Mortar based on hydraulic lime reinforced using natural fibers.

IS IT:

- [X] *Product*
- [ ] *Technology*
- [ ] *Equipment*

APPLICABLE FOR:

- [ ] *Restoration*
- [X] *Rehabilitation*
- [X] *New Construction*

APPLICABLE ON:

- [ ] *1. Foundations and underground structures*
- [X] *2. Vertical structures*
- [X] *3. Horizontal structures and vertical connections*
- [ ] *4. Roof and terraces*
- [ ] *5. Façade and building envelope*
- [ ] *6. Finishes and completion elements*
- [ ] *7. Integrated services*
- [ ] *8. General strategies for building recovery*

Related companies: *No companies; university research; structural study.*

DESCRIPTION

Flexural toughness is crucial for building applications to withstand horizontal stresses such as earthquake shocks or wind.

A significant advantage concerning fiber reinforcement of brittle materials is the composite behavior after cracking. Post-cracking toughness induced by natural fibers in cement materials may allow the large-scale construction to use of such composites.

The reinforcement is distributed into the composite leading to the effective capacity of sealing and bridging cracks under flexural or tensile stress. Particularly, three different fibers'(Giant Reed Fibers) lengths, 4, 8 and 12 centimeters, and three weight ratio, 0.5, 1 and 2% are used.

WHY TO USE

Nowadays, there is a growing need to reduce the environmental impact generated by the use of inorganic materials for building applications. The aim of this work is to investigate the bio-lime based mortar flexural toughness improvement due to the addition of common reed fibers (Arundo donax L.) in order to evaluate their possible application as ductile eco-compatible prefabricated bricks or laying and joint mortars for masonry. Overall, the findings of this study are valuable to understand the flexural behavior of new eco-compatible natural fibers reinforced mortars for masonry application providing scientific evidence of the effectiveness of giant reed fibers in the manufacturing of green building materials, as bricks or laying mortars.

The mortar can be used for:

- consolidation of historical walls;
- reinforcement of vertical elements;
- mortar for wall joints.

HOW TO USE AND APPLY

The mortars are obtained by mixing for five minutes the bio-lime mortar with randomly oriented fibers and using a water to mortar weight ratio equal to 0.18 according to mortar's technical sheet.

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TECHNICAL CHARACTERISTICS

The use of natural fibers as reinforcement for cement or lime-based mortars is increasingly emerging due to the improvement of mechanical properties that encourages their application in green building

The reed fibers reinforced natural hydraulic lime mortars can be consider as ductile eco-compatible prefabricated bricks, laying and repairing mortars for green building masonry application.

Fig.1: Bending tests at building Laboratory. *©Antonino Valenza*

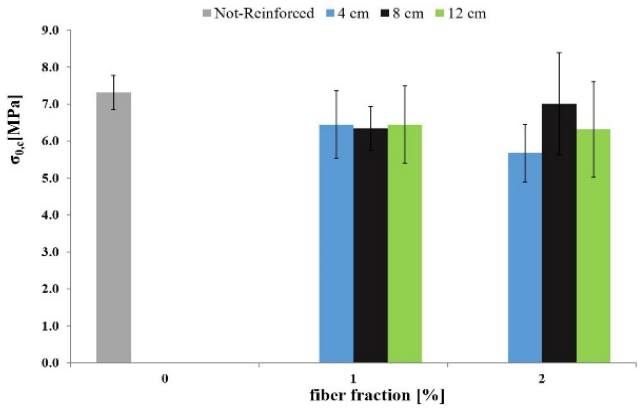

Fig.2: Compression strength (in function of the fiber fraction for different fiber lengths). *©Antonino Valenza*

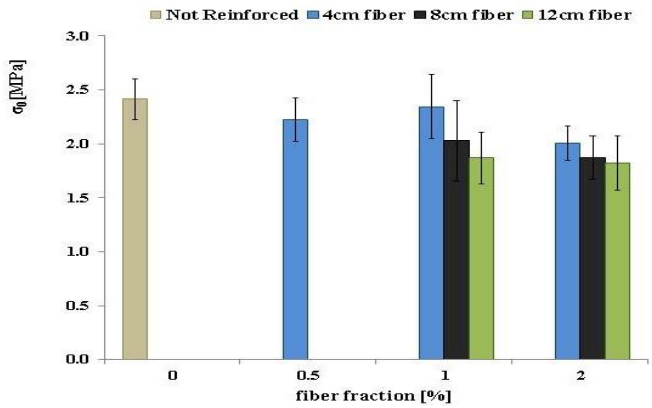

Fig.3: Flexural strength (in function of fiber fraction for different fiber lengths). *©Antonino Valenza*

There is a noticeable increase in the post-fracture stress with the rise of the fiber length, due to the higher amount of fibers crossing the midsection where the composite fracture is triggered. In particular, for 12 cm fiber reinforced mortars, a hardening behavior was observed.

