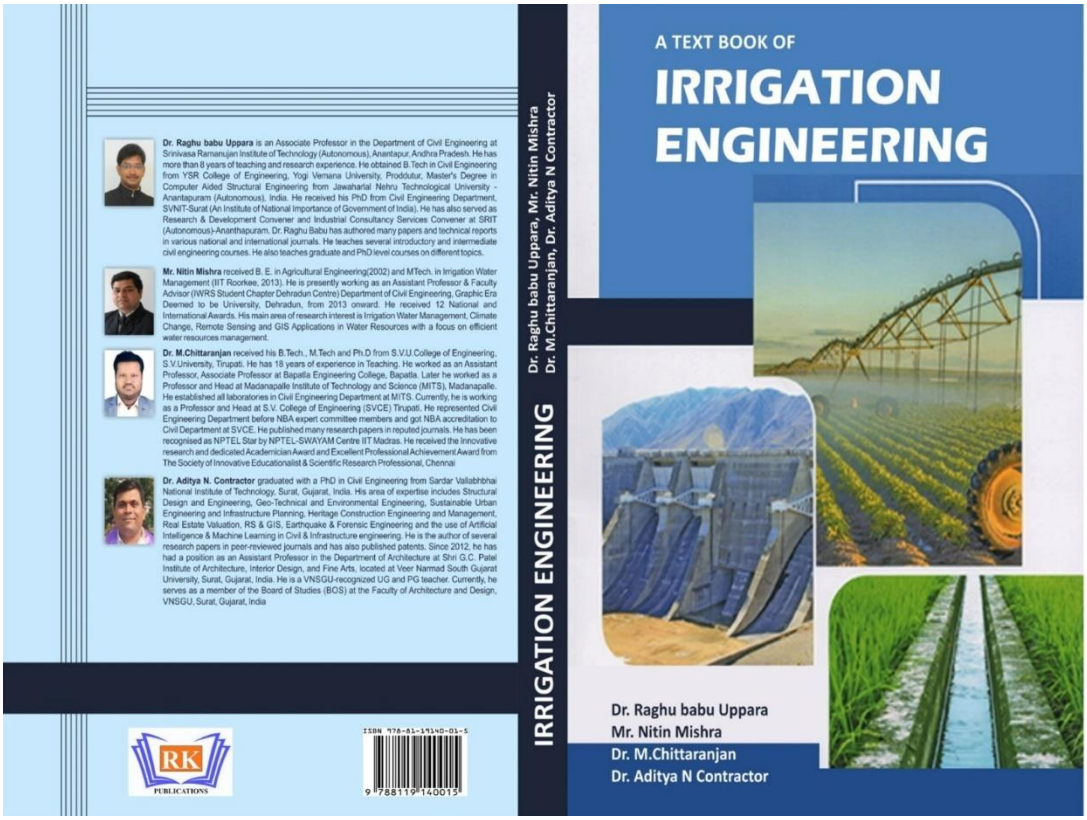

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CIVIL ENGINEERING INNOVATIVE DEVELOPMENT IN ENGINEERING ADVANCES [ICC IDEA - 2023]

9th – 11th March, 2023

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This is to certify that Mr/Ms/Dr G ANUSHA has presented the paper entitled

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in the INTERNATIONAL CONFERENCE on CIVIL ENGINEERING INNOVATIVE DEVELOPMENT IN ENGINEERING ADVANCES [ICC IDEA - 2023],

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CONVENER - ICC IDEA 2023
SRM IST, Kattankulathur

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2021-22

List of Publications

Sl. No.	Name of the faculty	Title of the paper/textbook	Name of the Journal / Textbook/conference proceedings	Month & year	Issue No / Volume No/ISBN	Indexing
2021-22						
1.	Dr. M. Chittaranjan	Effect of Sugarcane press mud on the Geotechnical Properties of an Expansive Soil	International Journal of Engineering Research and Applications (IJERA)	July 2021	2248-9622	UGC
2.	Dr. M. Chittaranjan	Effect of Water treatment plant sludge on the Geotechnical Properties of an Expansive Soil	International Journal of Engineering Research and Applications	June 2021	2248-9622	UGC
3.	J Harish	An Experimental Study on Partial Replacement of Cement by Ferrock	Recent Trends and Innovations in Civil &Agriculture Engineering	April 2022	-	Proceedings
4.	C M Prakash	An Experimental Study On Stabilization Of An Expansive Soil by Using Waste Ceramic Dust And Lime Powder	Recent Advances in Modelling and Simulation Techniques in Engineering and Sciences	2022	-	Proceedings

