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Conclusion and recommendation for further work

6.1. Conclusion

The treatment made using 2 mm aggregate, epoxy resin and with a cleaning surface procedure for the bamboo, with or without node, has proven to be significantly better in performance. Bond strength improved on average 4.5 times more than the natural bond stress of bamboo when embedded in concrete, as well as improving the waterproofing of the bamboo. Nevertheless as the bamboo node region has got the weakest stem fibres it has had an important influence on the bond stress and bearing resistance. This surface treatment on the bamboo strips means they can be safely used as concrete reinforcement.

The results from the test of two-way concrete slabs reinforced with bamboo strips showed that the gravel coating treatment applied on the bamboo strips successfully achieved increased bonding and the transfer of tension between concrete and bamboo. This has led to the mechanical properties of bamboo to be used more efficiently when the bamboo is applied for use as concrete reinforcement.

The results show that the use of *Dendrocalamus giganteus* (DG) bamboo layers with highest fibres volume fraction (V_f) and a moisture content up to ~ 2% (preferentially) can be applied in composite materials for engineering purposes when high tension and compression properties are required.

According to the predicted tensile strength and modulus of elasticity of the *Dendrocalamus giganteus* (DG) bamboo fibres (958.3 MPa and 54.4 GPa respectively), research is needed into a specific procedure to obtain bamboo fibres without them losing their mechanical properties.

Finally, using bamboo surface treatment on bamboo culm strips or laminated bamboo (highest V_f) strips and bars with a controlled moisture content in the fibres (0% MC to 2% MC) provides a new alternative material for concrete reinforcement in the Civil Engineering field.

6.2. Recommendation for further work

- A design methodology for bamboo concrete composite floor slabs needs to be established.
- A natural bonding resin that has equivalent properties to the epoxy resin currently used in this study must be researched and then applied to surface bamboo treatment for concrete reinforcement.
- A specific procedure to obtain bamboo fibres without them losing their mechanical properties needs to be researched.
- A study on injection or impregnation of the bamboo xylem to improve its mechanical properties as a matrix needs to be researched.
- More structural elements using the new material proposed in this study needs to be tested.
- Laminated bamboo composites which used the layers with the highest fibres volume fraction (V_f) of DG bamboo (studied in this work) needs to be study for more applications in engineering.