

Department of Nature and Agricultural Studies
Forestry Environment Direction
Gembloux-Belgium

Prospect to anticipate peeling wood quality on a still standing tree

Presented by P.Mertens



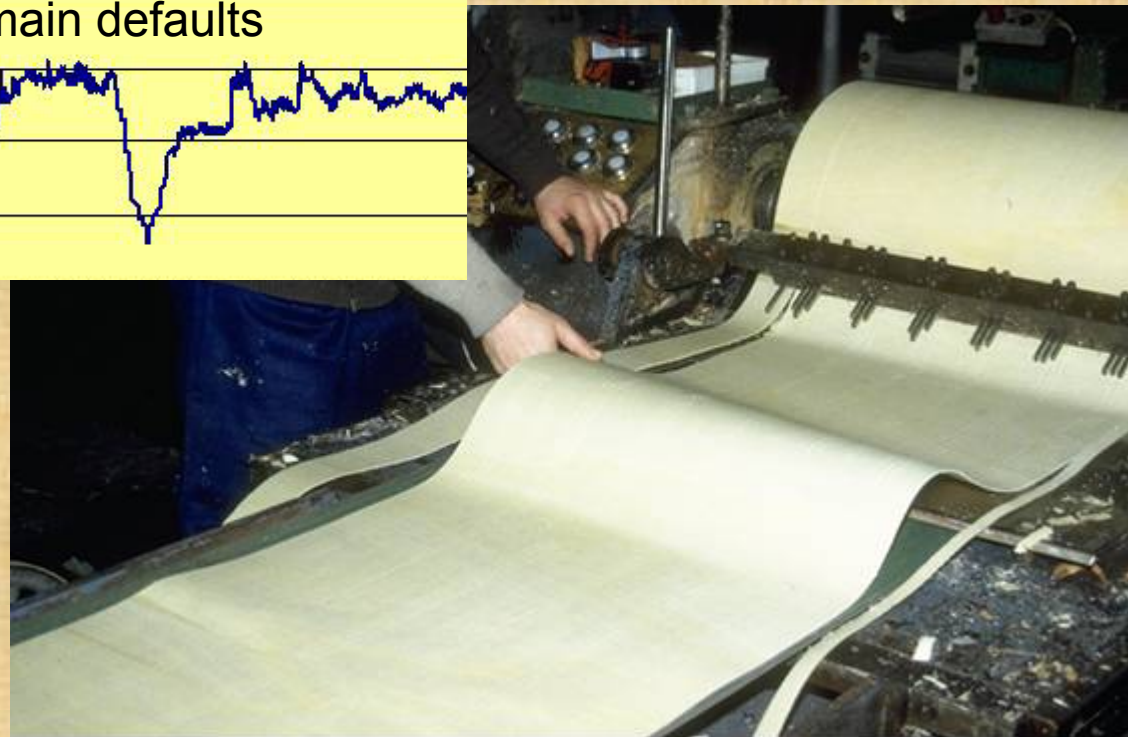
What relation exists between
The wood borer strength
on a standing tree
and
The veneer quality ?

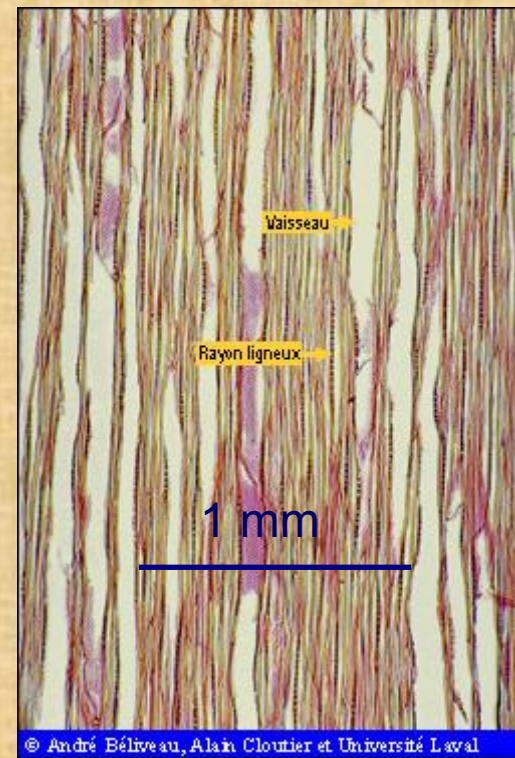
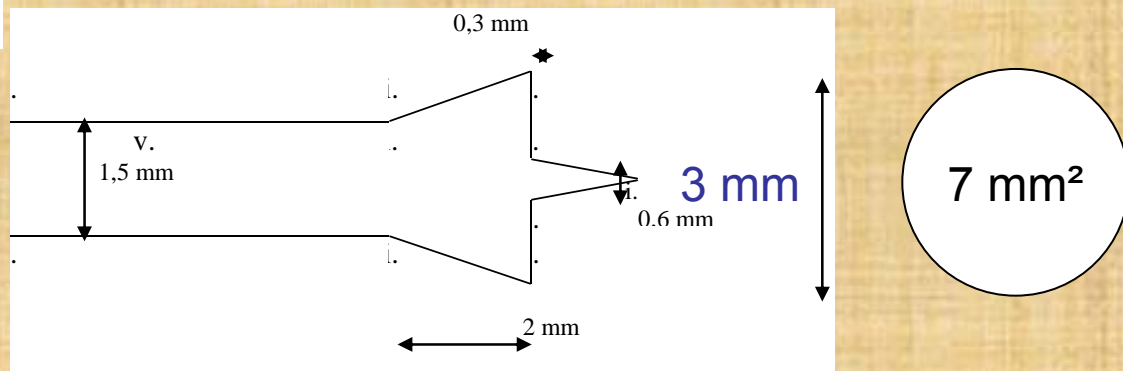


