

Experimental Study of Concrete Properties by Partially Replacement of Bagasse Ash for Cement

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Abstract

This paper reports the recycling of bagasse ash (waste product of sugar industries) as a cement replacement in concrete. Which provides a satisfactory solution to environmental concerns associated with waste management. Waste management is all the activities and action required to manage waste from its inspection to its final disposal. Sugar cane bagasse is a fibrous waste product of the sugar refining industry along with ethanol vapour. Therefore studies have been carried out on the uses of bagasse ash partially natural cement replacement in concrete. This project aimed to determine the level of bagasse ash replacement resulting in optimal compressive strength and split tensile strength test. The properties for fresh concrete are tested like slump cone test and for hardened concrete compressive strength at the age of 7, 14, and 28 days. Bagasse ash replacement in the proportion of 25%, 30% and 35% for cement. The test result indicate that the strength of concrete increases in the proportion of 30% replacement of bagasse ash with cement

Keywords: Ordinary Portland cement, Sugar Cane Bagasse Ash, Chemical Properties, Compressive Strength, Split Tensile Strength

Introduction

Concrete is the most widely used material on earth after water. Many aspects of our daily life depend directly or indirectly on concrete. Concrete is prepared by mixing various constituents like cement, water, aggregate, etc. For each ten tons of sugarcane crushed, a sugar factory produces nearly three tones wet bagasse ash. Bagasse ash is residue obtained from burning of bagasse in sugar producing factory. When bagasse waste is burned under the controlled manner. It also gives ash having amorphous silica, which has pozzolanic properties. Therefore, studies have been carried out on the uses of bagasse ash partial cement replacement in concrete. The increase in demand for the ingredient of concrete by partial replacement of material by the waste materials which is obtained by means of varies industries. This research work determine the effect of partial replacement of cement by bagasse ash on the mechanical properties of concrete. In the search for local building materials which is cheaper and readily available, the pozzolanic activity of bagasse ash is investigated and assessed in this research work by determining the strength of the mixtures when portion of cement is partially replaced. Therefore it might possible to use sugarcane bagasse ash (SCBA) as cement replacement material to improve quality and reduce the cost of construction materials such as mortar, concrete pavers, concrete roof tiles and soil cement interlocking block etc.

1. Materials and Properties

1.1 Bagasse Ash

The sugarcane bagasse consists of approximately 50% of cellulose, 25% of hemicellulose and 25% of lignin. Each ton of sugarcane generates approximately 26% of bagasse (at a moisture content of 50%) and 0.62% of residual ash. The residue after combustion presents a chemical composition dominantes by silicon dioxide (SiO₂). In spite of being a material of hard degradation and that presents few nutrients, the ash is used on the farms as a fertilizer in the sugarcane harvests.

1.2 Standard values of Cement

Table 1. Test on cement

Tests	Standard Values
Normal Consistency	28% (As Per Is12269-1987)
Initial Setting Time (Min)	33 Min (As Per IS12269-1987)
Final Setting Time (Min)	125 Min (As Per IS12269-1987)
Specific Gravity	3.15 (As Per Is12269-1987)
Fineness Of Cement	8% (As Per IS12269-1987)