Shivendra Awasthi, 2022, 10:1
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

A Review on Coconut Fiber and Marble Waste

Shivendra Awasthi, Asst. Prof. Mr. Anuj Verma
Department of Civil Engineering,
Rajshree Institute of Management and Technology,
Bareilly,UP,India

Abstract- Coconut fiber is extracted from the outer shell of a Coconut. The common name, scientific name and plant family of coconut fiber is Coir, Cocosnucifera and Arecaceae (Palm), respectively. There are two types of coconut fibres, brown fiber extracted from matured coconuts and white fibres extracted from immature coconuts. Brown fibres are thick, strong and have high abrasion resistance. White fibres are smoother and finer, but also weaker. Coconut fibres are commercial available in three forms, namely bristle (long fibers), mattress (relatively short) and decorticated (mixed fibers). These different types' of fibres have different uses depending upon the requirement. In engineering, brown fibres are mostly used.

Keywords- coconut fiber, fibres etc.

I. INTRODUCTION

Concrete-based architectural systems include a building's brick/block walls, gates and barriers, poles and boats, and pavements. Wherever there is a need for infrastructure, concrete can be found in abundance. Concrete is used twice as much as all other common building materials put together.

The modern use of concrete is significantly influenced by the presence of flowing water. In many ways, concrete resembles a large corporation. The importance of these polymers in today's concrete world cannot be overstated.

"Concrete cubes will be strengthened with new, high-quality materials that incorporate marble dirt as a cement substitute." Concrete is one of many solid materials available. Cement concrete is ubiquitous in today's society, appearing in everything from buildings to streets to bridges to dams. Concrete use will have an impact on your daily life, no matter how careful you are. Concrete is made up of two main components: filler and fastening agent. It's mostly made of cement and water, with a small amount of thrown in for good measure.

Fasteners are commonly made of coarse aggregate materials such as crushed stones, gravel, broken bricks, and clinker. The goal of combining cement, sand, and coarse aggregates to make cement concrete is to achieve a water-like consistency. Cement, sand, and gravel make up the fine aggregates in this type of concrete, while crushed stone and gravel make up the coarse aggregates.

II. CONCRETE

Aggregates, cement, and water make up the construction material concrete. Coarse gravel and fine sand are examples of aggregates. Sand is typically made from either natural sand or a synthetic material like slag, whereas coarse gravel is typically made from limestone or granite. The aggregates are bound together with Portland cement and other materials like fly ash and slag cement. "Water can be added to a dry composite to create a hard rock energy material, which can then be hardened and solidified using a chemical process known as hydration (Jawad Ahmad et al , 2022)."

"The various additives in concrete form strong bonds when water reacts with cement. Concrete is a versatile building material that can be moulded into any shape and used in a variety of ways." In today's society, it's used in everything from sidewalks to skyscraper foundations (Kumar Ashit et al ,2016). According to the American Concrete Institute, hydraulic cement concrete is a mixture of water and cement that is poured into a mould and then cured (ACI E1-ninety-nine). 60-75 percent of the total volume of granular material used in concrete is made

International Journal of Science, Engineering and Technology

An Open Access Journal

up of sand, gravel, crushed stone, and blast furnace slag.

III. LITERATURE REVIEW

R Hidayawanti et al (2016) In this study, recycled concrete aggregate (RCA) was used as a coarse aggregate in order to make concrete more environmentally friendly. Due to its porous nature, researchers have found that RCA reduces the performance of concrete. Concrete performance was improved in this study by adding waste glass (WG) as a filler material. RCA was used to replace 20%, 40%, and 60% of the coarse aggregate, while WG replaced 10%, 20%, and 30% of the cement, respectively.

"Compressive, split tensile, and punching strengths were used to determine mechanical properties, while slump cone testing determined freshness. Cement substituted with WG and RCA reduced workability, but improved mechanical performance at first before deteriorating due to a lack of workability in the concrete."

