Effect of banana skin powder and coir fibre on properties and flexural behaviour of precast SCC beam

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ABSTRACT

This paper addresses the potential alternative green construction technology utilising agricultural waste. Research on precast self-compacting concrete beam (PSCC-B) incorporating banana skin power (BSP) as cement replacement, and coir fibre (CF) as filler, was conducted. In this research, the materials and mechanical properties of the self-compacting concrete (SCC) with added BSP and CF were investigated. The study encompasses two trial mix comprising different percentages of BSP and CF. Two (2) control beams and six (6) beams containing various percentages of BSP and CF were cast and tested under a four-point loading test with a shear span-to-depth ratio of 1.7. From the results obtained, it was observed that an innovative mix ratio of SCC with 0.4% BSP and 0.5% CF enhances its compression strength and tensile strength by up to 7% and 59%, respectively. Likewise, modulus of elasticity for SCC with various ratios of BSP and CF recorded values in the range of 31–43 GPa, which is similar to or higher than most normal concrete. The flexural test results showed that PSCC-B with 0.4% BSP and 0.5% CF attained the highest ultimate flexural load, slightly lower deflection, and less crack width compared to the other beams.

KEYWORDS

Banana skin powder; Coir fibre; Flexural behaviour; Mechanical properties; Self-compacting concrete beam

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