Abstract

This study evaluated unbleached short eucalyptus pulp (EUCANATURAL) as reinforcement in fiber cement composites in air-cured flat, corrugated sheets and autoclaved boards. Its performance was compared with conventional Pinus and recycled cotton rag pup through mechanical, physical, dimensional, processing, and microstructural analyses. In autoclaved boards, complete replacement of Pinus by EUCANATURAL increased the modulus of rupture from 6.89 to 14.02 MPa, without significant changes in water absorption or bulk density. In air-cured composites, EUCANATURAL maintained flexural strength comparable to the reference formulations, while no adverse effect on dimensional stability was observed. EUCANATURAL also provided the highest solids retention during vacuum filtration, reaching 95%, 93%, and 99% for flat, corrugated, and autoclaved formulations, respectively. SEM observations showed eucalyptus fibers distributed within and in close contact with the cementitious matrix after both air and autoclave curing. The results demonstrate that unbleached short eucalyptus pulp can replace conventional softwood pulps while maintaining the physical and dimensional performance of fiber cement. Its marked contribution to flexural strength in autoclaved boards, combined with higher solids retention during processing, indicates advantages for both composite performance and material utilization in fiber cement production.