

# Potential of poplar and willow wood for load-bearing constructions

Lieven DE BOEVER<sup>1</sup>, Joris VAN ACKER<sup>2</sup>

Ghent University (UGent), Laboratory of Wood Technology, Coupure  
Links 653, 9000 Gent, Belgium.

1 e-mail: [Lieven.DeBoever@UGent.be](mailto:Lieven.DeBoever@UGent.be)

2 e-mail: [Joris.VanAcker@UGent.be](mailto:Joris.VanAcker@UGent.be)

and

Belgian Institute for Wood Technology  
Hof-ter-Vleestdreef 3, 1070 Brussels

[Lieven.DeBoever@ctib-tchn.be](mailto:Lieven.DeBoever@ctib-tchn.be)

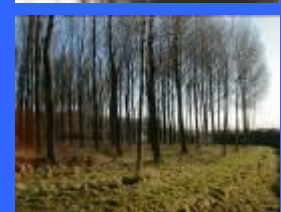


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# OUTLINE

- Research outline and hypotheses
  - From forest to end-product
  - Fundamental and applied
- Key results
  - Variability more important than mean values
  - Technical solutions are available
  - Integrated chain management is needed
- Realizations and perspectives
  - “Carport” prototype in laminated modified poplar timber
  - “MHM = Massiv Holz Mauer or Massiv Wood Wall : ETAG





## Part 1 Poplar and willow wood



chapter 2  
Botanical background



chapter 3  
Intrinsic wood properties

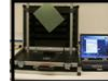


chapter 4  
Mechanical properties

## Part 2 Wood transformations



chapter 5  
Wood drying



chapter 6  
Wood grading



chapter 7  
Preservation and modification

## Part 3 Constructive products



chapter 8  
Solid timber applications

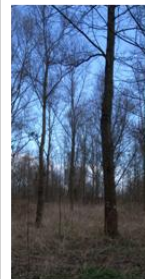


chapter 9  
Glued laminated timber



chapter 10  
Veneer based products

## Part 4 Impact on forestry-wood chain



chapter 11  
Wood supply - Forestry factors

chapter 12  
Wood demand - Economical factors



# HYPOTHESES

- HYPOTHESIS 1:

THE VARIATION INHERENT TO THE SPECIFIC BASIC WOOD PROPERTIES CAN BE ACCURATELY DESCRIBED.

- HYPOTHESIS 2:

ALLOMETRIC RELATIONS ALLOW THE PREDICTION OF END-PRODUCT PERFORMANCE BASED ON BASIC MATERIAL PROPERTIES.

- HYPOTHESIS 3:

ASSESSED VARIABILITY OF WOOD PROPERTIES AND THEIR ALLOMETRIC RELATIONS ALLOW THE DEVELOPMENT OF ACCURATE VISUAL AND/OR MECHANICAL GRADING.

- HYPOTHESIS 4:

LESS FAVOURABLE WOOD PROPERTIES CAN BE TECHNICALLY ALTERED OR THEIR VARIABILITY CAN BE LIMITED.



# HYPOTHESES

- HYPOTHESIS 5:

POPLAR AND WILLOW BASED CONSTRUCTION MATERIALS CAN BE PROCESSED TO COMPLY WITH A MINIMAL TECHNICAL PERFORMANCE (CE-MARKED PRODUCTS).

- Hypothesis 6:

Added value demonstrates innovation potential in load-bearing applications for poplar and willow wood



# HYPOTHESES

- HYPOTHESIS 7:

POPLAR AND WILLOW WOOD CAN BE APPLIED FOR CONSTRUCTIONS AS ONE MIXED SOURCE OF RAW MATERIAL USING DENSITY AS THE MOST INDICATING PROPERTY.

- HYPOTHESIS 8:

POPLARS AND WILLOWS ARE ABLE IN AN ECONOMICAL AND ENVIRONMENTAL SUSTAINABLE WAY TO SUPPLY A SIGNIFICANT ADDITIONAL WOOD SOURCE FOR HIGH VALUE-ADDED MATERIALS OR SHIFT SIGNIFICANT AMOUNTS OF RAW WOOD MATERIALS TOWARDS HIGHER VALUE-ADDED PRODUCTS.

