

# Development of low-emission particle boards by using different kinds of bark

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5.14 Education Session  
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Molecular Wood Biotechnology & Techn. Mycology, Göttingen University

# Outline

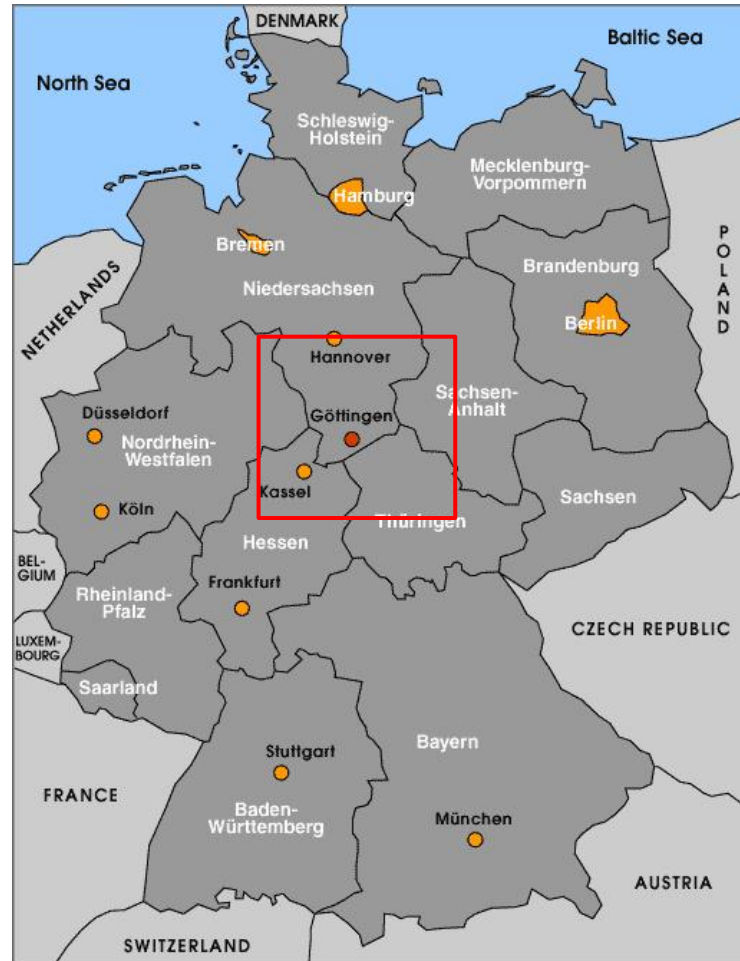
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- Georg-August-University of Göttingen
  
- Faculty of Forest Sciences and Forest Ecology
  
- Wood Biology & Wood Technology
  - ▣ Master program
  - ▣ Ph.D. program
  
- Organization of personal research project



# Georg-August-University of Göttingen

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Press, Communication & Marketing, Göttingen University



# Georg-August-University of Göttingen

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- Funded in 1737
- Basic data in 2011:
  - ▣ Students: 24,380 (thereof female: 12,658)
- 13 faculties
  - ▣ Natural Sciences, Mathematics and Informatics
    - **Faculty of Forest Sciences and Forest Ecology**
  - ▣ Law, Economic Sciences, Social Sciences
  - ▣ Humanities and Theology
  - ▣ Medicine

Göttingen State and  
University Library, Campus



# Faculty of Forest Sciences & Forest Ecology

## Forestry curriculum

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### **2 Forestry Bachelors**

in Forestry

in Molecular Ecosystem Sciences (English)

