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PROPERTIES OF CONCRETE BY PARTIAL REPLACEMENT OF CEMENT WITH BANANA LEAVES ASH: A REVIEW

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Abstract :- Production of waste materials from agriculture in India is increasing day by day. Agricultural wastes are biologically decomposed in the open. Agricultural waste materials can help increase the strength of concrete. The world is now focusing on alternative material sources that cause less harm to the environment. Tons of banana waste are discarded in India, which emit large amounts of methane gas and carbon dioxide, which are harmful to the body when inside and also cause global warming. Banana Leaves Ash is an agricultural product. It has the ability to replace a building material that is cement. Also, many researches has been carried out to use different types of waste in concrete to produce a much economical and sustainable product. The ashes of banana leaves have a pozzolanic reaction that sometimes occurs in cement. After growing a banana tree for consumption of fruits only and discarding the trunks, the use of banana leaves should be explored after the fruits have been harvested. Banana leaf is easily available, it is inexpensive and environmentally friendly. Banana leaf ashes were produced by the process of burning dried banana leaves and collecting its residues. Banana leaf ashes have a lower specific gravity value than normal cement. This makes the resulting concrete lighter with greater proportions of cement. Replacement of cement with banana leaf ash will be beneficial for low-income areas, which will benefit because of its high availability and ease of source and processes that will not be able to keep up with itself. Difficulties are occurring with decreasing average loads on structures that make up the cost and other parameters such as foundation work to reduce cement.

Keyword: - Banana leave ash, Concrete Compressive strength, Cement replacement

I. INTRODUCTION

Many researchers have done so much research in the past and have presented journals, articles, research papers and researches on this subject but the purpose of this study is to discuss in depth the possibilities of banana leaf ashes. This work will review the banana leaf ashes in more detail, as the entry into the production of concrete, its advantages and more valuable information will be analyzed comprehensively. Low cost materials are of great importance due to the increasing demand for a comfortable and affordable housing specially developed. In developing countries with high rates of poverty and starvation, people may not be able to buy imported and more expensive materials, so the use of our indigenous and agricultural waste becomes very important as it is readily available and most of our modern structures good construction has been done. In addition to concrete such as bridges, houses, tunnels, etc., concrete is the widest and oldest material used in construction. It is made up of four types of ingredients, such as granular aggregates, coarse aggregates, water and Portland cement, but for more durable, faster settling time there is need to add admixture to meet the needs of more stable concrete .Plain concrete requires a suitable environment to provide moisture for the minimum desired duration for good hydration and to participate in the desired strength. We know that curing for concrete is necessary for the hydration process. Any lack of curing will severely affect the strength and durability of the concrete.

II. LITERATURE REVIEW

According to Bajrang Dhage et.al. (2020) By partial replacement of cement with BLA the properties of the concrete change in compression, flexural and split tensile strength of the concrete. As the percentage of BLA in concrete increased, the compressive strength decreased compared to normal cement. The strength of the split tensile increases for 20% and 30% substitutions and decreases slightly for 40% and 50% substitutions. Flexible strength is good for 30% replacement. Slight reduction for & 40% & 50% replacement. By using a combination of partial replacement we can reduce the cost of concrete and increase the strength of concrete. Therefore, a combination of the two materials can be used to obtain good strength properties in low cost. They conclude that flexural and split tensile strength increases at 30% replacement of cement with BLA.
Maximum percentage of cement for partial replacement with BLA is 30%.

Ogenyi Ikenna Ndubuisi (2020) He said that the mass strength and density of the specimens decreased as the cement levels were replaced with banana leaf ashes, but the concrete still remains of its plastic nature The reason is that it maintains its workability, so it needs to be increased, practicality by adequate utilization of suitability so that work efficiency is improved and in turn its high power is maintained. Concrete with 15% banana leaf ash content for cement replacement of 15–20% by weight can be used for works requiring medium strength concrete as it exhibits sufficient compressive strength. Banana leaf ashes have a lower specific gravity value than normal cement. This makes the resulting concrete lighter with greater proportions of cement. Replacement of cement with banana leaf ash will be beneficial for low-income areas due to its high availability and ease of source.

K. Madhu prasad et.al.(2019) According to his investigation the strength value decreases slightly by increasing the amount of ash in the banana compared to controlling the banana. Whenever the strength achieved exceeds the target strength of 30 N / mm2. Pozzolanic reactions also increase strength with age. Thus, the use of BLA in concrete helps to transform it from an environmental concern into a useful resource for the production of a highly effective alternative cementing material. The process employed to produce banana leaf ash can be improved as this research has employed banana leaf ash derived from agricultural wastes. By using BLA in variable amount as a replacement for cement in concrete, concrete with higher durability and better strength can be obtained.

Jugal R. Pawar et.al.(2018) They have conducted experimental investigations on the properties of concrete by partial replacement of cement with banana leaves. The partial replacement of cement with BLA results in compression, flexural, and split tensile changes of concrete according to their investigation. They analyzed properties such as compressive, partition tensile and flexural strength were determined by casting cubes, cylinders and beams. The BLA will be used in cement to replace approximately 0%, 15% and 25% respectively. As the percentage of BLA in concrete increases, the compressive strength is joined to the desired strength that decreases with 28 days for 15% replacement with cement and 25% for replacement. The flexible and split tensile strength increases for replacement by 15% and decreases by 25%, respectively, compared to normal mixtures. It conclude that 15% replacement of cement with BLA increases compressive, flexural and split tensile strength.

