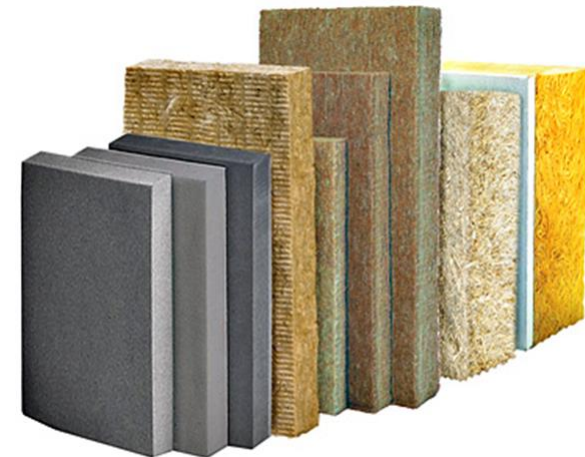




A review of the test methods used to assess the durability of bio-based building materials against termites and other insects

Magdalena KUTNIK and Ivan PAULMIER

Technological Institute FCBA, Biology Laboratory, Bordeaux, FR
magdalena.kutnik@fcba.fr



Bio-based materials

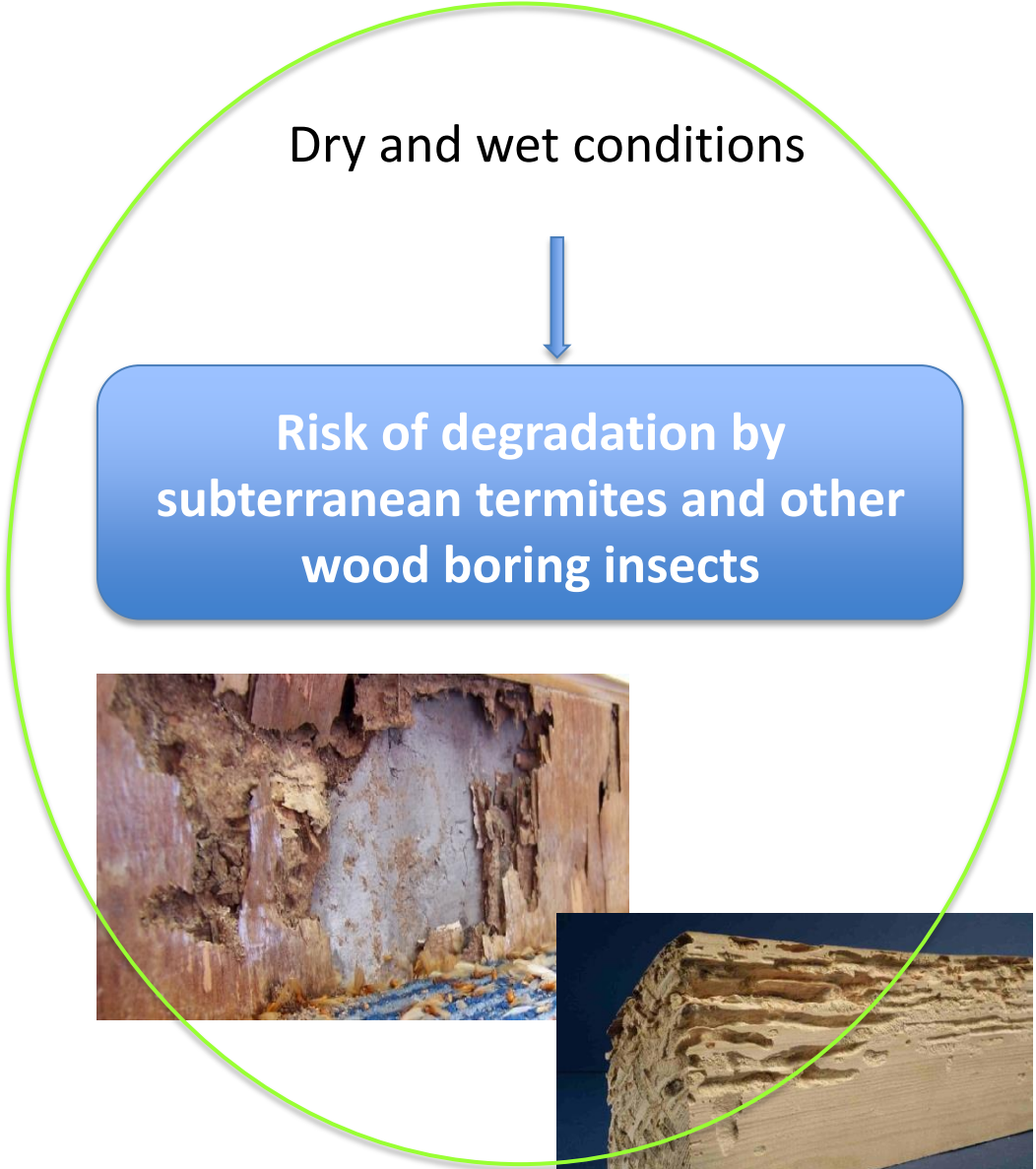
Severe moisture conditions
(condensation, weathering)