**Bachelor of  
Science (B. Sc.)**

### **5 Forestry Masters**

in Forest management & Utilization

in Forest Conservation

in For. Ecosystem Analysis & Inform. Processing

in Tropical & International Forestry (English)

in Wood Biology & Technology

**Master of Science  
(M. Sc.)**

### **Several PhD Programs**

e. g. PhD Program Wood Biology & Technology

**Ph.D., Dr. rer. nat.,  
Dr. forest.**



# Research areas/Working groups in the field of wood sciences

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- Prof. Dr. H. Miltz (chair Wood Biology & Wood Technology)
  - ▣ Wood decay, fungal decay testing, WPC, wood quality, wood protection etc.
- N. N. (chair „Wood Chemistry & Wood Technology“)
  - ▣ Wood chemistry, wood composites etc.
- Prof. Dr. U. Kües (chair Molecular Wood Biotechnolgy & Technical Mycology)
  - ▣ Fungi, molecular biology etc.
- Prof. Dr. A. Kharazipour
  - ▣ Biotechnology, wood composites etc.
- Prof. Dr. A. Polle (chair Forest Botany)

# Master-Program: Wood Biology & Technology – Course Scheme

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1. Semester (Winter semester, 30 Credits)				
6 C M.Forst.1311 Physik und Chemie des Holzes	6 C M.Forst.1312 Holzbiologie	6 C M.Forst.1113 Holzbiotechnologie	6 C M.Forst.1314 Nachwachsende Rohstoffe	6 C M.Forst.1315 Sozioökonomie
2. Semester (Summer semester, 30 Credits)				
6 C M.Forst.1321 Holztechnologie	6 C M.Forst.1322 Holz- und Papierindustrie	6 C M.Forst.1323 Holzverbundwerkstoffe	6 C M.Forst.1324 Energetische Nutzung von Holz	6 C Elective
3. Semester (Winter semester, 30 Credits)				
12 C M.Forst.1331 / M.Forst.1332 Projekt 1: Holztechnologie und Holzprodukte / Holzwerkstoffe oder Projekt 2: Molekulare Holzbiotechnologie	6 C Elective	6 C Elective	6 C Elective	6 C Elective
4. Semester (Summer semester, 30 Credits)				
30 C Master's thesis (Time: 6 months)				
Compulsory elective courses (altogether 66 Credits)		Elective courses * (altogether 24 Credits)		Master's thesis (30 Credits)

<http://www.uni-goettingen.de/en/course-scheme/73473.html>

## Basic courses

- wood chemistry
- wood physics
- wood biology
- wood technology
- economics, statistics

## Technological courses

- biotechnology
- pulp and paper
- coating/adhesives
- fungal degradation
- wood preservative
- drying
- energetic use



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Dr. forest.**





# PhD-Program: Wood Biology & Wood Technology

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- International program
  - the only three-year PhD-program on wood technology in Germany
- Open to highly qualified people who studied forestry, wood sciences, biology/micro-, chemistry/bio- and related fields
- Number of participants is limited to 12 students per year
- Weekly PhD-seminars during the semester
- Final examination: disputation (mostly common), rigorosum
- Leads to a *PhD*, *Dr. forest.* or *Dr. rer. nat.* degree within three years

<http://www.uni-goettingen.de/de/104605.html>



# Faculty of Forest Sciences & Forest Ecology

## Basic Data (2012)

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	Students (total)	Students (male)	Students (female)
<b>Bachelor (total)</b>	<b>375</b>	<b>272</b>	<b>103</b>
Forest Sciences	369	268	101
Molecular Ecosystem Sciences	6	4	2
<b>Master (total)</b>	<b>242</b>	<b>169</b>	<b>73</b>
Wood Biology & Technology	50	33	17
<b>PhD-Programs (total)</b>	<b>162</b>	<b>105</b>	<b>57</b>
Wood Science	37	25	12

Dean's office, Faculty of Forestry



# Development of low-emission particle boards by using different kinds of bark

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- R&D project is supported by the country-wide support measure *Central Innovation Program (ZIM) for SME* (small and medium-sized enterprises) of the Federal Ministry of Economics and Technology
- This funding module promotes R&D cooperation projects of companies and research organisations in the development of new products or processes



# Why Tree Barks in Particle Boards?

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Increasing shortage of wood material in wood panel industry

Formaldehyde emissions in particle boards

Use of bark for the production of particle boards.  
In this circumstance bark acts as:



