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Research Paper

A Study: How Using Waste Paper Sludge Ash and Rice Husk Ash Instead of Cement in Concrete

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ABSTRACT
This study aimed to assess the impact of different quantities of Rice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) on the strength and shrinkage characteristics of concrete during the drying process. Additional water was required when incorporating Rice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) into the concrete. Nonetheless, the concrete produced with different substances demonstrated equivalent or enhanced qualities in relation to the concrete exclusively comprised of Ordinary Portland Cement (OPC). The most significant enhancements were observed with Finer Rice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA). The utilization of Waste Paper Sludge Ash (WPSA) and Rice Husk Ash (RHA) as substitutes for cement was investigated in a particular concrete mixture in this research. In an attempt to assess its influence on concrete strength, the ash was utilized in different amounts during the experiments. A comparison was made between the strength of the concrete they created and normal concrete after a 28-day period.

Keywords*: Durability, RHA + WPSA, Concrete, Cement Replacement, Advanced Techniques.*

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I. INTRODUCTION

Concrete, a widely utilized material, is commonly employed in construction projects worldwide. A combination of cement, rough, smooth, and water-dissolvable substances. Concrete progress does not need any specific information. The strength of concrete is determined by how the materials are mixed and put together [1]. Building materials have become more expensive due to factors such as rising wages in the construction industry, shortage of essential components, and increasing electricity costs [2]. Making these helpful environment elements more solid has several advantages, including saving money, improving the quality of the design, using less energy during the production of cement, and protecting the environment by producing less waste [3].

Quality is connected to the characteristics and properties of materials, like how they are made and what they are made of. It also relates to how well we make sure they meet certain standards before they are used. Any improvement in these features is likely to improve quality [4]. The quality and stability of concrete can be greatly improved by adding a special ingredient called a pozzolan. When pozzolan is mixed with lime and water, it chemically reacts to form compounds that make the concrete stronger [5].

It also helps the environment by producing less waste. How long something lasts depends on the materials used and how easily they can be damaged. Making something better like this will probably help it last for a longer period of time [6]. By adding a special material called a pozzolan to concrete, it can make the concrete last longer and perform better. Silica and aluminum are found in a substance called a pozzolanic material or pozzolan. When it's cold outside and there is water nearby, it mixes with lime to make something like cement [7].

It has been found by scientists that the utilization of remaining Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) is possible in the field of construction. The main objective of this study was to decrease the temperature of extremely robust concrete through the application of Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA). Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) exhibit a more pronounced

cooling effect than regular concrete. Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA)can make mass concrete much cooler [8-9-10].

This experiment sought to assess the feasibility of decreasing cement quantities in concrete through the addition of Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA), as alternative materials to enhance the mixture. There are various options for finding an alternative substance to replace cement in mortar, such as experimenting with Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) [12]. By mixing quicklime with other substances, we can make a special building material that doesn't need cement andcan harden even when submerged in water. One possible approach is to mix Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) with quicklime, resulting in a combination that can form a hardened substance similar to cement, even when exposed to moisture [13-14].

By using Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA), companies can make a variety of mortars without using expensive cement. It costs less. In a few countries, Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) are used to make biogas, while in other countries they are just burned because people think they are not important [15-16]. The main goal of this research is to find different ways to use the waste leftover from Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) production, like the ash from Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA). To get rid of it in this specific location, the norm is to set it ablaze up above [17-18].

When we mention Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) we are discussing the delicate threads that are derived from discarded substances like Rise Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA). When you sprinkle a little bit of these thin fibers on a farm, they work like fertilizers [19]. However, if it is distributed in bigger amounts, it dirties the soil. The burning of waste in large fires by certain Agricultures and industries results in severe air pollution. Or, they get rid of the waste sludge in a way that causes problems and pollutes the soil [20-21-24].

The presence of landfills leads to expensive charges for waste removal and poses potential environmental problems as well. The similar characteristics between cement and this remaining sludge permit its partial application in concrete [27-30-34-38-40]. We can use this waste material instead of normal materials in concrete as a potential solution. We should find something else instead of cement to keep the environment and natural resources safe from pollution. Our intention was to incorporate leftover paper sludge into our project as a means to combat pollution by including it as an ingredient in the production of concrete [32-35-37].

