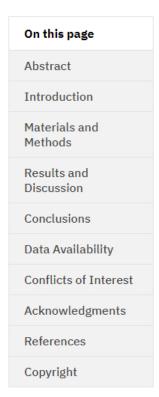
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# Impact of Addition of Banana Fibres at Varying Fibre Length and Content on Mechanical and Microstructural Properties of Concrete

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### Abstract

This experimental study aimed at investigating the impact of addition of banana fibres on the mechanical (compression, splitting tension, and flexure) and microstructural (microscopic morphology and Energy Dispersive X-ray Spectroscopy) properties of concrete. Concrete mixes comprising of banana fibres of varying fibre lengths (40, 50, and 60 mm) and fibre contents (0.1, 0.2, 1.0, 1.5, and 2.5%) were assessed. Addition of banana fibres to concrete was observed to significantly impact on compressive strength only at lower fibre contents of up to 0.25% for all fibre lengths. Fibre length had no significant impact on compressive strength at lower fibre contents of up to 0.25%, but shorter fibres were observed to perform better than longer ones at higher dosages more than 0.25%. Increase in fibre content positively impacted on tensile strength of concrete at relatively lower fibre dosages of up to 1%. Similarly, fibre length impacted on tensile strength of concrete at lower fibre contents of up to 1% and, longer fibres were observed to be more effective than shorter ones. Addition of banana fibres generally did not greatly contribute to flexural strength of concrete but had a marginal impact only when shorter fibres were used at lower fibre dosages. Also, microstructure of concrete was improved through better bonding between the fibres and the matrix and reduction in porosity of the matrix, which resulted in improved mechanical properties of the composite. Banana fibres further contributed to changes in phases of the composite structure of Banana fibrereinforced concrete (BFRC) through a reduction in its interplanar spacing and



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