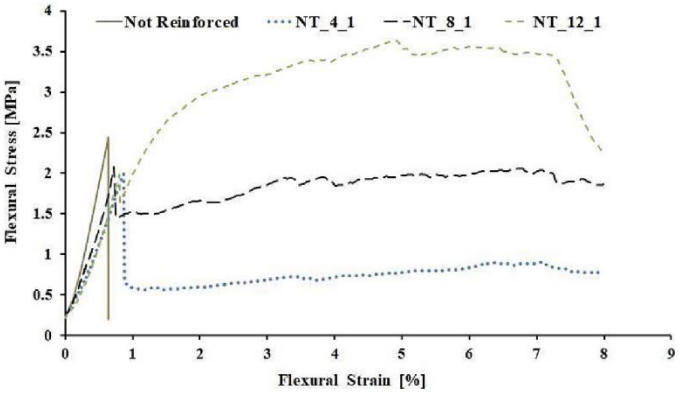

Fig.4: Flexural strength (in function of flexural strain). *©Antonino Valenza*

Modification of Natural Hydraulic Lime based mortar by the addition of common reed fibers can be a possible solution for manufacturing ductile eco-compatible prefabricated bricks or laying mortars for the green building sector.

RECOMMENDATIONS AND OTHER INFORMATION

N/A

EXAMPLES

N/A

REFERENCES / SOURCES AND LITERATURE

This scientific research was conducted inside the Laboratory of Natural, Composite and Hibryd Materials of the University of Palermo, Department of Engineering.

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Article:https://www.sciencedirect.com/science/article/pii/S2214509520300978?via%3Dihub