Detection of main defaults



Can it be used
as a early timber test
to select
trees and cultivars ?



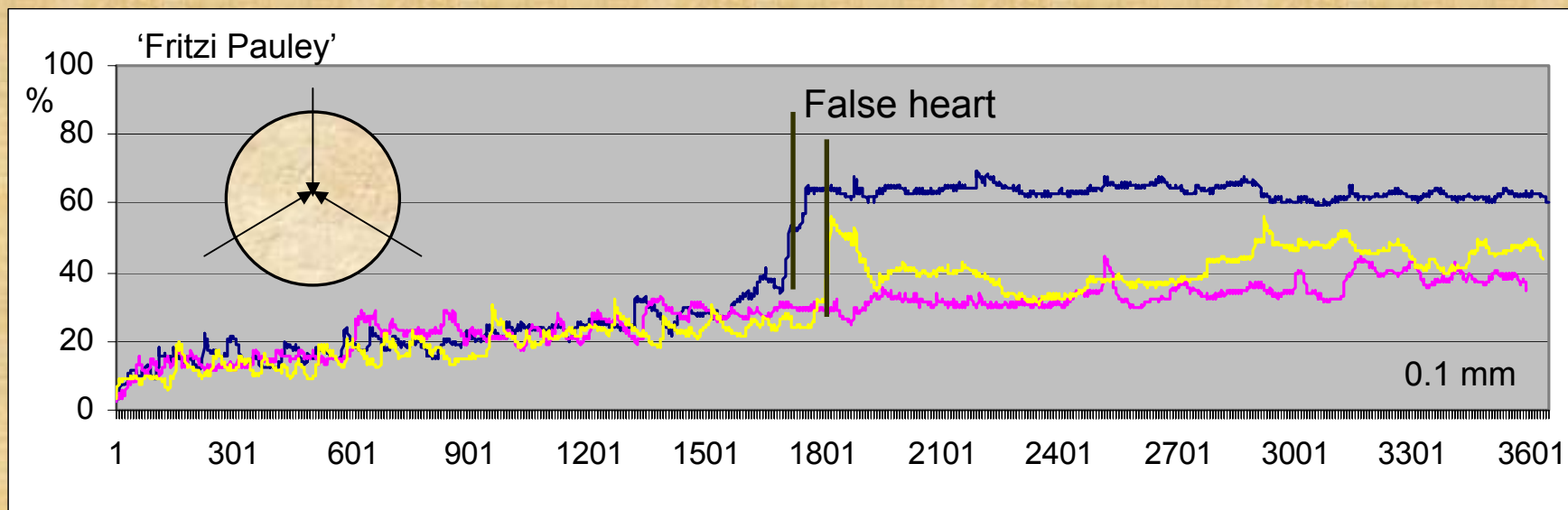


Resistant elements come across

Horizontally $\approx 9 - 11$ vessels
 Vertically $\approx 2,5 - 3,0$ fibers

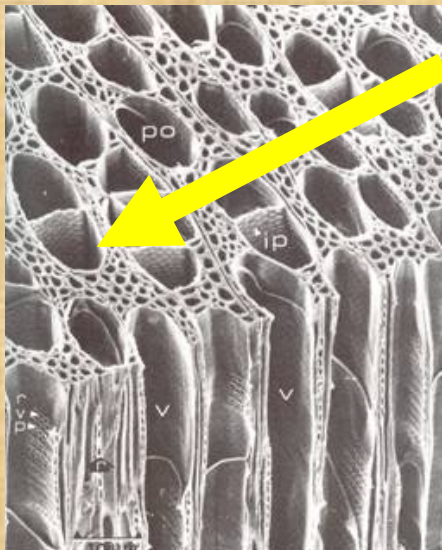
Variability analysed

Radial profile with 3 boring locations around each tree





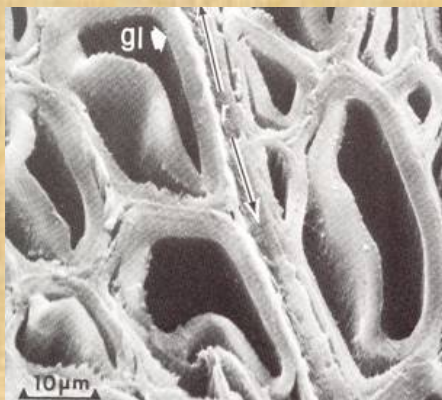
General wood structure and properties of poplars



