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Estimation of Compressive Strength of Cement Replacement for Different Biomass Percentage

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Abstract: *This study investigates the effect of partially replacing Ordinary Portland Cement (OPC) with Rice Husk Ash (RHA) and Sugarcane Bagasse Ash (SBA) on the mechanical properties and workability of M30 grade concrete. Cube, cylinder, and beam specimens were cast and tested for compressive, split tensile, and flexural strength after curing periods of 7, 14, 28, 56, and 90 days, in accordance with IS standards. The replacement levels varied, with RHA and SBA substituted at 5%, 10%, 15%, and 20%, and their combinations evaluated for optimal performance. The results indicated that individual replacements of RHA and SBA influenced strength development differently, with compressive strength decreasing at higher RHA content due to its porous nature, while SBA contributed positively up to 15% replacement. Workability improved with SBA but declined with increasing RHA content. A combined replacement of 15% SBA and 10% RHA yielded the highest values in compressive, tensile, and flexural strength, making it the optimal mix. The incorporation of RHA and SBA not only enhances certain mechanical properties but also offers an environmentally sustainable and cost-effective alternative to conventional cement, promoting the reuse of agro-industrial waste in construction materials*

Keywords: Rice Husk Ash, Sugarcane Bagasse Ash, Compressive Strength, Workability, Sustainable Concrete

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