Damage of plant fibres and its influence on the failure of bio-based composites: a multi-scale approach using *in situ* X-ray tomography characterization and finite element numerical modeling.

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General Objective

To gain a better understanding of the role of the different structural scales of plant fibers in their failure and that of the composite.

Approach

- Development of *in situ* tests using X-ray microtomography to track initiation and propagation of damage (DVC analysis);
- A top-down approach: tests ranging from a micro-sample of unidirectional composite to a single fibre;
- Finite-element numerical simulations of plant fiber fracture using a damage model (comparison between the experimental results and those from the numerical modeling).

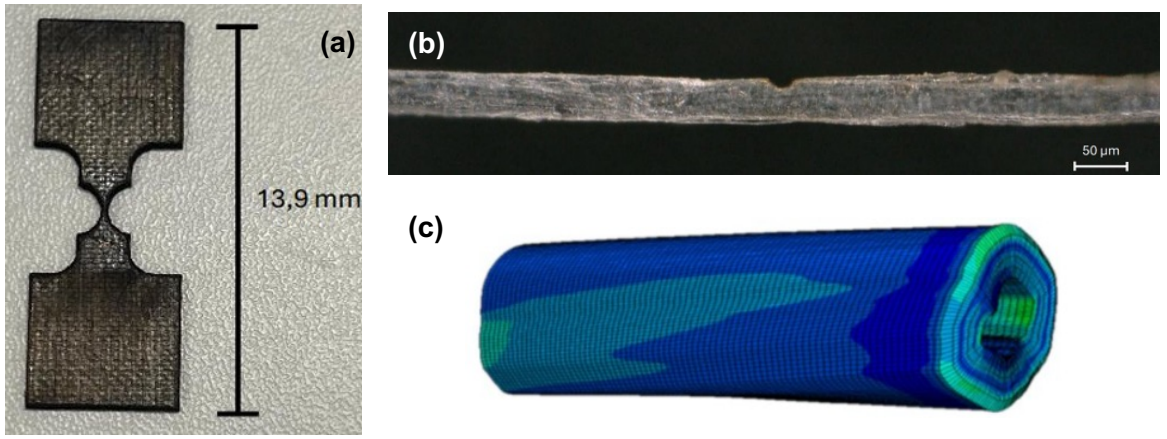

Figure: (a) A micro-sample of unidirectional flax-epoxy composite produced by laser machining. (b) Flax fiber notched by laser ablation. (c) Stress distribution in a plant fiber.