



# Bioinspired wood protection – evaluation of wood treated with biofinish

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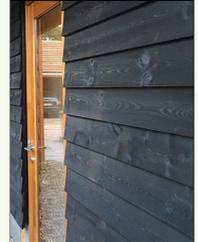
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## Bioinspired Wood Protection

The idea to utilize natural organisms, that are not deteriorating wood, but their presence inhibit growth of other decaying fungi was motivation for this investigation.

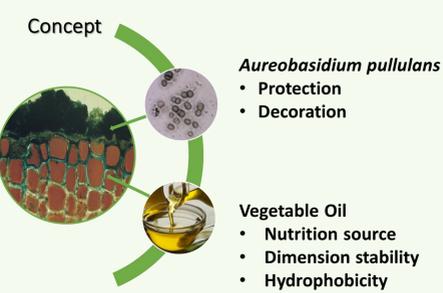
Consequently, such approach for wood protection will contribute toward development of a new environmentally friendly and sustainable wood treatments and trigger the utilization and production of green materials in the wood industry.



## Biofinish

is a fungal-based wood treatment with protective, decorative functionalities. It has several advantages compare to the traditional wood coatings and chemical treatments due to its environmental friendliness, low maintenance cost, absence of harmful chemicals and self-repairing property.

## Concept



The idea is to treat wood with natural substances, such as vegetable oil, and the living fungus *Aureobasidium pullulans*. Vegetable oil functions as nutrition source for *A. pullulans* at the same time enhance dimensional stability

and hydrophobicity of wood substrate. *A. pullulans* creates an aesthetically appealing dark living surface with protective functionality against UV radiation and other microorganisms.

## Process



## The aim

of this research is to evaluate performance of biofinish and develop an innovative 100% bio-based wood coating system for wood in outdoor applications.

## Biofinish for wood protection



**Natural weathering tests** were performed in San Michele, Italy, (46°11'15"N, 11°08'00"E).

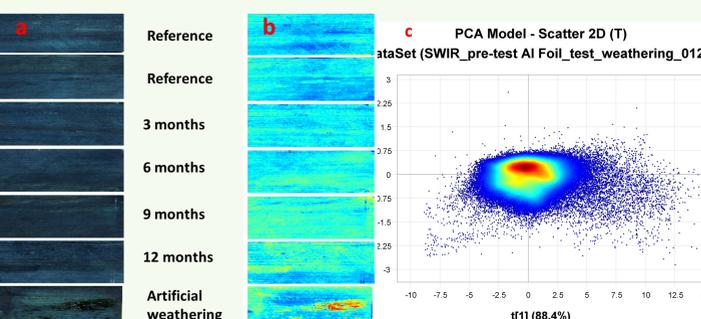
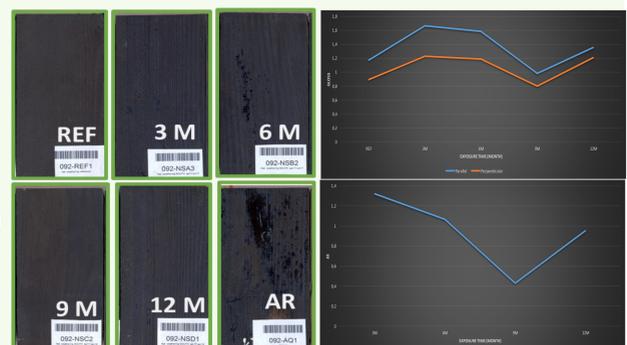
The weathering experiment was carried out for 12 months from March 2017 and measurement was performed in 3 months interval. **Artificial weathering** was performed using a weathering machine following the standard EN927.6. The weathering duration is 672 hours (UV and water spray). **Performance** of biofinish on wood surface was estimated based on color changes using a spectrophotometer (CIE  $L^*a^*b^*$  system) and gloss measurement. Hyperspectral imaging was used to investigate the progress of degradation on entire surface.

## Result

### Gloss evaluation and total color change

The gloss and total color of biofinish wood changes depending on the season. The highest gloss and total color change was found in May, August and March (spring and summer) respectively, the lowest was found in November (winter) Figure 1.

**Figure1** RGB image (left), gloss (up) and total color change (down) of biofinish wood samples after weathering tests.



**Hyperspectral Imaging** shows slight change of biofinish wood surface after 6 months (Figure 2). The highest changes due to secretion of vegetable oil were observed after artificial weathering. However, the spectral data on PCA score plot are clustered in one group which indicate the overall similarity of wood samples.

**Figure2** RGB image (a), score on PC1 (b) and PCA score plot (c) of biofinish wood samples after different exposure time.

## Conclusions

Biofinish coating protects wood from environmental factors and provide good performance on wood surface. The main problem was secretion of excessive oil to wood surface observed after artificial weathering.

## Future study for development of biofinish for wood protection

Biofinish coating has been developed by Xylotrade B.V., Netherlands and is already available on the market. Nevertheless some aspects regarding *A. pullulans* growth rate and mechanisms are still unknown and are under investigation.