Ahmad, J et al, 2021 Concreting is the process of using concrete as a building material, which is made up of cement, water, and aggregate (sand and gravel). Among coarse aggregate materials, stone ash is one of the less desirable options. "For this purpose, a compressive strength and water absorption test was conducted on coarse aggregate replacement materials from waste marble with a 40% M-Sand substitute. 0 percent, 25 percent, 50 percent, 75 percent and 100 percent of waste marble was used as coarse aggregate, while M Sand was used as fine aggregate in amounts of 40 percent."

Compressive strength was 35.801 MPa after 28 days for variation 3 (40 percent M-Sand + 50 percent waste marble), while water absorption was 1.77 percent for variation 1 (40 percent M-Sand + 0 percent waste marble). Using waste marble R close to 1 as a replacement for concrete mixture composition was found to be feasible.

Kumar Ashit et. Al. (2016) Materials such as glass powder and stone dust are used in the production of cement, which is a byproduct. As a 20 percent cement substitute, Glass Powder is used, and Stone Dust is used as a partial replacement for Fine Aggregate. 'At a grade of M25 or higher, this concrete is excellent. "Fresh concrete was used to measure Slump, while hardened concrete was used to measure Compressive Strength. 0 to 40% sand is substituted for sand in all tests, which are completed after 7, 14, 28, and 56 days with a 10% programme language period. As a 20% substitute for cement, glass powder is used in the same tests. Stone dirt and glass powder can be used as sand, according to research."

Kumar Rohit et. Al. (2016) as a partial talc substitute (2016). To further improve its environmental friendliness, cement can lower cement production costs while also reducing harmful gas emissions into the atmosphere. There is no need to worry about marble powder's consistency, preliminary placement time, final placement time, or soundness, according to previous research.

"Using marble powder to make low-cost, long-lasting concrete can help alleviate some environmental and ecological concerns. Some of the cement is replaced with marble powder to see what effect it has on the concrete's physical properties. A concrete mix's effect can be calculated by looking at the workability, compressive strength, and flexural strength of the substance in question."

Sahu Chandraprabha (2016) they used a variety of percentages of fly ash to make the cement bricks. Fly ash from a nearby quarry is being used in an attempt to reduce commercial waste. By determining the percentage of fly ash cement brick composition by weight that can increase strength without significantly increasing cement content, this project aims to achieve its objectives.

B. Krishna Rao (2016) "When marble dust is substituted for cement, its mechanical properties can be studied. Riverbeds, pasturelands, agricultural fields, landfills, empty pits, and roadside ditches are just some of the places where hazardous waste is dumped." More than half of the time, marble powder contains an excessive amount of calcium oxide.

Cementitious binder may be a better alternative to marble dust because of its high lime content. Concrete mixtures containing 0% to 20% marble powder as a partial cement replacement were tested in the laboratory. Compressive, tensile, and flexural energy properties of these mixtures were measured after 7, 28, and 56 days of testing.

Galetakis Michael et. Al. (2016) investigated the use of via-merchandise in the production of cement-based building materials. "Quarries, aggregate plants, and ornamental stone flowers all produce large amounts of pollution-causing quarry dirt and marble sludge. Both financial and environmental advantages can be gained by using these materials in manufacturing."

Research has tested the components, practice strategies, measured homes, and proposed uses of the materials. When making concrete, quarry dust and marble sludge were commonly used as high-quality aggregate or a substitute for cement.

"A protected manufacturing process is used to produce other building materials, such as load-bearing or decorative bricks and man-made stones. As part of the ongoing investigation, the study should be broadened to include a wider range of construction projects."

Pal Sonu et. Al. (2016) Marble dirt powder was used to partially replace cement in the M30 concrete grade. In all of the concrete samples, the water-to-cement ratios were found to be constant. After curing for seven and 28 days, the concrete samples were tested for compressive and tensile strength. "The compressive and split tensile strength of concrete could be increased by up to 10% by substituting Marble dirt powder for cement."

Long-term exposure to waste materials can lead to environmental issues. As a result, the importance of recycling has been emphasized. Using waste as an admixture or a source for new products is one way to make better use of natural resources while protecting the environment from pollution caused by waste disposal. Marble stone production generates hazardous waste and slurry.

