WASTE COCONUT SHELL: A REVIEW ON CONCRETE

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Abstract

Coconut shell and coir fibres are the natural materials which is abundantly available in tropical regions. In addition to that it will help to produce light weight and economically profitable materials in construction field. The current study examined the suitability of partial replacing of coarse aggregate with coconut shell and coir fibres. To compare the above, test for compressive strength, splitting tensile strength, temperature resistance, water absorption, electrical resistance, chemical resistance, pH test of sample were performed. The specific gravity, bulk density and water absorption of coconut shell and fibres were analyzed. A study on the economic aspects was also carried out. The addition of fly ash helps to increase the strength and workability of concrete. The results obtained from above will be compared with conventional concrete of same mix.

Keyword*- Waste tyre material, concrete, Future trend*

1 INTRODUCTION

The growing concern of resource depletion and global pollution has challenged many researchers to seek and develop new materials relying on renewable resources. These include the use of by-products and waste materials for building construction. The high cost of conventional building materials is a major factor affecting construction in India. In developing countries where abundant agricultural and industrial wastes are discharged, these wastes can be used for various purposes in construction industry. This will have double the advantages, reduction in the cost of construction material and also as a means of disposal of wastes. Thus the approach is logical and worthy. Coarse and fine aggregate used in concrete serve as filling and densifying the material. Nowadays, concrete has become the most widely used material due to easy and local availability of sand and coarse aggregates In our project we are using waste tyre and coconut shell as partial replacement of coarse aggregate in concrete and analyzing its different effect and various property in concrete.

1.1 Tyre Waste Concrete

Concrete is a mixture of cement, coarse aggregates, fine aggregates and water. Concrete is cured for 28 days to attain good strength. Various properties are linked with concrete: Workability is considered as fresh concrete property, where as compressive, tensile and flexural strengths belong to hardened concrete properties Coarse aggregates are obtained from mountains and rocks through quarry and crushing: Nevertheless, these processes are hazardous and are badly damaging the environment. There is a possible use of rubber tyre particles instead of coarse and fine aggregate in concrete. Millions of rubber tyres become waste every year and their disposal has become a serious concern. Moreover, the burning of the waste rubber tyres becomes a cause of pollution for environment. Using rubber in concrete by partial replacing aggregates do not increase compressive and tensile strength than an ordinary concrete but a suitable strength still can be obtained for use in structures

2 LITERATURE REVIEW

Eldin et al., conducted an experimental study on rubberized Concrete in year 1989 behaviour, discarded vehicle tyres constitute one important part of solid waste, which had historically been disposed of into landfills. An emerging reuse is the production of concrete, in which waste-tyre rubber particles in part replace the natural aggregates. This has an additional advantage of saving the natural aggregates used in concrete making. Recycled waste-tyre rubber is a rising material in the construction industry due to its low weight, elasticity, energy absorption, heat and sound proofing characteristics. Waste-tyre rubber can be used as chipped (20-30mm) or crumbed (3-10mm) or ash rubber(less than 1mm). The waste-rubber tyre particles cut into 20mm size. Its benefits are numerous such as reduction of the cost of aggregates and disposal, prevention of environmental degradation, and increase in life span of landfill areas. Concrete pavements are made of high strength mixtures, which lack sufficient flexibility. By partial replacement of fine and coarse aggregates with rubber, sufficient flexibility can be achieved and thermal changes can also be reduced. It is reported that use of waste-rubber tire particles as partial replacement of aggregates in concrete leads to loss of its strength.R. Nagalakshmi conducted an experimental study on Coconut Shell Concrete in year 1987 to assess the strength characteristics on M 25

concrete with partial replacement of cement with fly ash and coarse aggregate with coconut shell. The 20% of fly ash is replaced with cement and simultaneously by replacing 10%, 20% and 30% of coconut shell as coarse aggregate for concrete of grade M 25.Examined strength characteristics such as compressive strength, splitting tensile strength and flexural strength of concrete mix are found for 28 days of curing period, results are analyzed and compared with the regular mix. The results found were comparable with that of conventional mix. The result concludes that the compressive strength, splitting tensile strength and flexural strength of the concrete reduced with increasing percentage of the coconut shell replacement. K. Gunasekaran conducted an experimental study on Coconut Shell Concrete in year 2003 by about utilization of coconut shell as coarse aggregate in the development of light concrete. In this study, coconut shell is used as lightweight aggregate in concrete. The properties of coconut shell and coconut shell aggregate concrete is examined and the use of coconut shell aggregate in construction is tested. Moisture content and water absorption were 4.20% and 24% respectively and these values are more compared to conventional aggregate. Coconut shell exhibits resistance against crushing, impact and abrasion compared to conventional aggregate. There is no need to treat the coconut shell before use as an aggregate except for water absorption.

3 CONCLUSIONS

1. A composite mix of all the waste materials can be used as a replacement of C.A.
2. Chemical testing of e-waste should be done before using in the construction practices.
3. Beams and slabs with different waste should be tested for light weight construction units.
4. Combination with fly ash can also be an option for future experimentation.
5. Discarded vehicle tires constitute one important part of solid waste had historically been disposed of into landfills.
6. Rubber can use in the form of chipped or crumbled.
7. Recycled waste tire rubber has been used in different application. It has been used as a fuel for cement kiln, as feedstock for making carbon black, and as artificial reefs in marine environment.
8. An emerging use is the production of concrete, in which tire rubber particles partially replace natural aggregates; this has the additional advantages of saving in natural aggregates used in the production of concrete.

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