

Potential Use of Bamboo Reinforced Concrete Beams towards Sustainable Construction

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Bamboo is a natural resource that has the potential to be a substitute of steel reinforcement in reinforced concrete. This paper presents a study on the mechanical properties of bamboo as well as the behaviour of bamboo-reinforced concrete beams. Six bamboo samples were tested for compressive strength and tensile tests, respectively. In terms of structural properties, three reinforced concrete beams were tested to failure under four-point bending, which includes a control beam, a fully and partially reinforced beams with bamboo. Results of mechanical properties showed that bamboo with nodes has higher capability to be able to resist compressive loading compared to bamboo without node. On the other hand, tensile results revealed that bamboo splint managed to achieve 12.5% of the stress of high yield steel with comparable strain value. Results of structural properties showed that beam reinforced with bamboo can achieve approximately 46% of the beam capacity of the steel reinforced beam. Bamboo reinforced concrete beams failed in a brittle manner under bending with vertical cracks in the tension zone.

Keywords: Bamboo; Potential; Reinforced Concrete Beams; Steel; Substitute.

1. Introduction

Concrete is the most important building material due to its high compressive strength characteristic. Concrete is often reinforced with steel to improve its tensile strength. The combination of both materials which formed reinforced concrete is capable of sustaining dead load as well as the live load of the building structures. The extensive use of steel reinforced concrete in the construction industry contributes to the environmental deterioration. Production