Evaluating The Thermal Efficiency and Aesthetic Qualities of Rice Husk Based Clay Wall Panel for Sustainable Building Application

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Abstract— This study evaluates the thermal performance and aesthetic characteristics of lightweight wall panels produced from rice husk–reinforced clay for sustainable building applications. A locally sourced clay mixture known as "Goda Meti", a traditional Sri Lankan blend of clay and natural additives used in construction, was selected based on preliminary trials. The clay underwent sun-drying for seven days, grinding into powder, and removal of non-clay particles before paste formation. Rice husk was incorporated at concentrations ranging from 10 to 20 weight percent (wt%). The addition of 15 wt% rice husk resulted in the greatest improvement in thermal insulation, reducing the temperature gradient by -0.10°C/mm compared to pure clay. Increasing rice husk content beyond 15 wt% produced negligible further changes. Higher rice husk content decreased bulk density from 1.52 to 1.10g/cm3, increased water absorption, and did not significantly affect thickness swelling. Assessment of surface color, texture, and smoothness identified the most favorable aesthetic finish at 10 wt% rice husks. Lastly, rice husk–Goda Meti clay panels demonstrate reduced weight and improved thermal insulation with acceptable surface quality, supporting their potential as low-cost, sustainable interior wall panels for energy-efficient buildings.

Keywords—Rice Husk, Clay, Sustainable Wall Panel, Thermal Conductivity, Aesthetics Qualities