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Mechanical characterization of Italian bamboo

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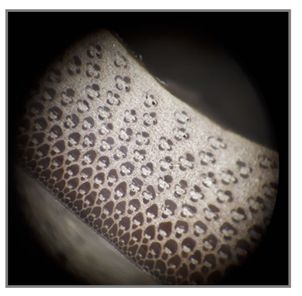
The material

Bamboo is an evergreen plant that grows spontaneously in many parts of the World, while in **Europe can be cultivated**.

This plant shows good mechanical properties **comparable** to other conventional building materials. Bamboo can be considered a **composite material**. In fact, it is composed on average by 52% of parenchyma cells (soft material), 40% of fibers (hard material) and 8% other.

Bamboo is an ecological material since it is an **important renewable resource**.



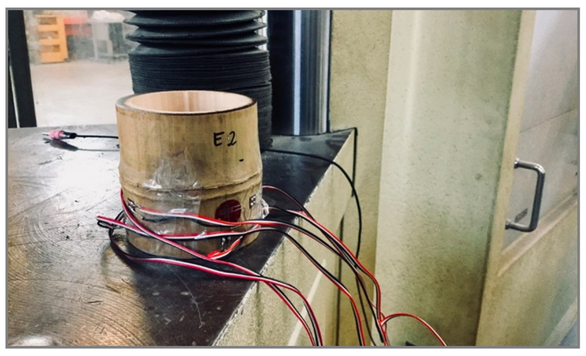
Mechanical characterization

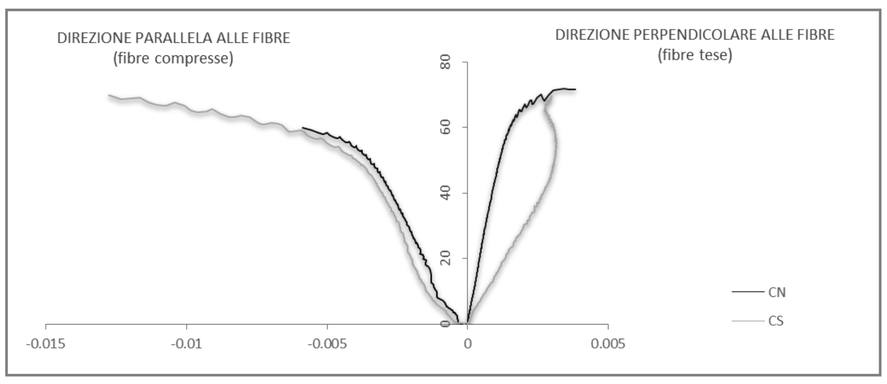
In accordance with ISO standards for structural bamboo, we have carried out **mechanical tests** on **Italian culms**. Tensile, compressive tests parallel and orthogonal to the fibers and shear tests have been carried out. The *Phyllostachys viridiglaucescens* is the bamboo species on the graphs.

Compressive tests parallel to the fibers

Average values:

$\sigma_{c,0}$ = **72.0 MPa** $E_{c,0}$ = **17 GPa**

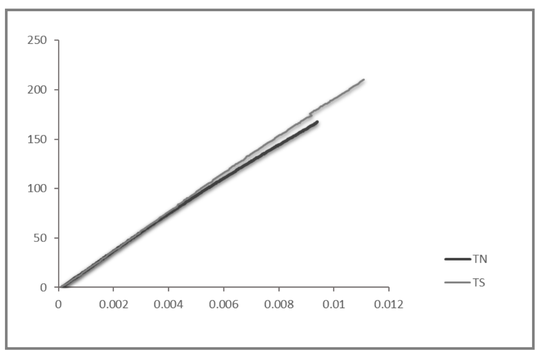




Tensile tests parallel to the fibers

Average values:

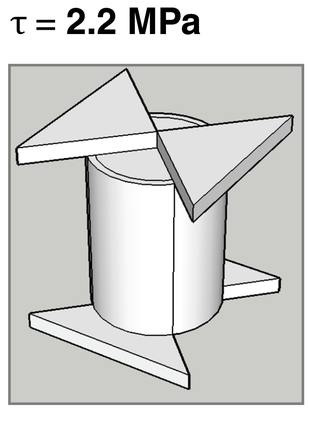
$\sigma_{t,0}$ = **215.0 MPa** $E_{t,0}$ = **17 GPa**



Compressive tests orthogonal to the fibers

Average value:

$\sigma_{c,90}$ = **14.2 MPa**



Tensile tests orthogonal to the fibers

Average value:

$\sigma_{t,90}$ = **2.0 MPa**

Shear tests

Average value:

τ = **2.2 MPa**

Conclusions

All the mechanical characteristics of the analyzed bamboo are **comparable** with the subtropical bamboo.

This work represents the initial step for the **knowledge** of **Italian bamboo**. It will be extended by including all species that are suitable for the structural applications and can grow in Italy, towards the use in **laminated beams**.