- HYPOTHESIS 9:

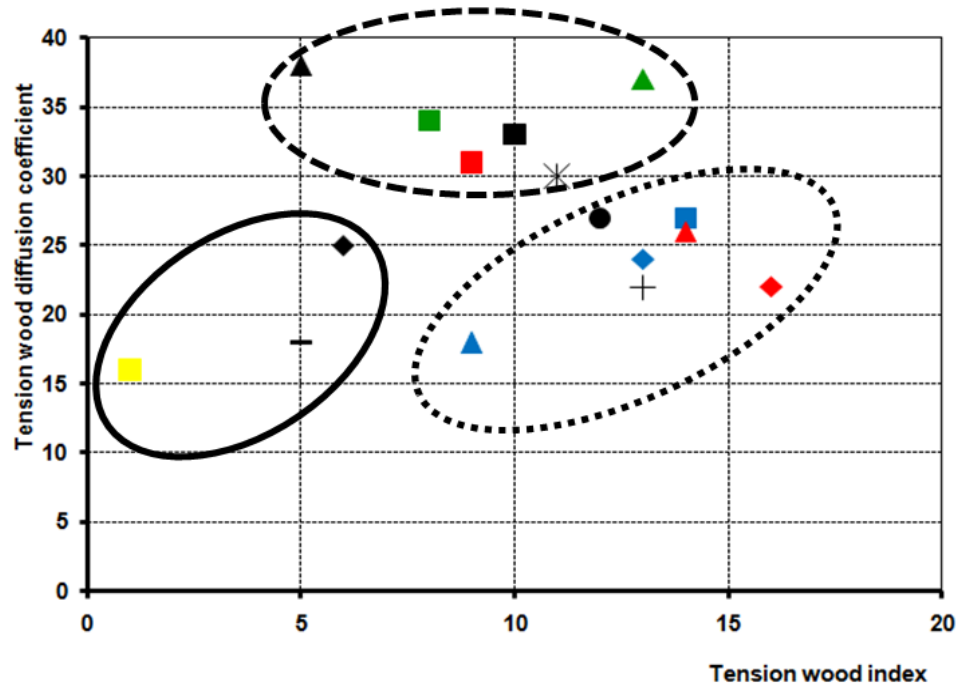
EARLY ASSESSMENT TECHNIQUES ALLOW THE SELECTION OF POPLAR AND WILLOW CLONES DISPLAYING ADOPTED WOOD CHARACTERISTICS SUITED FOR THE PRODUCTION OF LOAD-BEARING MATERIALS.