Substitute for woodchips

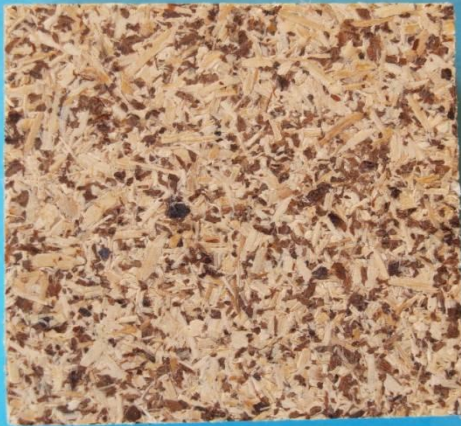


Formaldehyde scavenger

# Why Tree Barks in Particle Boards?

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Particle board consisting 80 % of spruce wood and 20 % of spruce bark in surface and middle layer



surface layer



middle layer

# Organization/proceedings

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- Practical activities
  - ▣ production of raw materials in the bioengineering of the Forest Faculty
  - ▣ chemical analysis of raw materials (lignin, sugars, ash content, stiasny number, hot and cold water extractives, sukzessive extraction etc.)



L: Chopper for chipping of solid wood  
R: Chipping machine for the production of middle layer material

# Organization/proceedings

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- Practical activities
  - ▣ production of raw materials in the bioengineering of the Forest Faculty
  - ▣ chemical analysis of raw materials (lignin, sugars, ash content, stiasny number, hot and cold water extractives, sukzessive extraction etc.)



L: Hammer mill for the production of upper layer material  
R: A wobbling sieve to fractionate the wood/bark particles

# Organization/proceedings

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- Practical activities
  - ▣ Manufacturing and measurement of three-layer particle-boards
    - strength properties, thickness swelling
    - formaldehyde emissions with different methods

Dept. Molecular Wood Biotechnology, Faculty of Forestry





# Organization/proceedings

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- Collaboration with
  - ▣ other departures of Göttingen University
    - e.g. GC/MS-Analysis of bark extractives
  - ▣ TU Braunschweig (IWF)
    - surface coating
    - screw extraction resistance

# Available Infrastructure

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Dept. Molecular Wood Biotechnology, Faculty of Forestry, <http://www.uni-goettingen.de/de/103483.html>



Dept. Wood Biology & Wood Products, Faculty of Forestry

- Sawmill\*
- Physical lab\*
- Emission lab
- Fungal lab\*
- Process laboratories
- Production of MDF, PB in laboratory- and pilot plant scale
- Technical hall (WPC, wood modification)\*
- REM
- etc.

\* Part of the Dept. Wood Biology & Wood Products and Dept. Wood Technology & Wood-based Composites, Faculty of Forestry



# Organization/proceedings

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- literature research
  - ▣ largest library in the field of forest sciences (sensu lato)
- coverage of research findings
- regular meetings with project partners
- preparing project applications (acquiring third-party-funds)
- regular meetings with the supervisor
  - ▣ presentation of research findings, next step
- supervision of students
- additional qualification courses (language courses, soft-skills)



# Fellowship for female academics

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- Dorothea Schlözer-Fellowship for young female scientists
  - ▣ aim: promoting equal opportunities and personnel diversity on Göttingen campus
- Key qualifications/courses on offer
  - ▣ presenting well, scientific writing
  - ▣ conflict management
  - ▣ acquiring third-party-funds
  - ▣ work-life-balance
  - ▣ etc.



Dorothea Schlözer-Program  
GEORG-AUGUST-UNIVERSITÄT  
GÖTTINGEN



## □ Mentoring program

Georg-August-University Göttingen • Büsgen Institute • Molecular Wood Biotechnology & Technical Mycology



Federal Ministry  
of Economics  
and Technology



Dorothea Schlözer-Programm  
GEORG-AUGUST-UNIVERSITÄT  
GÖTTINGEN



KLEESCHULTE  
E R D E N



IUFRO Organising  
Committee

Thank you for your kind attention!  
Muito obrigada!

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[www.uni-goettingen.de](http://www.uni-goettingen.de)

[www.forst.uni-goettingen.de](http://www.forst.uni-goettingen.de)

