

## Experimental Investigation on Partial Replacement of Cement by Neem Leaves Ash

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**Abstract:** As a result of the rising cost of building materials, it has become necessary to search for the affordable and cheaply obtainable material which might be partially replaced cement in the production of concrete. This project is an experimental study on the use of Neem Leaf Ash (NLA) as partial replacement for cement. Then, Neem leaves were dried, burnt and heated in a furnace to produce Neem Leaf Ash, which was discovered to possess pozzolanic properties. The Ordinary Portland cement was replaced by NLA at 05%, 10% and 15% by weight and the cubes were crushed to know the compressive strength of the concrete at different curing days. The results revealed that, the workability and strength properties of the resulting concrete was dependent on the water cement ratio, total days of curing, and percentage of replacement of NLA for OPC. It was noticed that the result of 5% and 10% NLA were gradually increasing at 28 days. We hope that this project work will provide a quick reference to practicing Engineer, who will find NLA as a good partial replacement for cement in concrete, thus reducing cost of concrete production.

**Keywords:** Cement, Fine aggregate, Coarse aggregate, Neem leaves ash.

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### I. Introduction

Ordinary Portland cement is one of the most important binding materials in terms of quantity produced. Since it is manufactured at very high temperatures, it consumes a lot of energy. Along with huge amounts of energy consumption, it emits harmful gases, which pollute the atmosphere. This affects the durability of Portland cement pastes, mortars and concretes. Natural pozzolans are vitreous cementitious materials, which by themselves possess little or no cementing value, but finely ground in the presence of moisture, they will chemically react with calcium hydroxide at ordinary temperatures to form hydrated phases possessing cementing properties. A sincere attempt has been made to study the possibility of using bamboo leaf ash as a partial substitute to cement, as it is amorphous in nature and has been found to have pozzolanic properties after calcination. Neem is a composite material which grows abundantly in our country. Since the cost of cement is high, neem leaves ashes are partially replaced with cement. Using the facilities present nowadays partial replacement by increasing the percentages of the neem leaves ash as 5%, 10%, 15% and decreasing the amount of cement the strengths such as compressive strength and tensile strength have been planned in our project.

### II. Materials and Methods

#### Cement

The Bureau of Indian Standards (BIS) has classified OPC in three different grades. The grades are (i) 33 grade (ii) 43 grade (iii) 53 grade. The binding materials used in concrete are Ordinary Portland Cement. This cement is of 43 grades conforming to IS 456-2000 and is having desired properties. The compressive strength of cement is checked by casting cube and testing under compressive testing machine and tensile strength of cement is checked by casting cylinder and testing under tensile testing machine.

#### Fine aggregate

Aggregate which is passed through 4.75 sieve and retained on 75 micron (0.075mm) is termed as fine aggregate. Fine aggregate is added to concrete to assist workability and to bring uniformity in mixture.

Usually, the natural river sand is used as fine aggregate.

#### Coarse aggregate

The coarse aggregate for the works should be river gravel or crushed stone. Angular shape aggregate of is 20mm and below. It should be hard, strong, dense, durable, clean and free from clay or vegetable matter. The pieces of aggregates should be cubical, or rounded shaped and should have granular or smooth surfaces. Coarse