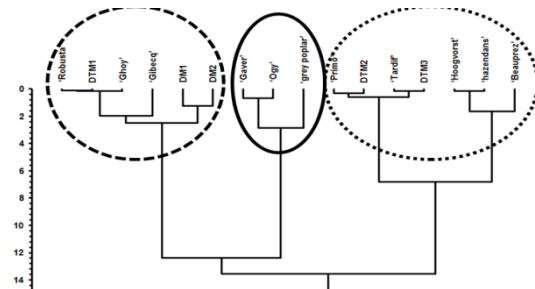
# INTRINSIC PROPERTIES



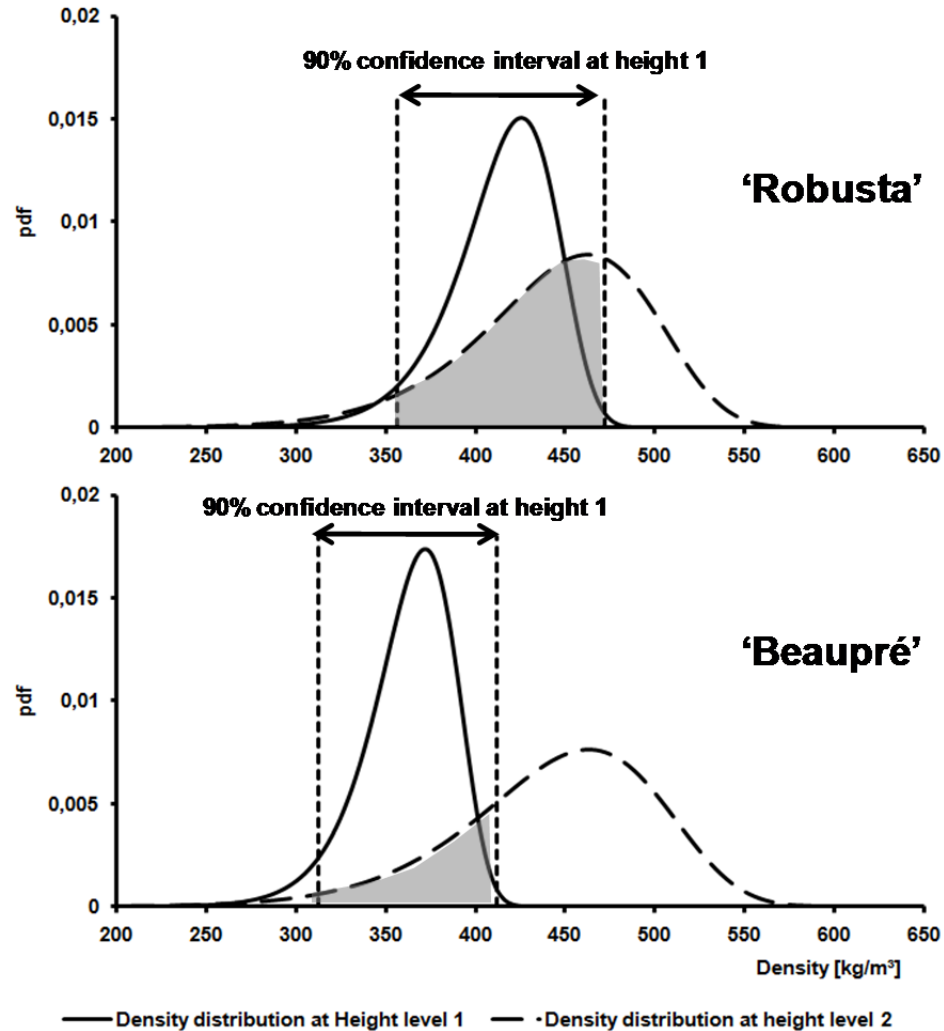
# INTRINSIC PROPERTIES



- |                 |               |               |            |
|-----------------|---------------|---------------|------------|
| ▲ 'Beauprez'    | ◆ 'Gaver'     | ✱ 'Ghoy'      | ▲ 'Gibecq' |
| ■ 'grey poplar' | ◆ 'hazendans' | ■ 'Hoogvorst' | — 'Ogy'    |
| + 'Primo'       | ■ 'Robusta'   | ● 'Tardif'    | ■ DM1      |
| ▲ DM2           | ■ DTM1        | ◆ DTM2        | ▲ DTM3     |