Syal Neeraj et. Al. (2016) Due to the excessive glass content and the use of managed graining; it has a high level of reactivity. "The hydrated cement matrix has very small pores as a result of the dense packing of cementitious material when using GGBFS." At 3 percent, 6 percent, 9 percent and 12 percent, GGBFS was replaced with GGBFS, while marble powder remained at 10 percent replacement. M30 concrete was used to create a messy, jumbled layout.

The blended concrete design was subjected to a wide range of tests. There were 72 samples made for compressive electricity and 72 for split tensile power testing following the blend design.
Compressive and split tensile energy in standard concrete samples were found to be significantly reduced when GGBFS and MWP were added.

Utkar Shalaka S. (2016) On the Compression Testing Machine, we'll put the cubes through their paces with varying proportions of waste marble powder (CTM). Concrete's load-bearing capacity can be increased by replacing cement with marble powder in the most cost-effective manner possible while still strengthening the concrete.

Pattapu Sree Saranya et. Al. (2016) As an added benefit, LP and MP are put to immediate use in the manufacture of self-compacting concrete without the need for any additional processing (SCC). "All combos have water to binder ratio of 0.33. Workability, compressive power, flexural electricity, and static and dynamic elastic moduli are all included in the evaluation of the houses."

Sparkling concrete's workability can be assessed using three different tests: a hunch-glide test, a T50 test, and an L-container test. The findings show that waste LP and MP can be successfully used as mineral admixtures in the production of SCC. The use of waste mineral admixtures improved the financial viability of SCC production per unit power due to its observed mechanical blessings.

Rizwan qadir et. al. (2016) It is based on the findings of various researchers over the last few decades. Experiments have shown that marble can increase the compressive strength of concrete, while coconut fibre keeps the concrete's internal temperature stable, preventing weathering. "The purpose of this project is to raise public awareness about the potential uses of coconut fibres and marble waste in civil engineering construction."

Razahi et al, (2020) A light-weight concrete mix can be made from fly ash and stone dust, since both of these aggregates have the right chemical composition to be used as expansive lightweight aggregates. Backside ash and stone dirt were found to make up the majority of the sample.

Na2SO4, CaSO4, and CaCO3, along with sledges of glass abrading, Fe2O3, blast furnace sludge, and oxidizing slag, were examined to determine the best properties of the manufactured light-weight mixture products, which were then tested. Also tested and determined were the type of furnace required for production and the sintering temperature required for the substances. "An oven-dried density of 1.46 kg/cm3 and an absorption ratio of 8.5% were found to be ideal for producing lightweight aggregates for use in lightweight concrete for structural purposes, according to this study."

Khasawneh, et al (2020) After completing an experimental study to determine the impact on compressive energy and cut up tensile power characteristics (0 percent, 4 percent, 8 percent, 12 percent, 16 percent, 20 percent), they looked at the behaviour of concrete with partial replacement of cement with waste marble powder M25 grade.

According to the findings of this study, the 12 percent cement/waste marble powder alternative has the highest compressive and tensile energy. Marble powder can be substituted for cement in cubes and cylinders at a rate of about 12 percent for each cube and cylinder respectively, and the cost of production can be reduced by using marble powder, which is readily available.

Pereira et al, (2020) This research compares the compressive, cut-up tensile, and flexure energy of various cement-and-sand blends, as well as their waste marble powder results. We also take into account its usability and durability. Waste marble powder can be used as a substitute for some of the cement and sand in concrete mixes, which is the primary goal of this study.

"Waste generated from marble installations is commonplace because it is so widely used in systems that generate more waste." A waste product that results from sawing and shaping marble with a help of a piece of marble rock is known as marble powder. High oxide calcium content in marble powder, which has a cementing property, allows it to be used as an alternative to cement in the cement sand mixture.