RICE HUSK ASH (RHA)

The waste produced from burning rice husk is known as rice husk ash. Due to the significant rice production in East and Southeast Asia, there is a substantial quantity of rice husk found in the region [9]. Rice cultivation in these Asian countries is made possible by favorable factors such as sufficient land, water resources, and an abundance of rainfall [13].Rice husk ash (RHA) has the potential to become an important issue in countries that export rice, as it can help reduce environmental pollution [17]. Pozzolan, also known as rice husk ash, is a leftover substance from rice processing. When combined with lime, it shows cement-like qualities [19].

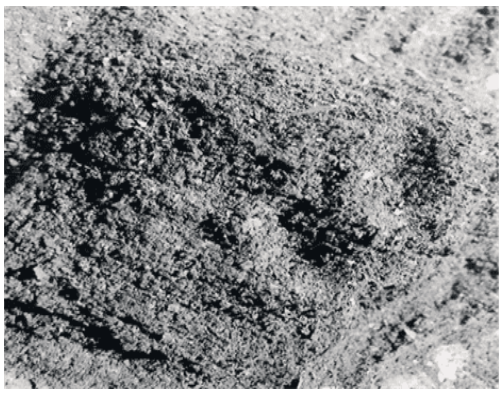

Fig 1 Rice Husk Ash

(Shown in fig 1)Carbon-neutrality, absence of harmful substances, and a low silica dioxide composition are key characteristics of Rice Husk Ash (RHA) [20]. It is recommended to use the grayish rice husk ash because it is suitable and safe to use. Much extra shells are removed by using open fields and then put back into the field [24]. Eating rice husk is a way to obtain RHA. This will allow us to use the rice problem in a way that is both interesting and good for the environment [32]. The use of rice husk waste is becoming more common, but there are difficulties in handling it [40].

PRODUCTION OF RICE HUSK ASH (RHA)

The husk accounts for approximately 21% of the weight removed from every 1,000 kg of rice. The complete combustion of the husk yields a substance called RHA, weighing around 55 kilograms [15]. The outermost layer of the husk is a composition of 50% cellulose, 30% lignin, and 20% silica. The silica, which remains as fiery debris after the cellulose and lignin have been burned off, is then discarded [19]. You need silica in a special form for RHA to work as a usable substance. Shiny silica does not react much when it is mixed with lime. When considering the topic, it is safe to say that rice husk ash reacts rapidly at high temperature. below 752 degrees Celsius According to a study on works related to the idea of silica burning [20-40].

PROPERTIESE OF RICE HUSK ASH (RHA)

The capability of the waste material without purpose to engage with pozzolanic materials is determined by both the silica type and the level of carbon existing [16]. To generate certain forms of waste, you require a technique that can uphold a cold temperature and minimize the duration of the procedure. As a result, what will happen is the production of waste that contains a low level of carbon but has a substantial surface area [19-20].

WASTE PAPER SLUDGE ASH (WPSA)

Recently, there has been a heightened global focus on preserving the earth's ecological equilibrium and fostering a more environmentally friendly atmosphere. India creates over 300 million tons of waste each year due to its farming and manufacturing activities [19]. Using materials like these creates problems with getting rid of them, possibly harming people's health, and making things look less nice. Instead of using cement to make something strong, you can use waste paper because it contains silica and magnesium [32]. The kind of machines used, the final product made by a recycled paper factory, and the amounts of waste produced are all closely connected. In making cheap hotels, we can use some waste water from paper mills instead of small rocks in the concrete. For every 1 ton of recycled paper, 300 kg of slime is made [36].

Fig 2 Waste Paper Sludge Ash

The expense of constructing a landfill for the paper plant muck is too high given its substantial weight and volumes The primary components of the dry paper ooze consist of silica, calcium oxide, alumina, and magnesium oxide [26]. Using these materials can cause problems when getting rid of them, possible health dangers, and not looking good. One ton of recycled paper results in the production of 300 kilograms of slime [40]. (Shown in fig 2)

II. LITERATURE REVIEW OF RICE HUSK ASH (RHA)

The main goal of this study is to find out if we can use rice husk ash instead of cement in concrete. We think that if we add ash from rice husks to the concrete, the mixture will become stronger. Scientists are trying a new way of mixing rice husk ash with concrete instead of using cement like usual during a test. It has successfully met various needs for concrete structures, like making them strong [19-20]. Construction is expected to benefit from the increased use of rice husk ash concrete through the project. There are many factors that affect how rice husk ash concrete acts. To make sure our experiments are reliable, we will keep these factors the same [11].