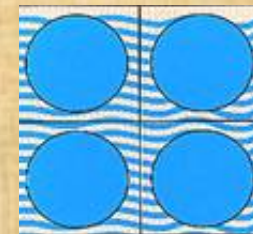
Normal structure

Density: 300 - 400 - 520 kg/m³

Dry volume : 20 – 26 – 34 %

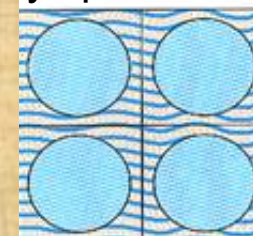


Tension wood

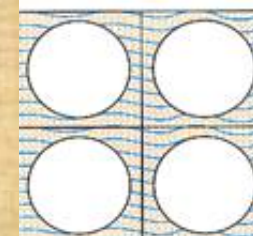


Free water in empty spaces

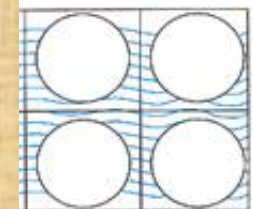
75 - 70 - 60%



Fibers saturation 35-45% H₂O



Loss of linked water



Dry wood

With max shrinkage 7-10 %





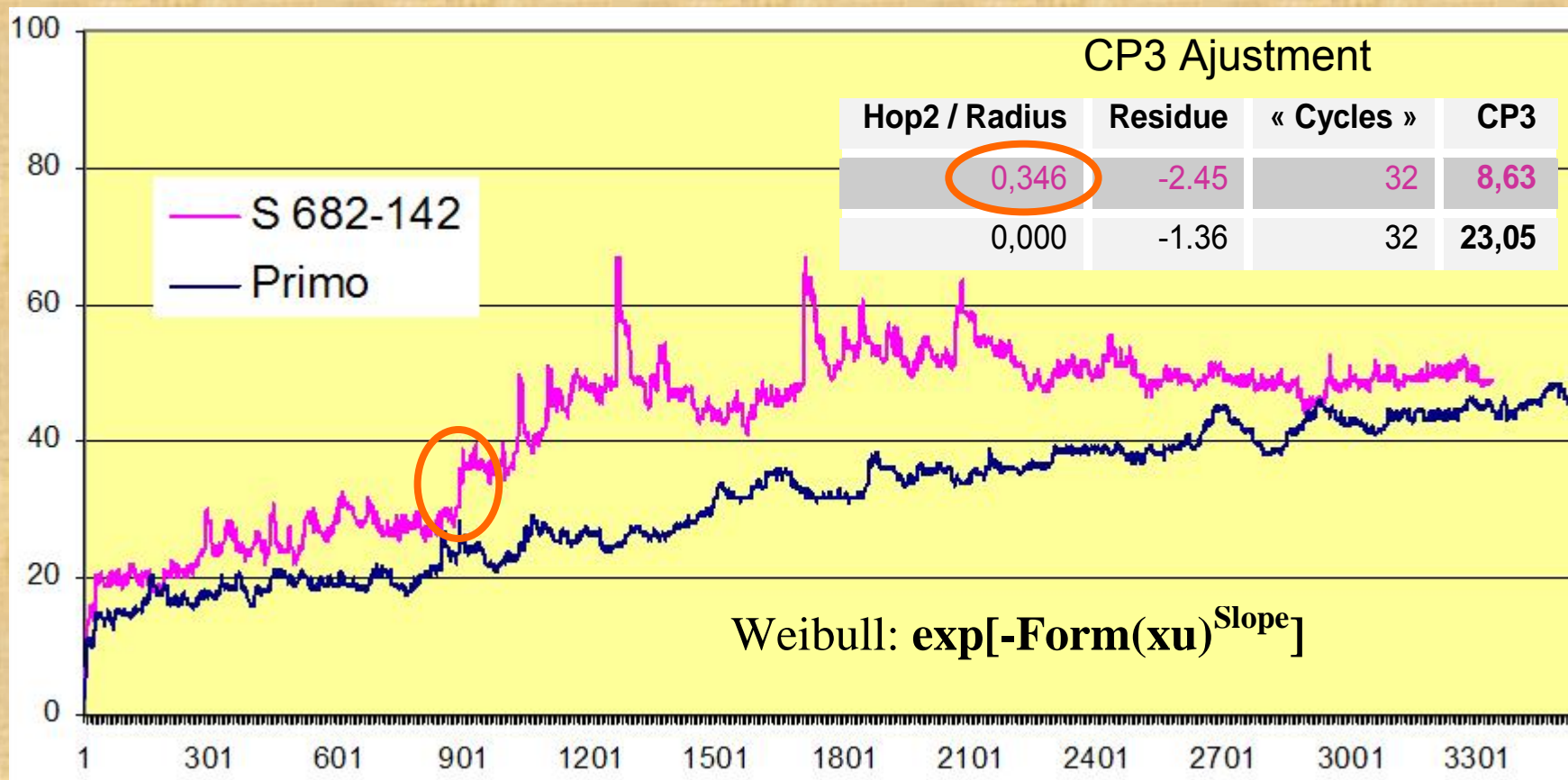
Curve description by 10 parameters grouped in 3 principal components

