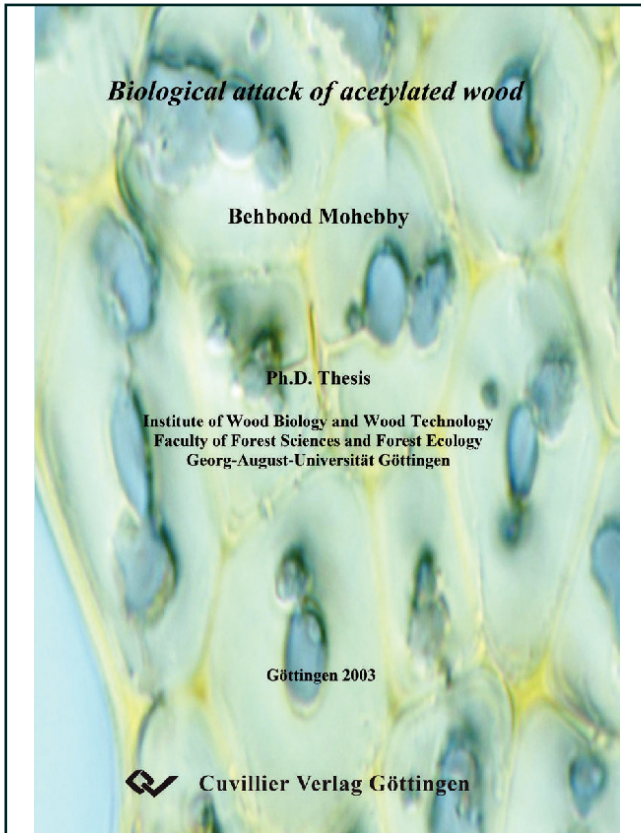




Behbood Mohebby (Autor)
Biological attack of acetylated wood



<https://cuvillier.de/de/shop/publications/3266>

Copyright:

Cuvillier Verlag, Inhaberin Annette Jentsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen,
Germany

Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: <https://cuvillier.de>

Contents

Chapter 1

Research background

1.1. Introduction	1
1.2. Chemical wood modification	1
1.2.1. Etherification	2
1.2.2. Esterfication	4
1.2.3. Urethanes	7
1.2.4. Oxidation	8
1.2.5. Silylation	8
1.3. Acetylation of wood	10
1.3.1. Acetylation processes	10
1.3.2. Properties of the acetylated wood	11
1.4. Other types of wood modification	16
1.4.1. Thermal wood modification	16
1.4.2. Enzymatic wood modification	18
1.5. Aims of this thesis	19
References	19

Chapter 2

Soil bed trials with acetylated wood

Material and methods	30
2.1. Sample preparation	30
2.2. Acetylation	30
2.3. Soil bed trials	31
2.3.1. Sample preparation	31
2.3.2. Determination of dynamic Modulus of Elasticity (MOE _{dyn})	31
2.3.3. Soil bed preparation	32
2.3.4. Chemical analysis	33
2.3.4.1. Extractives free wood preparation	33
2.3.4.2. Klason lignin	33
2.3.4.3. Holocellulose	33
2.3.4.4. α -Cellulose	34
2.3.4.5. IR spectroscopy	34
2.3.5. Microscopy	35
2.3.5.1. Light microscopy	35
2.3.5.2. Scanning Electron Microscopy	35
2.3.6. Microcalorimetry	35
2.3.7. Ergosterol assay in decayed wood	36
2.4. Results and discussion	37
2.4.1. Mass and MOE _{dyn} losses	37

2.4.2. Chemical analysis	40
2.4.3. Microscopy	42
2.4.4. IR spectra of acetylated wood	51
2.4.5. Microcalorimetry	57
2.4.6. Ergosterol assay	58
2.5. General conclusion	61
2.6. Acknowledgements	61
References	61

Chapter 3

Microbial attack of acetylated wood in field soil trials

3.1. Introduction	68
3.2. Material and methods	68
3.2.1. Sample preparation	68
3.2.2. Acetylation	68
3.2.3. Determination of acetyl content	69
3.2.3. Field test of acetylated wood in soil contact	69
3.2.5. Microscopy	70
3.2.5.1. Light microscopy	70
3.2.5.2. Scanning Electron Microscopy	70
3.3. Results	70
3.4. Discussion and conclusion	72
References	81

Chapter 4

Degradation of acetylated wood by Basidiomycetes

4.1. Introduction	83
4.2. Material and methods	83
4.2.1. Sample preparation	83
4.2.2. Microorganisms and conditions	83
4.2.3. Microscopy	84
4.2.3.1. Light microscopy	84
4.2.3.2. Scanning Electron Microscopy	84
4.3. Results	84
4.3.1. <i>Trametes versicolor</i>	84
4.3.2. <i>Poria placenta</i>	96
4.4. Discussion	111
References	116

Chapter 5

Bioassays of acetylated wood

5.1. Introduction	119
5.2. Material and methods	119
5.2.1. Sample preparation	119

5.2.2. Sterilization	119
5.2.3. Solid-state fermentation	119
5.2.3.1. Medium and fungus	119
5.2.3.2. Mass loss determination	120
5.2.3.3. Ergosterol assay	120
5.2.3.4. Microcalorimetry	120
5.2.3.5. Fluorescein Diacetate analysis (FDA)	120
5.2.4. Liquid-state fermentation	121
5.2.4.1. Medium and fungus	121
5.2.4.2. Protein assay	122
5.2.4.3. MnP assay	122
5.2.4.4. Laccase assay	123
5.2.4.5. Xylanase assay	123
5.2.4.6. Endoglucanase (EG) (endo-type β -1,4-gulcanase) activity	123
5.2.4.7. CBH (exo-type β -1,4-gulcanase) activity	123
5.2.4.8. DNS assay for reducing sugars	123
5.3. Results and discussion	124
5.3.1. Solid-state fermentation	124
5.3.2. Liquid-state fermentation	129
5.4. Conclusion	133
References	134

Chapter 6

General Discussion

6.1. Acetylation level and protection mechanism	136
6.2. Chemical aspects of protection in acetylated wood	137
6.3. Microscopical evaluation of microbial attack	138
6.4. Fungal protection mechanism and bioassays	139
6.5. Mode of protection in acetylated wood	141
6.6. Conclusion	142
References	143