The main focus of this project is to discover alternative purposes for waste produced by combustion. These leftovers are made up of the ashes from burning rice husks, and the sludgy waste that comes from burning paper. Instead of using the usual materials like concrete, the intention is to employ these alternative materials for construction activities [18]. The goal was to explore the possibility of incorporating Rice Husk Ash and Waste Paper Sludge Ash alongside Ordinary Portland Cement for the formulation of Concrete. Furthermore, we sought to determine if this would have any influence on the strength of the concrete [14]. The power of the concrete was assessed by subjecting it to tests measuring its capacity to withstand pressure and fragmentation. We can

determine the strength of concrete by using the IS mix design method. Also, we wanted to find out how the concrete's strength could be affected [13]. The investigation assessed the levels of substitution within four groups, namely 5%, 10%, 15%, and 20%. The duration of recovery was investigated in this study to determine the length of time required for improvement to occur. In our study, we looked at different time periods multiple times, from 7 to 28 days [8]. **[Rasik Fayaz, Er. Parvinderjeet Kaur, Er Kiran Talwar (August 2018)].**

The purpose of this study is to explore different ways in which rice husk can be utilized. In order to assess the effectiveness of the replacement method, experiments were conducted at four varying levels, specifically 5%, 10%, 15%, and 20%. Scientists studied the properties of concrete after mixing it with cement. We purposely tested the strength and usefulness of concrete. The preferred way to mix regular concrete in India is the Indian Standard procedure. This approach served as inspiration for the development of an alternative blend design to substitute Rice Husk Ash.**[N Kaarthik Krishna, S Sandeep, K M Mini (2016)].**

This document aims to investigate the feasibility of utilizing Rice Husk Ash (RHA) as a replacement for certain constituents of Ordinary Portland Cement (OPC) within concrete. Instead of using OPC, different amounts of RHA were used, ranging from none to 25%. There were no other options available to the control group. Our goal was to test how well recently poured concrete sticks together using the Compact Factor test. Besides testing how strong something is, we also checked how long concrete cubes can last underwater. We checked them after 1 week, 2 weeks, and 4 weeks. When a higher quantity of Rice Husk Ash (RHA) was utilized in comparison to Ordinary Portland Cement (OPC), a decline in the compacting factor was noticed. Using a different type of material called RHA instead of the typical material OPC makes the hardened concrete less strong.**[OBILADE, I.O. (September 2014)].**

This paper examines how using rice husk ash instead of regular cement affects different kinds of concrete. We tried using different amounts of RHA instead of OPC. We started with no RHA and went up to 40%. The scientists examined the strength, absorbency, and durability of concrete. This research suggests that using RHA instead of OPC (Ordinary Portland Cement), up to 20%, can be a beneficial method to partially substitute cement. It stays strong and lasts a long time, even when being squeezed. **[C. Marthong (August2012)]**.

Different amounts of replacement material were added to a mixture made up of 1 part cement, 2 parts sand, and 4 parts aggregate in this research. The amount of new material used was between 5% and 20%. The test used cubes with both normal and special samples. We conducted various tests on these examples. The test results showed that lightweight concrete performed well and met our expectations. Adding more ash made the material less strong. However, the strength was considered good enough for making lightweight concrete. The text explains that if we replace 0-10% of the materials used in concrete, the concrete will become less heavy.**[D. A. Opeyemi, O. O. Makinde (September 2012)].**

The objective of this study was to determine the viability of utilizing rice husk ash as an alternative material in concrete. The current testing involves labelling the concrete cubes as the Control and Specimen. Other materials were incorporated into the composition of the cubes, accounting for a shift of 5 to 20 percent. This occurred when using a blend of materials - one part cement, two parts sand, and four parts gravel. Scientists did tests and found that when they used rice husk ash instead of other things, the concrete got stronger. However, it was observed that the best results were obtained when the amount of rice husk ash added stayed below 10%.**[I.B. Ologunagba, A.S. Daramola, A.O. Aliu (December 2015)].**

This paper aims to investigate how the characteristics of concrete can be altered by adding varying amounts of Rice Husk Ash. In this research, they used waste RHA instead of cement. The M-25 mix has to have 5%, 10%, and 15% of the substance's weight to meet the requirements. After 28 days, the experts checked the concrete samples to see how strong, absorbent, and dense they were. The results were then compared to normal concrete. The results show that it is okay to use waste RHA instead of 10% of the cement.**[Mohammad Iqbal Malik, Aarif Manzoor, Barkat Ahmad, Syed Asima, Rozi Ali (February 2015)].**