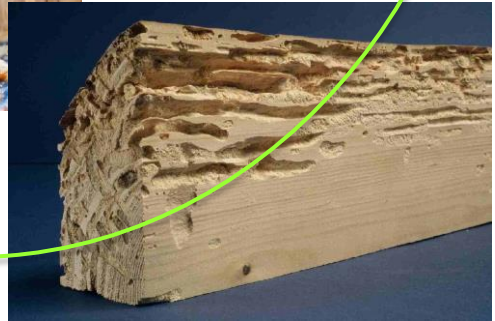
**Risk of fungal growth
(moulds and decay fungi)**



Dry and wet conditions



**Risk of degradation by
subterranean termites and other
wood boring insects**



Insects damaging bio-based materials



Building materials damageable by termites

Wood and solid wood-based materials

Wood-based panels meant for acoustic / thermal insulation

Biobased materials used for thermal insulation (CFI, straw, hemp, cotton)

Bricks made of compressed biobased raw material mixed with cement

Water pipes containing additives of biological origin

Electric cables coatings

Structural breakdown

Aesthetic damage

Loss of performance

Inappropriate for use

Functional damages



Importance of protecting bio-based building materials



Example of materials degraded by other insects

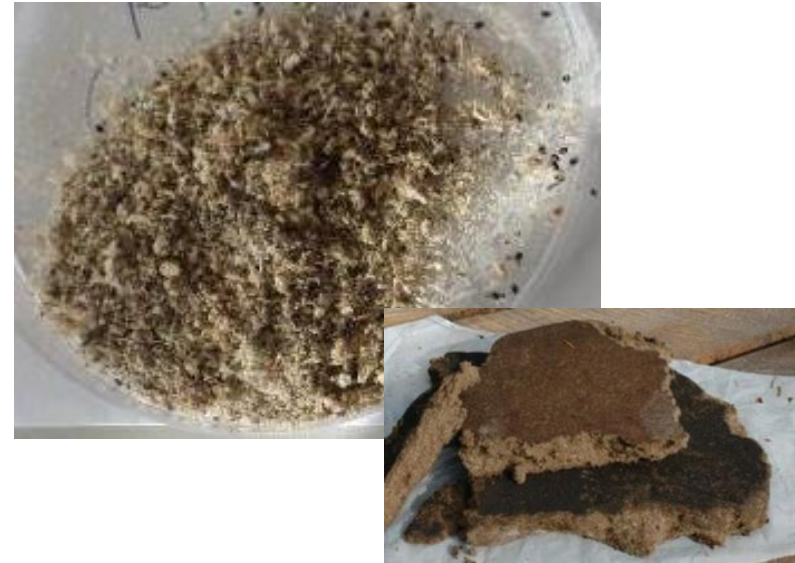
Plywood panels infested by *Lyctus sp.*



Bamboo infested by powder post beetle



Wood fibers-based insulation degraded by ants



Dermeste



Polystyrene degraded by *Hylotrupes bajulus*



Compressed paper degraded by *Anobium punctatum*



Non-wood biobased materials tested at FCBA



Insulation

- Wood fibers
- Cotton wool
- Linnen wool
- Cellulose
- Straw
- Hemp
- Reed



- Wood
- Paper
- Leather
- Hemp



Panels

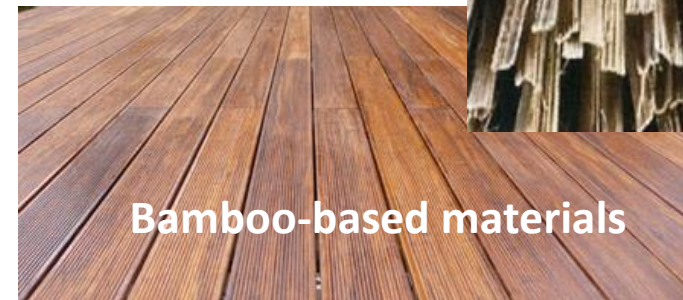


WPC



Wood Hemp

Bricks



Bamboo-based materials

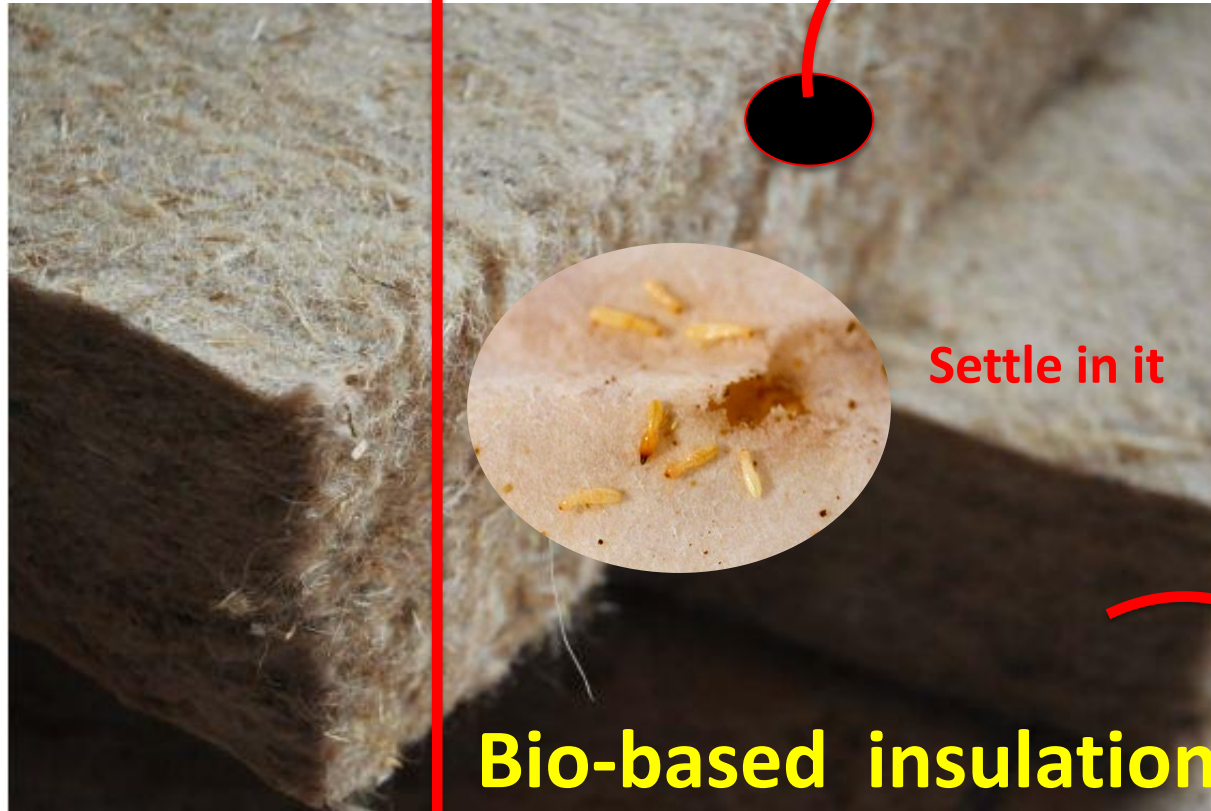


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Cross it

Eat it



Settle in it

Destroy it

Bio-based insulation



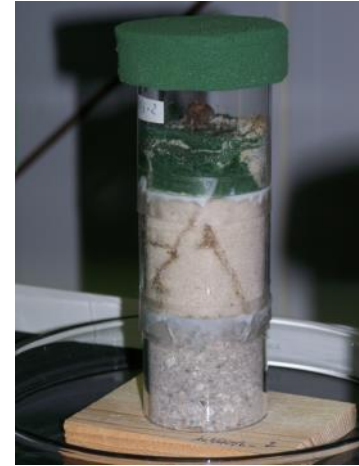
Testing the “barrier effect” = capability of termites to penetrate and cross the test material



Method CTBA–BIO–E-044-3 Evaluation of the resistance of cellulose-based insulation materials against subterranean termites



Adapted from the standard XP X41-550 (2009)



Testing the capability of termites to degrade and consume the test material