Vishal Gadgihalli et.al.(2017) They have an analysis of the properties of concrete as a mixture of banana peels and have verified the strength of the concrete and temperature emitted due to the chemical reaction of normal Portland cement. They have observed that the M20 and M30 grades with banana peel powder have lower temperatures (1.2°) C) and (1.17°c) than normal concrete (1.37°c) and (1.39°c). Temperature transmission efficiency is more or less the same for all grades. Approximately 12.41% and 15.82% heat transmitted property is reduced from M20 and M30 grade concrete respectively.

Rodrigo C. Kanning et.al (2014) They found that BLA materials exhibited a Pozolanic activity index with a strength of (7.900 +- 0.098) MPa. They had a good performance in terms of fresh state parameters and mechanical behavior in a rigid mortar state. The compressive strength up to 10% BLA mortar mixture was about 25% higher than that of the reference sample and about 10% higher under stress in bending average. The mechanical strength of solid samples with 10% and 20% BLA mixtures was MPa and (47 +- 2) MPa at 28 days, respectively. These values were 25% and 40% higher than 0% BLA. Both materials had good electrochemical parameters after about 200 days in humidity and cyclic salt spray chamber aging. BLA can be used as a pozzolanic material in civilian structures with low costs and an equivalent reduction of environmental impacts of this type of residue. Occurs as a result of accumulation in the eld. The solid dose electrical distribution network with 10% BLA content was satisfactory as cross arms for factory production.

S. Sakthivel et.al.(2019) They conducted experimental research for concrete with partial replacement of cement by banana leaf ash (2%, 4% and 6%) and tested in addition to banana fiber with 0.2%, test results show that The strength of concrete increases. Concrete mixtures differ in workability compared to conventional mixtures. The addition of banana leaf ash increased the compressive strength of concrete by 2% and 6%. This makes it clear that the substitution made by ash can successfully meet cement properties. Adding banana fiber to the conventional mixture by 0.2% increases the tensile strength of concrete.

III. CONCLUSION

This investigation leads to the following conclusions :- Partial replacement of cement which changes the Compressive, Flexural & Split tensile strength of concrete. As the percentage of BLA increases in the concrete the compressive strength decreased as compare to normal cement, by using above combination of partial replacement we can reduce cost of concrete and increase the strength of concrete. So, the combination of the two materials can be used to get good Strength properties in low cost. According to the presence of pozzolanic essential compound as required by standards, the presence of much finer particles and hence, larger surface area per particles make BLA pozzolanic material. The strength parameters decrease slightly with increase in Banana leaves ash content in the concrete when compared to normal concrete. Also the strength increases with age due to pozzolanic reactions. Thus, use of BLA in concrete helps to transform it from an environmental concern to a useful resource for the

production of a highly effective alternative cementing material. By using BLA in variable amount as replacement of cement in concrete, concrete with high durability and improved strength can be obtained.

IV. REFERENCES

[1] Bajrang Dhage , Vijay Rathi , Pramod Kolase ,"Experimental Study On Partial Replacement Of Cement By Banana Leaves Ash", The International journal of analytical and experimental modal analysis (IJAEMA) ,volume XII September(2020)

[2] Ogenyi Ikenna Ndubuisi ,"Potentials of banana leaf as admixture in the production of concrete", a journal on civil and environmental engineering, 2020

[3] K. Madhu prasad, P. Eswanth , "Mechanical and Durability properties of concrete by partial replacement of cement with Banana Leaves Ash", JAC: A Journal of composition Volume XII Issue XII (DECEMBER 2019)

[4] Jugal R. Pawar, Aman S. Khaire, Experimental Investigation on Properties of Concrete by Partial Replacement of Cement with Banana Leaves Ash", International Journal for Research in Engineering Application & Management (IJREAM) Special Issue-ICRTET-2018

[5] Vishal Gadgihalli, MeenaY.R, Sindhu Shankar and Raghavendra Prasad Havanje Dinakar (2017). "ANALYSIS OF PROPERTIES OF CONCRETE USING DRIED BANANA PEEL POWDER AS ADMIXTURE", International Journal of Research Granthaalayah, 5(11), 351-354

[6] Rodrigo C. Kanning, Kleber F. Portella, Mariana O.G.P. Bragança, Marcelle M. Bonato, Jeannette C.M. dos Santos , "Banana leaves ashes as pozzolan for concrete and mortar of Portland cement", ELSEVIER, journal homepage: www. elsevier.com/locate/conbuildmat (23 January 2014)

[7] S. Sakthivel, R. Parameswari, M. Gomathi, S. Sangeeth ,"Experimental Investigation on Concrete with Banana fiber and Partial Replacement of Cement with Banana Leaf Ash", International Research Journal of Engineering and Technology (IRJET), Volume:06 Issue:03, MARCH 2019.