By conducting research and experimentation, our aim was to comprehend the variations in concrete when incorporating Rice husk ash. The research assessed the influence of adding rice husk ash to concrete on its behavior and outcomes. They tested two options for replacements: zero and twenty percent. The addition of rice husk ash, comprising 20% of the concrete mix, led to enhanced durability and increased capacity to withstand pressure, surpassing the qualities exhibited by the concrete mix without rice husk ash. The object's strength was assessed through vigorous pressure application during our testing process. Two replacement levels were experimented with: one where no replacements were made and another where twenty percent replacements were implemented. When 20% rice husk ash was incorporated, the strength reached its peak, outperforming the strength obtained in the absence of any ash addition. The measurement of power occurred on three different occasions: after 14, 21, and 28 days.**[Arvind Kumar, Amit Kumar Tomar, Shravan Kishor Gupta, Ankit Kumar (July 2016)].**

The primary focus of this investigation was to examine the outcomes of utilizing our locally available Rice Husk Ash instead of the costly Ordinary Portland cement in concrete. Our goal was to find out how much concrete we could use instead of other materials when building houses. This would make the houses stronger

and also save money. This study provides a possible way to handle and control any remaining agricultural waste. We found out that RHA is equal to 1. When something is 55 times denser than water, it means it is a lot heavier or more tightly packed than water. The weight of RHA concrete was determined to be 2. The numbers 043, 1912, and 1932 show how heavy something is in kilograms for each cubic meter. We got these numbers by replacing 10%, 20%, and 25% of the material.**[Maurice E. Ephraim, Godwin A. Akeke and Joseph O. Ukpata (May 2012)].**

The strength of concrete was investigated by examining the impact of replacing Ordinary Portland Cement with Rice Husk Ash in this study. Large-scale concrete projects can utilize Rice Husk Ash, which is a byproduct of farming. Experiments have shown that when it is pushed together, it is very strong. It has a strength of 33-38 in a specific measurement. When 10-25% of the mixture is replaced, the strength is 4N per square millimetre. Typically, this combination features equal proportions of various substances. According to this research, buildings constructed with RHA Concrete could have a longer lifespan compared to those made with traditional concrete. This investigation aims to examine how the utilization of RHA, instead of OPC, influences the strength and properties of concrete.**[Godwin A. Akeke, Maurice E. Ephraim, Akobo, I.Z.S and Joseph O. Ukpata (May 2013)].**

The primary objective of this research paper is to examine the utilization of RHA as a substitute for cement in the production of mortar and concrete. This research examines the characteristics of mortar and concrete, such as their strength, durability, and initial state. In the last ten years, adding extra things to make concrete stronger and better has become really important in making it. Examples of these objects can include things that come from nature, things that are left from making something else, or things that are made quickly with little thought put into them. Cement is often enriched with fly ash, silica fume, ground granulated blast furnace slag, as well as rice husk ash. The process of scorching the outer part of rice seeds produces a material called RHA. The composition of this item includes a distinct variety of silicon dioxide, which exhibits an irregular structure and boasts a considerable surface area. It provides good performance with other items too.**[Alireza Naji Givi, Suraya Abdul Rashid, Farah Nora A. Aziz, Mohamad Amran Mohd Salleh (2010)].**

The aim of this investigation is to determine whether using rice husk ash instead of cement in concrete is a viable option and observe its impact on the concrete's strength. The goal of this study was to test how strong the concrete is when we use less water and replace some cement with rice husk ash. When you hear something at a certain temperature, it creates a substance called RHA by burning its outer covering. Other studies have found that RHA is very reactive and can be added to cement because it can strongly hold things together.**[Naraindas Bheel, Shanker Lal Meghwar, Sohail Ahmed Abbasi, Lal Chand Marwari, Jabbar Ahmed Mugeri, Rameez Ali Abbasi (October, 2018)].**