Method CTBA–BIO–E-043 Resistance of materials against subterranean termites



Adapted from the standard EN 117



Testing the resistance of WPC against termites

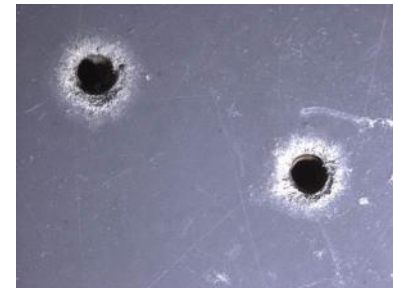
according to CEN/TS 15534-1



Testing the resistance cable coating

Method CTBA-BIO-E-019 Resistance of plastic materials against subterranean termites

Adapted from the standard EN 118



Testing the attractivity of a material for termites

Method CTBA-BIO-E-027 Attractivity of a material or a substance to subterranean termites



Examples of resistance criteria

Insulation material

Resistance criteria of XP X 41-550 (visual rating of the test material, termite mortality) to assess termites ability to cross the material

Composite materials, bio-based bricks, insulation

Resistance criteria of EN 117 (termite mortality, visual rating)
+ mass loss of test samples (to assess the feeding effect)

Cable coating

Example of visual rating scale

- 0 no visual degradation;
- 1 slight attack;
- 2 attack of depth less than half of the thickness of the material + enlargement of the pre-drilled hole
- 3 attack deeper than half of the thickness of the material but not penetration into the wood placed above
- 4 the test material is crossed and the wood attacked



To conclude

- ✓ Increase of building materials with bio-based content
- ✓ Raw materials of poor inherent resistance against biological threat (straw, hemp, cotton, bamboo, linen ...)
- ✓ Risk of biological degradation depending on geographical areas, climate, exposure ...
- ✓ Very few standardized method developed to assess the resistance of bio-based materials
- ✓ Adaptations of existing standards, mostly of the ones developed to test wood-based products
- ✓ Importance of selecting/developing reliable test methods depending on the properties which need to be tested (attractivity, resistance ...)

THANK YOU !



magdalena.kutnik@fcba.fr