

# The Utilization of Agricultural Waste as Agro-Cement In Concrete

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**Abstract:** *The utilization of agricultural waste as agro- cement presents a sustainable and innovative approach to addressing the environmental and economic challenges in the construction industry. Agricultural by-products such as bamboo leaf ash and sugarcane bagasse ash, known for their pozzolanic properties, can effectively replace a portion of traditional cement in concrete mixtures. This substitution not only reduces the carbon footprint and reliance on energy- intensive cement production but also promotes waste valorization and supports the circular economy by minimizing landfill disposal. These agro-wastes, being locally available, offer cost advantages and contribute to resource efficiency in rural and semi-urban construction settings. Compared to industrial by-products like fly ash, bamboo leaf ash and bagasse ash demonstrate competitive mechanical performance, particularly in terms of compressive, tensile, and flexural strength when used in optimal proportions (10–20%). While fly ash enhances long-term strength due to its slower pozzolanic reaction, agro-wastes often improve both early and long-term strength depending on their composition and treatment. This study explores the feasibility and effectiveness of using these materials in concrete, comparing them to fly ash, analyzing their chemical properties, and assessing their impact on the workability, durability, and environmental sustainability of the final concrete product. The findings suggest that bamboo leaf ash and sugarcane bagasse ash hold significant potential as eco-friendly, locally sourced alternatives to conventional cementitious materials, paving the way for greener infrastructure development..*

**Keywords:** Agro-cement, Bamboo leaf ash, Sugarcane bagasse ash, Fly ash, Sustainable construction