Lins Paul Kuriakose, et. al. International Journal of Engineering Research and Applications
www.ijera.com
ISSN: 2248-9622, Vol. 11, Issue 6, (Series-II) June 2021, pp. 06-09

RESEARCH ARTICLE OPEN ACCESS

Effect of Sugarcane press mud on the Geotechnical Properties of an Expansive Soil

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ABSTRACT
Expansive Soils are soils that have the ability to shrink and/or swell, and thus change in volume, in relation to changes in their moisture content. Expansive soil or clay is considered to be one of the more problematic soils and it causes damage to various civil engineering structures because of its swelling and shrinking potential when it comes into contact with water. Therefore it is essential to stabilize the expansive soil by suitable additives. Sugarcane press mud is the residue of the filtration of sugarcane juice. Large amounts of sugar cane press mud are released by the sugarcane industry and the disposal of this by-product is a major issue. Due to the presence of calcium it has the potential to enhance the geotechnical properties of soil. A study was made on the effects of variation of geotechnical properties of soil treated with 2%, 4%,6%,8% 10% of sugar cane press mud. It was found that there was an improvement in some geotechnical properties of an expansive soil. From this investigation it was found that sugarcane press mud can be utilized effectively in the stabilization of expansive soil where strength consideration is significant

Key Words- Expansive Soil, Compaction parameters, CBR, sugarcane press mud, unconfined compressive strength

Date of Submission: 02-06-2021 Date of Acceptance: 15-06-2021

I. INTRODUCTION

Expansive Soils are soils that have the ability to shrink and/or swell, and thus change in volume, in relation to changes in their moisture content. They usually contain some form of expansive clay mineral, such as, montmorillonite or vermiculite, that are able to absorb water and swell, increasing in volume, when they get wet and shrink when they dry. Expansive soil or clay is considered to be one of the more problematic soils and it causes damage to various civil engineering structures because of its swelling and shrinking potential when it comes into contact with water Chijioke Christopher et al (2019). Expansive soils may cause Structural damage to lightweight structures such as sidewalks and driveways, Lifting of buildings, damage to basements, and building settlement, Cracks in walls and ceilings, Damage to pipelines and other public utilities, Lateral movement of foundations and retaining walls due to pressure exerted on vertical walls, Loss of residual shear strength causing instability of slopes, etc. Therefore it is essential to stabilize the expansive soil by suitable additives. Masoumeh Mokhtari et al(2012)

Sugarcane press mud is the residue of the filtration of sugarcane juice. The clarification process separates the juice into a clear juice that rises to the top and goes for manufacture, and a mud that collects at the bottom. The mud is then filtered to separate the suspended matter, which includes insoluble salts and fine bagasse. This industrial waste is mostly used as soil conditioner, soil fertilizer and for wax production. Other industrial applications are reported (cement and paint manufacturing, foaming agent, composting aid for bagasse, etc.) and it has been used as human food by resource-poor families. In animal production, it has been used as feed ingredient, notably for ruminants, because of its sugar and mineral content. But use of sugar cane press mud in soil stabilization is rare.

Jasbir Saini (2019) investigated and reported that addition of sugar cane press mud lead to the increase in optimum moisture content and decrease in Maximum Dry density.CBR values UCS values improved upto 5% of Sugar cane press mud then decreases

Jijo James (2019) have been made experimental investigations to study the effect of sugar cane press mud on strength characteristics of an expansive soil. He observed that increase in

Dr.M.Chittaranjan, et. al. International Journal of Engineering Research and Applications
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RESEARCH ARTICLE OPEN ACCESS

Effect of Water treatment plant sludge on the Geotechnical Properties of an Expansive Soil

