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Retraction

Retraction: Experimental Investigation of Organic Waste Ash in Concrete (*IOP Conf. Ser.: Mater. Sci. Eng.* **1145** 012018)

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[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:[2107.06751v1](#)

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Experimental Investigation of Organic Waste Ash in Concrete

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Abstract. Organic waste is one of the major wastes producing substances in the world. Recycling is done on plastics and other materials due to its high cost. The major constituents of concrete are cement and possess certain properties that cannot be replaced by any material. Usage of cement leads to environmental pollution, greenhouse effect. Replacement of cement with organic waste will reduce the cost, time and also reduces pollution. This paper focuses on replacement of cement partially with organic waste ash in 5%, 10% and 15% by weight on mechanical properties of concrete. The XRF test is used and the result shows organic waste ash is not a pozzolanic substance. The optimum performance is obtained at 5% replacement of cement by weight.

Keywords: organic waste, cement, concrete XRF tests

1. Introduction

Sustainable development is one among the greatest challenges in construction industry. Concrete plays an important role in any construction. In concrete coarse aggregate, fine aggregate and cement are the three materials involved in it [1]. The major cost consuming material is cement hence replacement of cement will give a solution for cost reduction in construction project. Partial replacement of cement with relevant material is essential to maintain the quality and also in cost reduction. Organic waste is one of the most generation wastes in the world [2]. Hence this will be appropriate in replacement of cement in concrete and also dumping of waste can be reduced as well as it will reduce the environmental burden. Fly ash, rice husk ash, wood ash has been used in the concrete and many researches has been made in the above waste [3]. This study focusses on organic waste ash generated after combustion of 80% waste wood and 20% animal waste. This type of waste has been used in olden days for flooring, cladding as a building material [4].



2. Materials

2.1. Cement

Cement which is used in this research is ordinary Portland cement for the preparation of the specimen. Cement is the fine grey powder that acts as a binding material which is used for the construction.

2.2. Fine Aggregate

Aggregate which is free debris was used and aggregate having a size less than 4.75mm was used.

2.3. Coarse Aggregate

Crushed aggregate was used of size 20mm to prepare the concrete specimen.

2.4. Organic waste ash

The organic waste includes wood ash, oak, coconut ash and animal waste ash. Ashes which are passed through 75 μ m were taken for this study [5]. Chemical composition is obtained by using XRF test which is shown in Table 1.

Table1. Chemical composition

S.No	Parameters	Organic waste ash
1	SiO ₂ %	35.3
2	CaO %	13.4
3	Al ₂ O ₃ %	7.6
4	K ₂ O %	5.7
5	Fe ₂ O ₃ %	4.3
6	MgO %	5.1
7	Cl %	2.3
8	P ₂ O ₅ %	1.4
9	SO ₃ %	1.0
10	TiO ₂ %	0.48
11	SrO %	0.15
12	La&Lu %	<1.0

3. Workability

The workability aspect in concrete is very essential in concrete. The workability will be higher in concrete if the slump is high and the better workability will be useful in placing the concrete in desired placed in construction work [6]. Slump test result for partial replacement of organic waste ash in concrete is presented in Table 2. It is observed that inverse relationship is obtained between the percentage usage of organic waste ash and workability [7].

Table 2. Slump value

Organic waste ash %	0	5	10	15
Slump (mm)	40	36	30	6

4. Compressive Strength

5%,10% and 15% replacement of organic waste ash is used in concrete to find the strength and it is compared with conventional concrete at 7-, 28- and 56-days strength [8]. The following Figures 1, 2 and 3 shows the obtained compressive strength using organic waste and wood ash at 7day, 28 day and 56 day.