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WEBSITE OF THE COMPANY

N/A

IMAGES AND CAPTIONS

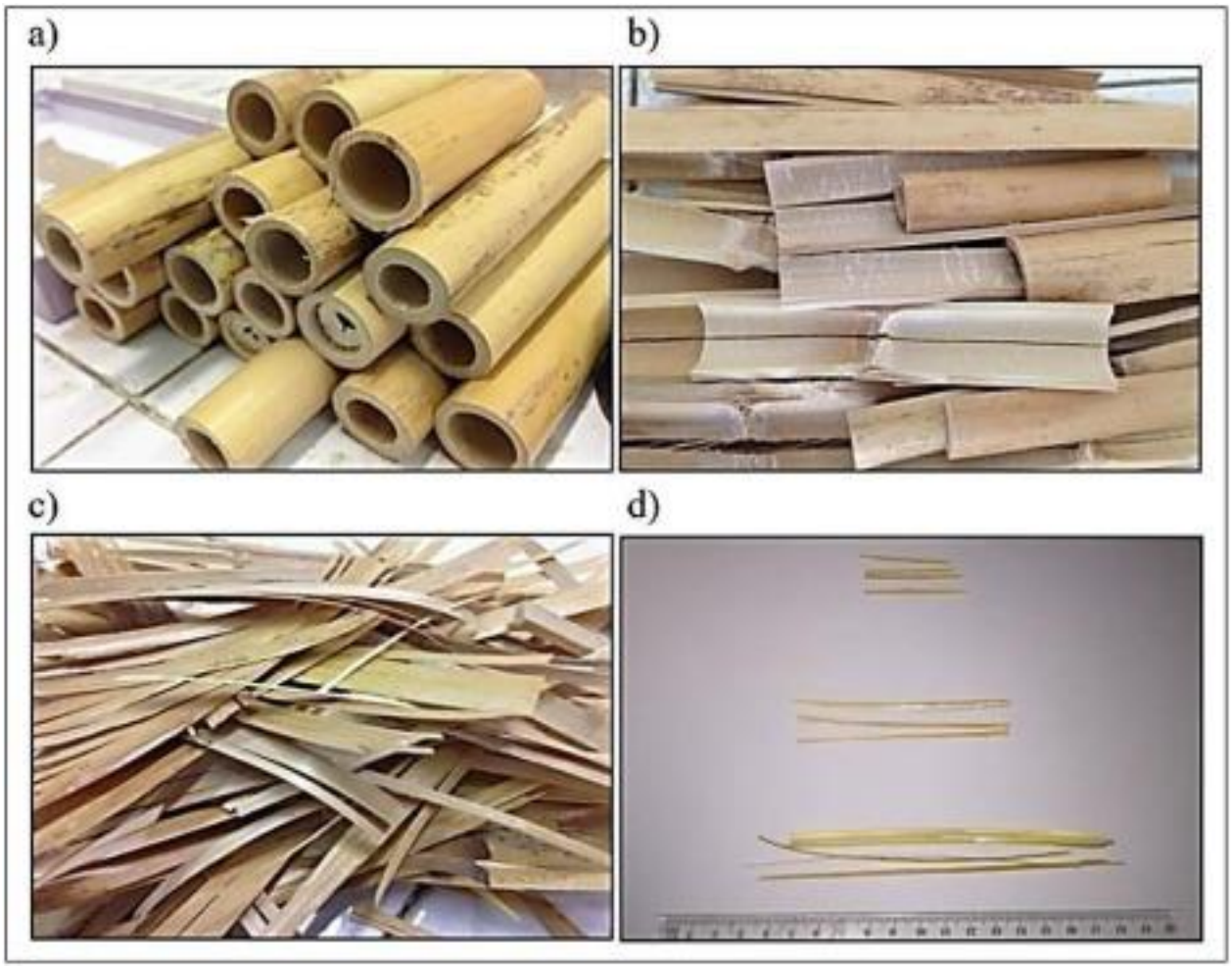

Fig.5: Manufacturing process of the fibers: a) Cut stems; b) Broken stems; c) Decorticated skins; d) 4, 8, 12 cm long Arundo donax L. Fiber. *©Antonino Valenza*

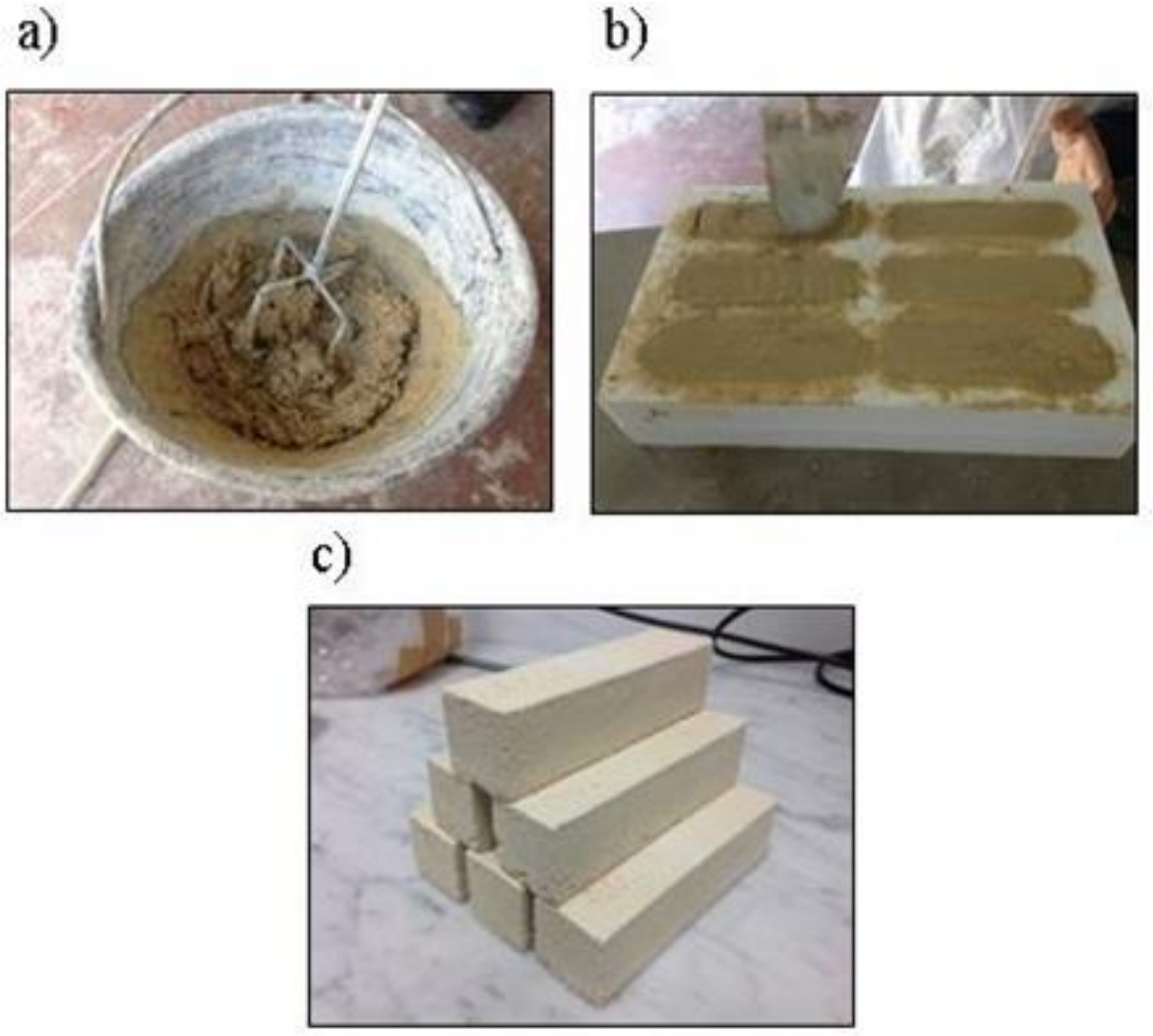

Fig.6: Manufacturing process of the composites: a) Mortar and fibers mixing; b) Fiber reinforced mortar casting; c) Composites after 28 days of hardening. *©Antonino Valenza*