The focus of this investigation is to explore the consequences of utilizing rice husk ash as a replacement for cement in hollow sand concrete blocks. The machine's shaking action generates a block of significant magnitude, measuring 225 x 225 x 450 millimetres. We can say from the results that when we add RHA to the block, it becomes less dense. The blocks exhibit decreased heaviness as more RHA is introduced into them. When you squeeze the block, it does not become any more powerful or resistant. The results show how the qualities of the blocks are affected by changes in temperature and moisture levels.**[G. L. Oyekan and O. M. Kamiyo (13 January, 2011)].**

The central focus of this investigation was to assess the feasibility of utilizing fly ash and rice husk ash as alternatives to specific constituents in concrete. The investigation further examined the chemical components found in the ash and their effects on the durability of compressed concrete. We looked at different chemicals in fly ash and rice husk ash using charts, tables, and pictures. Different ways of handling coal or rice husk at first resulted in varying amounts of specific substances such as Sodium oxide, Titanium oxide, and Phosphorus pentoxide. Sometimes, these substances were decreased significantly or not discussed in the end product**[Sam Joel (July, 2020)].**

LITERATURE REVIEW OF WASTE PAPER SLUDGE ASH (WPSA)

In order to conduct this study, broken concrete blocks that had not been previously used were utilized to create novel materials in a laboratory setting. Crushed and unused concrete undergoes a process in a laboratory to produce recycled materials. Using WPSA (Wireless Power and Signal Amplification) and RCA (Remote Control Automation) is expected to improve the strength and usability of concrete structures. In all mixtures, the absorption of water by concrete will be reduced. The purpose of using these testing methods was to evaluate how well the concrete works and determine if it is suitable for construction projects. The experiment showed that when you combine WPSA and RCA, the strength of concrete gets better**[Fauzi M.A., Sulaiman H., Ridzuan A.R.M. and Azmi A.N. et. al. 2016]**

The concrete mixture had both glass fibers and steel fibers in it, with different amounts of each material. Later, they checked how strong concrete is when compared to regular concrete. Also, we check how long these combinations can stay intact when they touch a substance known as 5% H2So4. Hydrogen combines with chlorine to create a new substance. This mixture can be created by using the leftover ash from waste paper

in concrete. When they checked it, the findings revealed that the concrete became significantly more powerful.**[Mounika Ch., Asif Ali Sk. Et. al. 2015]**

The study employed waste paper sludge ash as a substitute for cement in investigating concrete. We changed the M-20 concrete mix by adding sludge ash instead of some of the cement. Different amounts of sludge ash were used, with the lowest being 5% and the highest being 20%. The examination of the concrete by the scientist aimed to determine its durability, water absorption capabilities, and density. We compared the results of concrete with sludge ash to the results of regular concrete without sludge ash. To make things function well, you can use Waste Paper Sludge Ash instead of cement, but only up to 10% of the total weight. Make sure the ash particles are smaller than 90µm. Utilizing waste paper sludge as fuel can yield significant amounts of power. The ash residue remaining from fuel combustion can be employed as a substitute for cement.**[J. Lakshmi Sudha, D.S.V.S. Ram Sagar, R. Janaki Ram et.al. 2018]**

The substantial energy stored within waste paper sludge ash makes it an extremely beneficial fuel source. Instead of using some cement, you can burn it and use the leftover ash. The main topic covered in this article is the investigation of sludge ash, a waste byproduct resulting from the paper-making process. In the research, it was discovered that Waste Paper Sludge Ash can be utilized as a cement replacement, as long as its proportion is below 5% of the total weight. The ash particles utilized must be smaller than 90 micrometres to guarantee the ease of working with the mixture. **[Harsh K. Mistry, Kaushal D. Patel, Kunj B. Patel, Kahan P. Ramani et. al. 2017]**

The combination of M-20 and M-30 now incorporates waste paper sludge in place of cement. You can use some of the leftover wet paper, called waste paper sludge, from 5% to 20%. Afterwards, we studied these combinations compared to normal concrete to see how they differed in terms of how easily they flowed and how long-lasting they were. Three experiments were carried out on the solid samples. The tests were called compression, splitting tensile, and flexural tests. The tests were conducted in order to determine the duration of something lasting over a span of 28 days**[Sumit A Balwaik; S P Raut et. al. 2013]**

This study seeks to assess how the utilization of WPSA and FRCA, instead of conventional cement and sand, influences the strength and longevity of foamed concrete. The research demonstrates that applying pressure to certain substances increases the durability of foamed concrete. **[Sharipudin, S.S., Ridzuan, A.R.M, and Mohd Saman, H., et. al. December 2012]**