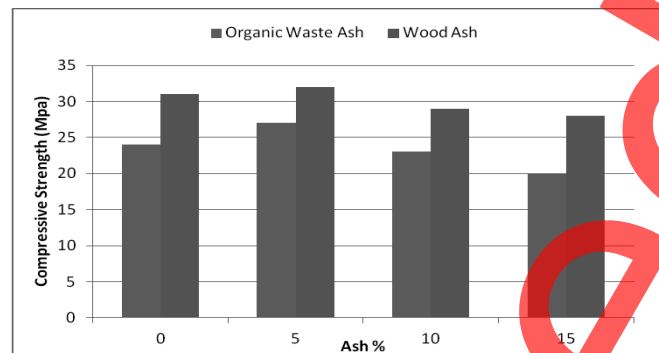


Figure 1. Compressive strength of organic waste ash and wood ash at age of 7 days.

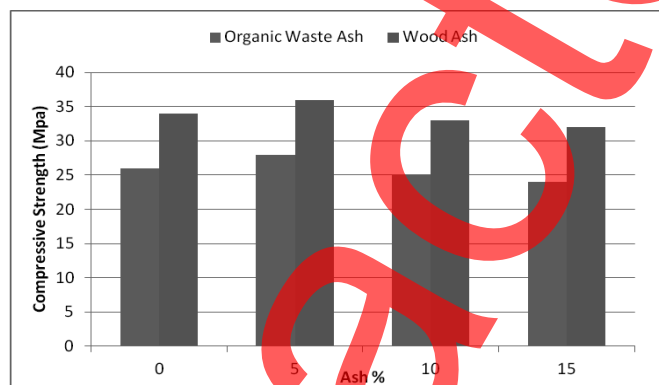


Figure 2. Compressive strength of organic waste and wood ash at 28 days.

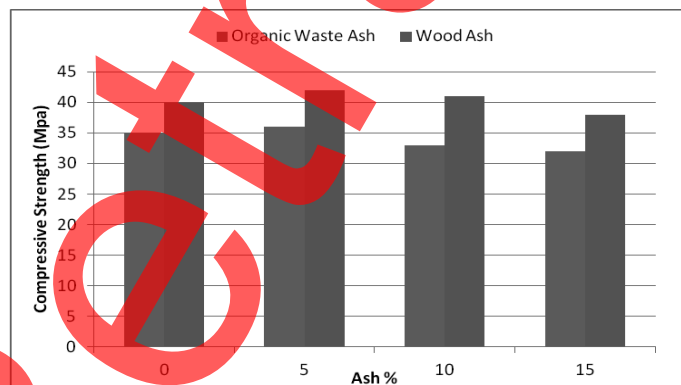


Figure 3. Compressive strength of organic waste and wood ash at 56 days.

5. Tensile Strength

5%,10% and 15% replacement of cement with organic waste ash has been used in concrete to find tensile strength of concrete, and it is compared with conventional concrete at 28 days strength [9-11]. The figure 4 shows the attained tensile strength results using organic waste ash and wood ash at 28 days.

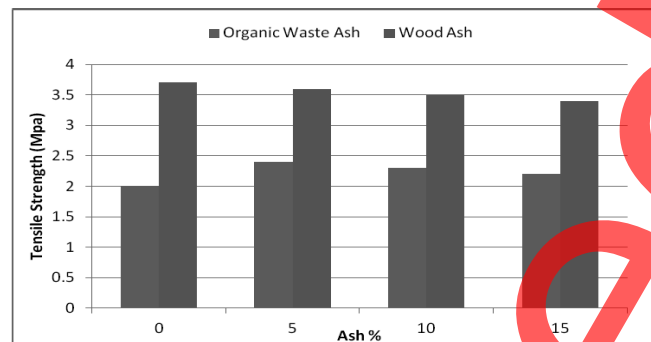


Figure 4. Tensile strength with organic waste and wood ash at 28 days.

6. Conclusion

The following conclusions have been arrived from the various experimental investigations in usage of organic waste in concrete.

- Ductility of the concrete increases when organic waste ash ratio varies from 1 to 6 percent replacement.
- 5% replacement of cement with organic waste have good result in tensile and compressive strength.
- Compressive strength result at 56 days indicates, organic waste does not have any impact on mechanical properties of concrete.
- Workability increases with the percentage increase of organic waste ash in concrete.

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