# INTRINSIC PROPERTIES

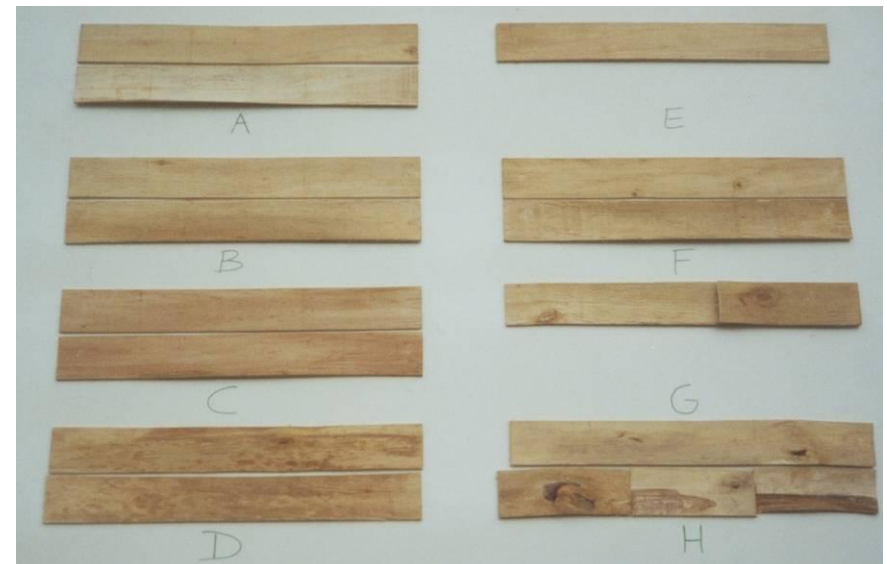


# MECHANICAL PROPERTIES

	Rejected			Assigned visual grades					
	MOE <sub>mean</sub>	MOE <sub>0.05</sub>	MOR <sub>m,k</sub>	MOE <sub>mean</sub>	MOE <sub>0.05</sub>	MOR <sub>m,k</sub>	MOE <sub>mean</sub>	MOE <sub>0.05</sub>	MOR <sub>m,k</sub>
Threshold	-	-	-	9000	6000	18	11000	7400	24
Robusta	9550	6600	32	<b>9500</b>	<b>7800</b>	<b>26</b>	-	<b>10200</b>	<b>40</b>
Gibecq	9200	7600	20	<b>9000</b>	<b>7000</b>	<b>23</b>	-	-	-
Primo	7400	5400	30	6900	5400	27	-	7000	43
Gaver	8700	6600	29	8000	7100	30	-	8100	41
Tardif	8000	6400	29	8100	6000	30	-	-	-
Ghoy	7500	6600	31	8200	6000	32	-	7200	42



# Case study “Veneer trial”



# Case study “Veneer trial”



B1

B3

C

**Willow with promising wood quality in regard veneer production.**

**High variability in natural regenerated stands !**



# LAMINATED TIMBER



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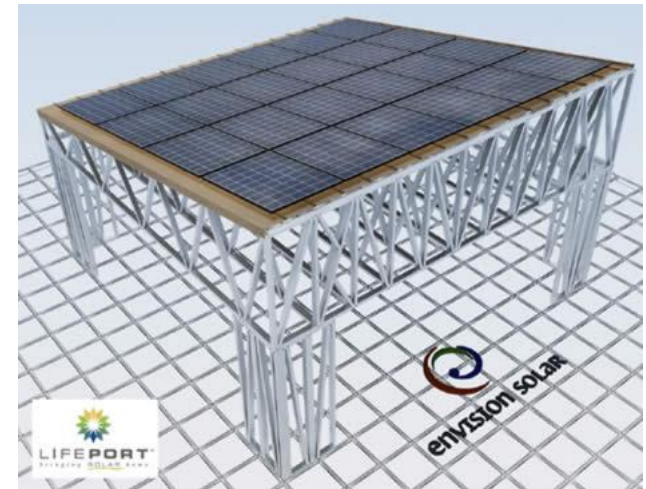
# DRYING ?



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# REALIZATIONS



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# PERSPECTIVES

- WORLD WIDE IMPORTANT SOURCE OF RAW MATERIAL, BUT ...
- STRENGTH PROPERTIES SHOULD BE EVALUATED AT EARLY SELECTION STAGE
  - SUFFICIENT, BUT ...
  - LARGE GENETIC POOL, ...
- EASILY TREATED
- SPECIFIC APPLICATIONS ALREADY INTO DEVELOPMENT
- SOLID WOOD PANELS (CONCRETE OF FUTURE)
- HIGH PERFORMANCE WINDOW PROFILES
  - UNDER DEVELOPMENT, ...



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# THANK YOU

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