



# Optimizing Lime Mortar Performance: A Comprehensive Study on Mechanical and Durability Improvements with Palm Jaggery and Gallnuts

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## Abstract

Cement plays a major role in construction, but lime mortars are becoming more significant as modern building materials, especially for historic building restorations. This study investigates using two naturally occurring additives, palm jaggery and gallnut, as modifiers in the mixed water and lime mortar (class B). Workability, compressive strength, water absorption, acid resistance, NaCl cycle testing, and microstructural analyses using SEM and XRD were among the experimental tests conducted. Based on fresh mortar testing, four distinct additive dosages (5%, 10%, 12.5%, and 13%) and three distinct weight-to-length ratios (0.5, 0.6, and 0.65) were considered. In light of those mix design specifications, 39 blends were selected, and their fresh and toughened properties were assessed. About 4.3 MPa of maximum compressive strength was reached, which is 200% stronger than traditional lime mortars.