Book of Abstracts

COST Action FP1407 - 3rd Conference

„Wood modification research & applications“

Kuchl, September 14-15, 2017

Salzburg University of Applied Sciences
Forest Products Technology & Timber Constructions

in collaboration with
the Society of Wood Science and Technology &
the European Conference on Wood Modification

COST Action FP1407

Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife)

Wood modification research & applications

Third COST Action FP1407 International Conference

Kuchl, Austria

14-15 September 2017

Editors: Gianluca Tondi, Marko Posavčevič, Andreja Kutnar and Rupert Wimmer

Salzburg University of Applied Sciences
Kuchl, 2017

Print ■ Druckerei Schönleitner
Print-run ■ 150 copies

COST Action FP1407
3rdInternational Conference
Kuchl, Austria
14-15 September 2017
"Wood modification research & applications"

Organizer ■ Salzburg University of Applied Sciences; Forest products technology & Timber constructions
Co-organizers ■ Society of Wood Science and Technology (SWST) & European Conference on Wood Modification (ECWM).
Editors ■ Gianluca Tondi, Marko Posavčevič, Andreja Kutnar, Rupert Wimmer

ISBN 978-3-200-05255-0

Proceedings of the 3rd COST Action FP1407 International Conference - Wood modification research & applications
Edited by ■ Gianluca Tondi, Marko Posavčevič, Andreja Kutnar, Rupert Wimmer
Organizer ■ Salzburg University of Applied Sciences, Forest products technology & Timber constructions.
Co-organizers ■ Society of Wood Sciences and Technology & European Conference on Wood Modification.

All papers have been reviewed.

Cover pictures ■ Gianluca Tondi, Hermann Huber, Alexander Petutschnigg;
Salzburg University of Applied Sciences
Cover design ■ Gianluca Tondi, Ingrid Seidl; Salzburg University of Applied Sciences

Published by ■ Salzburg University of Applied Sciences Press, Marktstraße 136a, A-5431 Kuchl, 2017

ISBN 978-3-200-05265-9 (digital edition)
ISBN 978-3-200-05255-0 (printed edition; not for sale)

Do extractive compounds of thermally modified woods play an important role in the decay and termites resistances of these modified materials? A preliminary study.

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Keywords: antifungal activity, ash wood, extractive compounds, termite resistance, thermal modification

Thermal modification processes have been developed to increase the biological durability and dimensional stability of wood. However, the reasons of the decay resistance improvement of heat treated wood are still not very well known. This durability improvement of heat treated wood can be explain by several reasons, as the high hydrophobic behaviour (Weiland and Guyonnet, 2003), the polymer chemical composition modifications (Vallet *et al.*, 2001), the hemicelluloses degradation (Hakkou *et al.*, 2006) and the generation of new extractive substances (Lekounougou *et al.*, 2009).

The aim of this paper was to evaluate the anti-fungal and anti-termite activities of extractives compounds from heat treated ash woods according the modification process intensity. All of the tests were carried out in the laboratory with two different complementary research materials. The main research material consisted of ash (Fraxinus excelsior L.) wood thermally modified during 2 hours, at temperatures of 170, 200, 215 and 228 °C, under ThermoWood® Process. The reference material was untreated ash wood for decay and termite resistance screening tests. Each treated and untreated wood sample were extracted with water or acetone. The extractives contents were determined for each treated and control wood sample. One part of the obtained extracts was blended with malt agar block test [1200 µL, C= 2.5 % m/m in acetone, in 10 mL of Malt-Agar medium] in order to investigate their anti-fungal properties. To determine the inhibition

effectiveness of extractives, two different fungi were selected: Coriolus versicolor (white rot) and Poria placenta (brown rot). Fungal activity was carefully observed for the duration of seven days. The other part of extractives was impregnated within Whatman papers [70 microL, C= 2.5 % m/m in acetone, on a Cellulose paper of 2.5 cm-diameter] and expose to termite attacks. Finally, extractives were analysed by GC-MS and their number of chemical components and their respective quantity are related to their anti-termite and antifungal activity levels.

First results show that anti-fungal activity of heat treated ash wood extracts vary according to heat treatment intensity and the solvent used during the extraction process (Figure 1). It appears clearly that untreated and treated ash wood extracts are more efficient against brown rot than white rot growing.

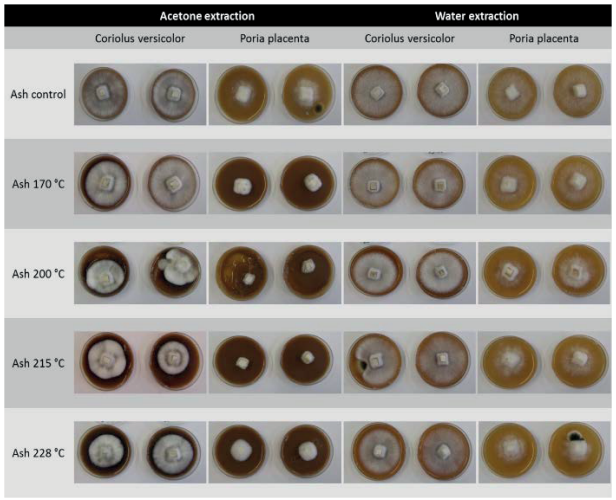

Figure 1: *Coriolus versicolor* and *Poria placenta* growing according to the inhibition of untreated and heat treated as wood extracts (1200 µL), after seven days.

However, the anti-termite activity of heat treated ash wood extracts is not really significant. Finally, GC-MS analyse highlights that almost all of the original acetonic extractives disappeared and new compounds were formed resulting from degradation of hemicelluloses and lignin. These included monosaccharides and their dehydratation products, as well as syringaldehyde, as the most prominent lignin derived compounds and generally the major detected component according to the TIC. Further studies involving investigation of toxicity and fungal inhibition properties are needed to draw conclusions on the specificity of such phenolic compounds.

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