This study wants to find out if waste paper sludge can be used to make concrete. To find out if waste paper sludge can be used instead of cement in concrete, the researchers tested different amounts (4%, 8%, 12%, and 16%) in their experiment. Use different things to make cubes, rectangular bars, and cylinders. Use a mix of regular concrete and concrete that has been partially replaced. The cube was 150mm wide, 150mm long, and 150mm tall. The prism bars were 500 millimeters long, 100 millimeters wide, and 100 millimeters tall. Simplified: The bars were 500 mm long, 100 mm wide, and 100 mm tall. The cylinders were 10 centimeters wide and 20 centimeters tall. After we waited for different durations (3, 7, and 28 days), we tested how well the substance could handle being pressed, bent, and stretched. **[P Bhargavi, S Kavitha Karthikeyan, G Snekha, A Vinothini et. al. March 2016]**

The objective of this research is to investigate the robustness of concrete materials. Furthermore, it seeks to ascertain the optimal quantity of Hypo Sludge that can substitute for a specific amount of cement. Tests will be carried out by scientists to determine the outcome of combining cement and Hypo Sludge. In order to observe the effects on cement, various proportions of Hypo Sludge, such as 5%, 10%, 15%, and 20%, will be experimented with. The purpose of the investigation is to observe the effects on concrete when we include varying amounts of waste called Hypo sludge. We will do tests to measure how tough the material is when compressed and stretched. The directions used to create M25 grade concrete were based on the guidelines in IS: 10262-2009**[Mr.R. Balamurugan, Mr.R. Karthickraja et. al. March 2014]**

The objective of this research was to analyze the outcome of introducing waste paper sludge ash into M20 mix concrete and its implications for the cement characteristics. Experiments were conducted with different quantities of ash added to the mixture in order to determine its impact on strengthening concrete. The amount of ash varied between 0% and 25%. We tested the strength of the concrete after 28 days and compared it to the normal kind to see how well it did. Used paper waste can be burned as a fuel because it has a high amount of heat energy. In the forthcoming years, it will be possible to utilize surplus cash in lieu of cement**[Jeevanjot Singh, Dr. Sandeep Chandel et. al.2023]**

Because more people want traditional materials and want the construction industry to grow sustainably, designers and developers are using different materials in their projects. Using waste materials from industries and leftover material from farming is really helpful for this goal. Scientists have studied adding ash to cement to learn how it behaves in concrete. Additionally, they tried to test how strong and useful concrete is. We make regular concrete using a method called Indian Standard mix design. This method has created a mix design that can replace Rice Husk Ash effectively.**[Jeevanjot Singh, Mohit, Gurpreet Singh et. al. 2023]**

It is very important to find ways to use waste again and use less of our natural resources. By improving how we get rid of dirty water, we can greatly decrease the amount of money spent. This could possibly save up

to half of the total expenses. This research paper looks at how fresh and hardened concrete are different. Moreover, it investigates the application of Waste Paper Sludge Ash (WPSA) instead of cement in the composition of concrete. By adding waste paper sludge ash (WPSA) to concrete, it can make the structures last longer, easier to work with, and less likely to absorb water. Various testing methods were used to check if the concrete was suitable to be used as a structural part. The study found that adding waste paper sludge ash (WPSA) to concrete made it stronger.**[Jeevanjot Singh, Mohit, Gurpreet Singh et. al. 2023]**

MATERIALS UTILIZED

RICE HUSK ASH (RHA)

The waste produced from burning rice husk is known as rice husk ash. Due to the significant rice production in East and Southeast Asia, there is a substantial quantity of rice husk found in the region. Rice cultivation in these Asian countries is made possible by favorable factors such as sufficient land, water resources, and an abundance of rainfall [3-5-8-10-13].

