Retraction

Retraction: Partial Replacement of Saccharum officinarum Bagasse Ash with Cement in Normal Concrete (IOP Conf. Ser.: Mater. Sci. Eng. 1145 012001)

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IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

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

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Partial Replacement of Saccharum officinarum Bagasse Ash with Cement in Normal Concrete

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Abstract. This report represents a detailed works on utilization of refined Saccharum officinarum bagasse ash (SOBA) as partially mixed with the cement content for the preparation of normal concrete. This experiment reveals SOBA result on cement replacement material (CRM). The CRM properties of SOBA were used because of its chemical properties, fine grained and availability. Usages of bagasse ash act as a good additive under continuous production of SOBA. Around 1700 Mt of Saccharum officinarum is produced, which gives roughly 30–35% bagasse in sugar companies. This experimental works enhances the content of SOBA was utilized from 10% - 30% in cement partially. The concrete properties such as workability, compressive strength and splitting tensile strength of concrete using SOBA is done. This shows, replacement of SOBA (6–60% content) inhibit the value of fresh concrete in slump test. The compressive strength and splitting tensile strength of 6% SOBA shows a good increase in their comparison with 100% cement concrete mixture.

Keywords: Saccharum officinarum Bagasse Ash (SOBA), compressive and splitting tensile strength. Cement replacement material (CRM).

1. Introduction
Concrete is the major building material utilized in every part of construction industry. Concrete is usually made of cement, aggregate and water along with chemical admixtures. Thus, concrete is usually weak in tension and strong in compression. Utilization of agricultural waste in concrete will implies on its strength. The Agricultural waste is produced by the different agricultural practices. It includes the waste available after the production of crops, poultry, etc The Saccharum officinarum Bagasse Ash is a Sugarcane is a type crop produced in large quantity. The burning properties of this SOBA are results in large formation of residue after their production. Therefore, it is utilized with the partial mixing with cement for preparation of normal concrete. This project work deals with the usage of Saccharum officinarum Bagasse Ash in normal concrete. The properties of concrete were studied at different parameters.

2. Methodology
This experimental work is done under two phases:

2.1. Phase I
Under this phase the physical properties of cement, fine aggregate, coarse aggregate, water and ash were experimented in laboratory with the standard specifications [1]. Sample test with normal concrete and SOBA under different percentages such as 0%, 10%, 20%, 30% and 40%.

2.2. Phase 2
In this phase covers the study of fresh and hardened properties. Initially the basic test was taken in phase 1 and further the specimens are prepared with the mould of size 150mmx150mmx150mm of about 30 cubes are prepared for testing the compressive strength and further the split tensile strength were determined by preparing the size of specimen of 150mm diameter and 325mm vertical height [2]. About 30 specimens were prepared under different percentage of SOBA mix with the normal concrete.

3. Materials Used
- Cement: Ordinary Portland Cement (OPC-43 grade).
- Fine Aggregate: 4.74mm and retaining on 150-micron standard sieve.
- Coarse aggregates: 20mm.
- Mixing water: Potable Water
- Saccharum officinarum Bagasse Ash: 60% of cellulose, 15% of hemi-cellulose and 25% of lignin.

4. Mix Design
Mix Design Process is made as per code IS 10262-2009.
Final quantities for 5% Cement = 348.00 kg/m³
Bagasse ash = 35.40 kg/m³
Fine aggregate = 652.25 kg/m³
Coarse aggregate = 1170.00 kg/m³
Water content = 210.35 kg/m³
Water-cement ratio = 0.56
Final mix proportion = 1: 1.54: 2.6

5. Experimental Work
The properties of all the materials utilized is satisfy the requirements of codal provisions and the results are represented in Table 1 and Table 2. The properties of concrete tested and tabulated in Table 3.

| Sl. No | Material          | Test                | Result |
|--------|------------------|---------------------|--------|
| 1      | Cement           | S.G                 | 3.8    |
|        |                  | In.setting time(min) | 30     |
|        |                  | Fi.setting time(min) | 280    |
|        |                  | Fineness (%)        | 7.8    |
| 2      | Bagasse ash      | Specific gravity    | 2.60   |

(Note:S.G- Specific gravity, In.setting Time, - Initial setting Time, Fi.setting time: Final setting Time)
Table 2. Test results of Fine and coarse aggregate

| Sl. No | Material       | Test | Result |
|--------|----------------|------|--------|
| 1      | Fine Aggregate | S.G  | 2.60   |
|        |                | W.A (%) | 1.35 |
|        |                | F.M  | 3.0    |
| 2      | Coarse Aggregate | S.G  | 2.65   |
|        |                | W.A (%) | 0.8  |

(Note: S.G - Specific gravity, W.A - Water Absorption, F.M - Fineness Modulus)

The results obtained from the various test of cement, Bagasse ash, aggregates from the laboratory satisfy the BIS Code requirements [3,4].

5.1. Test on Properties of Concrete

Table 3. Slump Test results

| W/C Ratio | Initial Value (mm) | Final Value (mm) | Type of slump | Slump value (mm) |
|-----------|--------------------|------------------|---------------|------------------|
| 0.45      | 300                | 300              | True          | 0                |
| 0.50      | 300                | 270              | -             | 30               |
| 0.55      | 300                | 231              | Shear         | 69               |
| 0.60      | 300                | 206              | Collapse      | 94               |

5.2. Compressive Strength Test

The table 4 and figure 1 clearly shows that the difference in strength between Normal concrete and SOBA concrete [5]. It shows the compressive strength for 7 days and 28 days is 10% replacement of Bagasse ash and strength increases enormously [6]. From the above study of compressive strength, it clearly states that with less percentage of mixing of SOBA will gradually extend gradually the compressive strength of normal concrete.

Table 4. Compressive strength results of SOBA in Concrete

| Specifications | 7-days  | 28- days |
|----------------|---------|----------|
|                | (MPa)   | (MPa)    |
| SCBC 0%        | 17.59   | 25.04    |
| SCBC 10%       | 21.28   | 27.67    |
| SCBC 20%       | 16.80   | 26.51    |
| SCBC 30%       | 13.67   | 23.10    |
| SCBC 40%       | 12.56   | 20.02    |
5.3. Split Tensile Strength Test
The table 5 and figure 2 clearly shows that the difference in strength between Normal concrete and SOBA concrete [7]. It shows the split tensile strength for 7 days and 28 days is 10% replacement of Bagasse ash and strength increases gradually [8]. From the above study of split tensile strength, it clearly states that with less percentage of mixing of SOBA will gradually extend gradually the compressive strength of normal concrete [9,10].

Table 5. Split Tensile strength results of SOBA in Concrete

| Specifications | 7-days (MPa) | 28- days (MPa) |
|----------------|-------------|----------------|
| SOBA 0%        | 2.3         | 3.0            |
| SOBA 10%       | 3.6         | 4.5            |
| SOBA 20%       | 2.4         | 3.2            |
| SOBA 30%       | 2.5         | 3.1            |
| SOBA 40%       | 2.0         | 2.3            |

Figure 2. Splitting tensile strength of SOBA concrete at 7 and 28 days
6. Conclusion
This project work was done successfully, with the utilization of SOBA as a replacement material in concrete with the partial mixture with cement. From the work done the following conclusions have been summarized:
• SOBA in concrete extend gradually the compressive strength of normal concrete.
• SOBA gives the maximum splitting tensile strength to normal concrete.
• SOBA utilization in concrete is a technique of reducing waste residue accumulated after production.
• SOBA saves the quantity of cement with its mixture partially.
• SOBA empowers the workability therefore does not need super plasticizers.

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