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ABSTRACT
Expansive soils are soils that expand when water is added, and shrink when they dry out. This continuous change in soil volume can cause damage to houses, other buildings, roads, pipelines, and other structures. Therefore it is essential to stabilize the expansive soil by suitable additives. The conventional Water treatment plant involves the process of coagulation, flocculation, sedimentation, filtration and disinfection. Large volumes of sludge or residues are generated during the processing of raw water to make it fit for drinking purpose. In general, this sludge is discharged directly into nearby water bodies or dumped in the landfills after dewatering. It may cause contamination of water bodies and soil from the chemical products used in the treatment. The review of published literature reveals that water treatment plant sludge or alum sludge can be utilized as a binding material due its pozzolanic properties. Hence A study was made on the effects of variation of geotechnical properties of soil treated with 2%, 4%, 6%,9% ,10% of water treatment plant sludge. It was found that there was an improvement of compaction parameters, CBR, Unconfined Compressive Strength and swelling characteristics when compared to untreated soil. From this investigation it was found that alum sludge can be utilized as an expansive soil stabilizer.
Keywords- Expansive soil. Alum sludge, Compaction parameters, unconfined compressive strength, Swelling pressure

Date of Submission: 09-06-2021 Date of Acceptance: 23-06-2021

I. INTRODUCTION

1.1. Expansive Soil

Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When they absorb water, they increase in volume. The more water they absorb, the more their volume increases. This change in volume can exert enough force on a building or other structure to cause damage. Cracked foundations, floors, and basement walls are typical types of damage done by swelling soils. Damage to the upper floors of the building can occur when motion in the structure is significant. Expansive soils will also shrink when they dry out. This shrinkage can remove support from buildings or other structures and result in damaging subsidence. Fissures in the soil can also develop. These fissures can facilitate the deep penetration of water when moist conditions or runoff occurs. This cycle of shrinkage and swelling places repetitive stress on structures, and damage worsens over time. Therefore it is essential to stabilize the expansive soil by suitable additives. Masoumeh Mokhtari. Masoud Dehghani et al (2012)

1.2. Water treatment Sludge/Alum Sludge

All water treatment plants (WTPs) produce waste/residue known as water treatment sludge (WTS) or Alum Sludge during the purification of raw water. Discharging alum sludge into river, streams, ponds, lakes, drains etc. or land filling the dewatered water treatment plant sludge is not environment friendly disposal option. Based on the characteristics, sustainable and profitable disposal through recycling and reuse have been reviewed. Utilization of alum sludge in brick making, in ceramics making, in the manufacture of cement and cementitious materials and as a substitute to building materials could provide safe disposal route. Reuse in wastewater treatment, in removal of heavy metals from aqueous solutions and in nutrient reduction from laden soils and runoffs are also some of the possible alternatives. The review of published literature reveals that alum sludge can be utilized as a binding material due its pozzolanic properties. Ahmad et al (2016)

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This is to certify that

J HARISH

From *NIT Patna* has presented the paper entitled

An Experimental study on Partial replacement of cement by Ferrock

at the international conference on
Recent Advances in Modeling and Simulation Techniques in Engineering and Sciences
[RAMSTES-2021]

Organized by
Multiscale Simulation Research Centre (MSRC), with Departments of Mechanical, Civil, and Chemical Engineering
at
Manipal University Jaipur (MUJ) India
held on
8-10, December 2021

Dr. Rajveer Singh Shekhawat
Dean, FOE (Honorary Chair)

Dr. Dhaneshwar Mishra
Convener

Dr. Abhishek Sharma
Convener

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C M PRAKASH

From *NIT Patna* has presented the paper entitled

An Experimental Study on Stabilization of an Expensive soil by using waste ceramic dust and Lime powder

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Dr. Dhaneshwar Mishra
Convener

Dr. Abhishek Sharma
Convener

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1.	Dr. M. Chittaranjan	Effect of Poly Com Admixture on Geotechnical Properties of Black Cotton Soil	International Journal of Recent Technology and Engineering	Jan 2020	2277-3878	Scopus
2.	A Usha	An Experimental Study On The Influence Of Pedestrians On Traffic	Sustainable Development And Circular Economy In Civil Engineering	Dec 2021	-	Proceedings
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Effect of PolyCom admixture on Geotechnical Properties of Black Cotton Soil