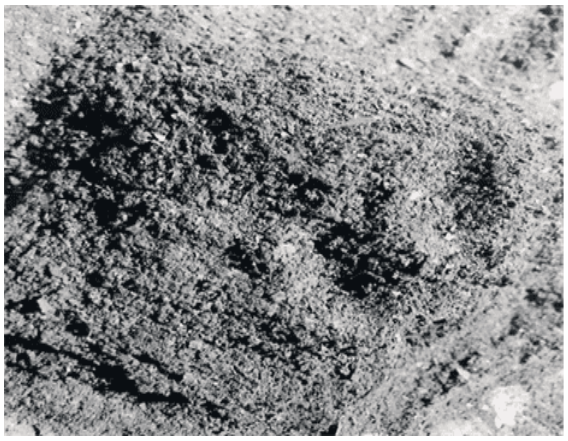

Fig 3 Rice Husk Ash

(Shown in fig 3)Carbon-neutrality, absence of harmful substances, and a low silica dioxide composition are key characteristics of Rice Husk Ash (RHA). It is recommended to use the grayish rice husk ash because it is suitable and safe to use. Much extra shells are removed by using open fields and then put back into the field [15]. Eating rice husk is a way to obtain RHA. This will allow us to use the rice problem in a way that is both interesting and good for the environment [7]. The use of rice husk waste is becoming more common, but there are difficulties in handling it. Rice husk ash (RHA) has the potential to become an important issue in countries that export rice, as it can help reduce environmental pollution. Pozzolan, also known as rice husk ash, is a leftover substance from rice processing. When combined with lime, it shows cement-like qualities [19-20].

WASTE PAPER SLUDGE ASH (WPSA)

Recently, there has been a heightened global focus on preserving the earth's ecological equilibrium and fostering a more environmentally friendly atmosphere. India creates over 300 million tons of waste each year due to its farming and manufacturing activities [24]. Using materials like these creates problems with getting rid of them, possibly harming people's health, and making things look less nice. Instead of using cement to make something strong, you can use waste paper because it contains silica and magnesium [27]. The kind of machines used, the final product made by a recycled paper factory, and the amounts of waste produced are all closely connected. In making cheap hotels, we can use some waste water from paper mills instead of small rocks in the concrete. For every 1 ton of recycled paper, 300 kg of slime is made [30].

Fig 4 Waste Paper Sludge Ash

The expense of constructing a landfill for the paper plant muck is too high given its substantial weight and volumes The primary components of the dry paper ooze consist of silica, calcium oxide, alumina, and magnesium oxide [37]. Using these materials can cause problems when getting rid of them, possible health dangers, and not looking good. One ton of recycled paper results in the production of 300 kilograms of slime [39-40]. (Shown in fig 4)

CEMENT

A robust and long-lasting blend is created when cement and water are combined. This mixture can stick objects together well and make them harden. When constructing buildings, cement is a substance employed to bind and unite various elements [13]. This tool is used for connecting rocks, bricks, and blocks together. Lime, clay, and magnesium are the key ingredients used in the production of this cement [19]. It is commonly used in civil engineering to construct things. To make it, you need to heat limestone and clay or other suitable materials [20]. The widely utilized Portland cement, known as OPC, is classified into types 33, 43, and 53. In construction, cement is a substance that helps different parts stick together. This happens because it becomes hard and strong when it dries [37-40]. (Shown in fig 5).

Fig 5 Cement

AGGREGATES

Mixing various substances such as cement, lime, or mud with aggregates is the process used to create mortar or concrete. Objects can be permanently joined together by these materials, which do not undergo any changes when exposed to different substances [12]. Aggregates make up the majority of concrete, accounting for approximately 60-65% of its composition. The way concrete looks and acts is affected by the stuff used to make it. The building is made using materials that are close by [17]. Gravel works better for big things, while pit sand is better for small things. Aggregates can be divided into two main categories: small or large. Usually, these groups make up about 60 to 65 percent of all the concrete [19]. When rocks are not strong or durable, they often break into two clean pieces. Gravel is the main material that makes up most of the big rocks in concrete [20]. Adding small pieces of rocks and sand to concrete helps make it stronger and last longer, so it doesn't get damaged easily [40]. (Shown in fig 6).

Fig 6 Aggregates

WATER

During the study, water samples were collected from an unobstructed stream for the first time. The water exhibited clarity and purity as it lacked any dirt or impurities within it. It is essential to maintain the acidity level at a minimum of 6 [4-7-13-19-20-28-36-40].

PROBABLE CONCLUSIONS

1. One effective approach to reducing the cost of cement is by incorporating waste materials like Rice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA)into the production process, as they can be acquired at no charge.
2. Substituting cement withRice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA) can enhance the workability and strength of concrete. Experimental evidence shows that it has a longer duration.
3. The strength of concrete surpasses that of normal concrete after a 28-day hardening process with the addition of Rice Husk Ash (RHA) and Waste Paper Sludge Ash (WPSA).

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