IV. CONCLUSION

From the above study, it can be concluded that the marble waste and coconut fiber can be used as admixture in concrete. It can be seen that marble waste can increase the compressive strength of concrete and coconut fiber maintain the internal temperature of concrete structure so weathering effects will be negligible. In experiments, used different percentages of marble waste and coconut fiber and observed that if both percentages of marble waste and coconut fiber will same then the compressive strength increases than the concrete without marble waste and coconut fiber. And also it can be observed that tensile strength increases with the use of coconut fiber and marble waste.

REFERNCES

[1] Jawad Ahmad, Rebeca Martínez-García, Jesús de-Prado-Gil, et. al. "Concrete with Partial Substitution of Waste Glass and Recycled Concrete Aggregate", Materials 2022, 15, 430. https://doi.org/10.3390/ma15020430.

[2] R Hidayawanti, Yuhanah, D Mayasari, "The effect of m-sand and waste marble for strength of concrete", Materials Science and Engineering 930 (2020) 012024.

[3] Kumar Ashit, Saxena Anil Kumar (2016). "Combined use of Stone Dust as Partial Replacement of Sand and Glass Powder as Cement" International Journal of Engineering Research & Technology (IJERT), Vol. 5.

[4] Kumar Rohit, Dhaka Jitender (2016). "Review On Use of Marble Powder as Partial Replacement of Cement in Concrete Mix" International Journal for Technological Research in Engineering, Volume 4.

[5] Sahu Chandraprabha (2016). "Partial Replacement of Cement with Marble Dust Powder" Imperial Journal of Interdisciplinary Research (IJIR), Vol-2.

[6] Rao B. Krishna (2016). "Study on Marble Powder as Partial Replacement of Cement in Normal Compacting Concrete" IOSR Journal of Mechanical and Civil Engineering, Volume 13.

[7] Galetakis Michael, Soultana Athanasia (2016). "A review on the utilization of quarry and ornamental stone industry fine by-products in the construction sector" Elsevier.

[8] Pal Sonu, Singh Amit, Pramanik Tarkeshwar, Kumar Santosh, Kisku N. (2016). "Effects of Partial Replacement of Cement with Marble Dust Powder on Properties of Concrete" International Journal for Innovative Research in Science & Technology, Volume 3.

[9] Syal Neeraj, Bansal Rajwinder Singh, Kumar Arun (2016). "Analyse the Strength Properties of Pozzolana (Ground Granulated Blast Furnace Slag) and Marble Waste Powder with OPC" International Journal of Engineering Research and Development.

[10] Shalaka S. Utkar (2016). "Use of Marble Powder as A Partial Replacement of Cement" ICRTESM.

[11] Pattapu Sree Saranya, Sagar N.Vidya Lal (2016). "A Study on Mechanical Properties of SSC with Partial Replacement of Cement with Lime and Marble Powder" International Journal of Science and Engineering Research (IJ0SER), Vol 4.

[12] Qadir Rizwan, Fahad Perviaz,(2016). Effects of Coconut Fiber and Marble waste on properties of Concrete" International Journal of Scientific & Engineering Research, Volume 7, Issue 7.

[13] Razahi, Mustafa Musleh, and Avani Chopra. "A review of using sisal fiber and coir fiber as additives in stone matrix asphalt." International Research Journal of Engineering and Technology (IRJET) 7.2 (2020).

[14] Ahmad, J., Aslam, F., Martinez-Garcia, R., de-Prado-Gil, J., Qaidi, S., & Brahmia, A. (2021). Effects of waste glass and waste marble on mechanical and durability performance of concrete. Scientific reports, 11(1), 1-17.

[15] Pereira, T. G. T., Silva, D. W., Eugênio, T. M. C., Scatolino, M. V., de Carvalho Terra, I. C., Fonseca, C. S., ... & Mendes, L. M. (2020). Coconut fibers and quartzite wastes for fiber-cement production by extrusion. Materials Today: Proceedings, 31, S309-S314.

[16] Khasawneh, M. A., & Alyaseen, S. K. (2020). Analytic methods to evaluate bituminous mixtures enhanced with coir/coconut fiber for highway materials. Materials Today: Proceedings, 33, 1752-1757.