

# Use of Processed Tea Waste Powder and Fiber in Improving the Properties of Rice Husk Ash Filled Compressed Stabilized Earth Blocks

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Rice husk ash (RHA) and processed tea waste (PTW) are major agricultural wastes. A recent study has shown that 7.5% of soil can be replaced with RHA in Compressed Stabilized Earth Blocks (CSEBs) due to its pozzolanic properties. Since PTW shows good pore-forming ability, the present study was planned to determine whether there is a potential to improve pore properties of previously upgraded CSEBs by replacing soil with PTW powder or fiber. The mixing percentage of soil, cement and RHA was 86.25: 6.25: 7.50 in the previously upgraded block. Five types of CSEBs of 300 mm x 150 mm x 100 mm (L x W x H) were manufactured by replacing 0% (Control- BC), 3 % (B3), 5% (B5), 7% (B7) of soil by PTW powder and 3% (BF) of soil by PTW fiber. The suitability of properties of raw materials were tested prior to manufacture CSEBs. Mechanical properties of manufactured CSEBs were tested. Data were subjected to One-way ANOVA followed by Tukey's pair wise comparison in MINITAB 14. The values were compared with SLS 1382: 2009 and British standards. The dry and bulk densities and weight reductions of PTW incorporated blocks (B3, B5, B7 and BF) showed significantly higher reductions ( $p < 0.5$ ) than that of Controls. B3 showed the highest compressive strength ( $3.8 \text{ Nmm}^{-2}$ ) except Controls. In addition, B3 also showed the lowest surface erosion (pitting depth = 0 mm and pitting rate =  $0 \text{ mm min}^{-1}$ ) and the highest durability (Slake durability Index = 90). In addition, B3 showed the lowest loss on ignition (12.5%) and the percentage weight reduction (6%) except controls. According to SL standard 1382 part 1: 2009, only blocks BC and B3 were suitable for construction of walls (Grade 3). In addition, B3 was also suitable for external walls compared to control blocks. When compared with the British standards, only BC was suitable for load bearing walls for two storey houses. Considering all aspects, 3% of PTW powder incorporated CSEBs with 7.5% of RHA can be recommended for single story buildings and for external use in places where PTW is highly abundant.

*Keywords: RHA; PTW; Pozzolanic properties; Pore-forming ability*

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