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Abstract: ***Over the past few years to stabilize the clayey soil which has been generally adopting these days in developing paved and unpaved roads, cement based products such as soil cement, and different kind of materials like lime are used. These additives being used in soil improves the strength, durability and workability of soil and generally it leads to a thickness reduction of the pavement layers. Regrettably, boundless amount of conventional additives are required to strengthen the soil used in pavements which leads to relatively long curing time. The compaction action should be completed within the stipulated time period, because which significantly affects the construction costs. The other disadvantages associated with cement stabilized layers can be the shrinkage cracks developed which reflect rapidly through asphaltic surfaces and cause greater deterioration. Therefore the development of polymeric based additives has been of particularly interest as they demonstrate many added advantages; such as their ability to reduce permeability, increase durability, allow non time depending during the mixing stage and provide increased flexibility.***

In this project PolyCom is being used as additive from the list of various Polymer Stabilization Materials. The advantage being selecting PolyCom as it does not create a chemical reaction and is not a rigid setting agent. Black cotton soil was taken in the analysis and it is added with PolyCom to find out the changes in the properties and from the inference of results it was observed that PolyCom addition enhances the Geotechnical properties of soil when compared to the black cotton soil used alone as a stabilized material.

Keywords: Black Cotton Soil; PolyCom; Permeability; Durability; Flexibility

I. INTRODUCTION

Soil improvement is to be one of the main concerns in the construction activities due to rapid growth of population, urbanization and industrialization. The term soil improvement is being used in the ground improvement techniques which improve the index properties and other engineering properties of weak soils. Where the soils are unsuitable for construction activities that soil can be effectively improved by the process of soil stabilization and also enhance the broad range of sub-grade soil properties altering from clay to granular materials. In soil stabilization process, revamp the durability, strength and other qualities of soil by modifying its physical properties and it improves the load bearing capacity, shear strength capacity of soil and also it controls the swell-shrink potential of expansive soil subgrade. This process is practiced by using a vast variety of admixtures i.e. metakaolin, Portland cement, lime, stone dust, fly ash and by products of different materials are cement-kiln dust and lime-kiln dust. Soil intensification by using stabilization is more resistant to damaged by frost or inclement and water conditions.

Subgrade soil provides base for the whole pavement structure. Weak expansive soil subgrade is contact with water has high tendency to swell and shrink. This behaviour is commonly exhibit from clayey soil by the presence of rich of Montmorillonite mineral. These weak soils can be intensifying through the insertion of cementitious additives and chemical admixtures. Many construction purposes, like airport and highway construction to alter the sub base and subgrade properties. Black cotton soils/Weak sub grade soils can be stabilized or usually improved by the inclusion of a small percentages of lime and cement. This study investigates the changes in the strength of the Black cotton soil by using PolyCom as admixture.

1.1 Black Cotton Soil

Black Cotton soils are those soils, which have tendency to increase in volume when water is available and decrease in volume when water is removed. These volumetric changes are due to the rich existence of Montmorillonite clay mineral in expansive soils. These volume changes of expansive soils provoke severe damage to structures resting on it. In India Black Cotton soils are also known as expansive soils. Expansive soils are common in Africa, Australia, India, South Africa, U.S., Israel, Indonesia, Burma and other countries in Europe. In India expansive soils common in Western Madhya Pradesh, part of Rajasthan, Uttar Pradesh, Andhra Pradesh, Karnataka.20% of the total area covered with expansive soils in India. In India Black cotton soils is also called as Expansive soils due to their color and property of growing cotton.

The BC Soils in India have Liquid Limit of 50-100%, Plasticity index of 20-65%, Shrinkage Limit of 9-14% ,<2 micron 40-75%. These soils are exceptionally stiff in dry condition and possess high shear strength. When ingress of water it gets reduced significantly. In summer season, it is very common to see shrinkage cracks with hexagonal column structures with vertical cracks as wide as even 10cm extending up to a depth of 3m or more.

II. EXPERIMENTAL STUDY

2.1 Material Used

Black cotton Soil: The soil taken for this investigation is obtained from Karapa village near Kakinada, East Godavari (District). The oven dried and crumbled material passed through I.S.4.75 mm sieve is used for the study. The index and engineering properties of

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