CP1 General dispersion

Slope	Average %	Hop1	CMR	CP1
-0,388	45,4	-6	0,001565	31,18
-0,270	32,0	0	0,000763	43,85

CP2 Form

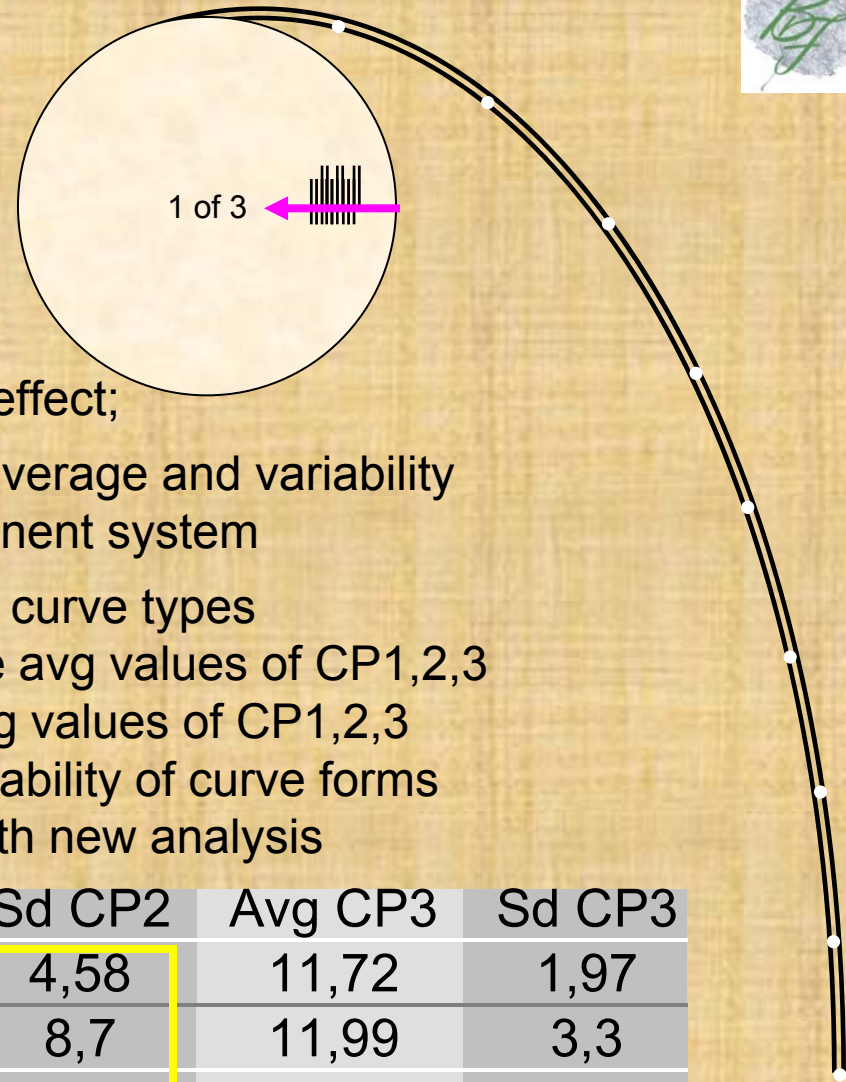
Form	Hop1 / Radius	False heart	CP2
8,3	0,727	0.368	-29,71
5,5	0,000	1.000	-19,72





Clonal material

DxD	22
DxN	20
N	4
TxD	6
TxT	12
Total	64



First results

Non statically hybrid effect;

Clonal groups statically different for average and variability values in 3 component system

Family of clones grouped in curve types

V235, V471, V24 and hybrids within the avg values of CP1,2,3

V1, V5 and hybrid S4 within the avg values of CP1,2,3

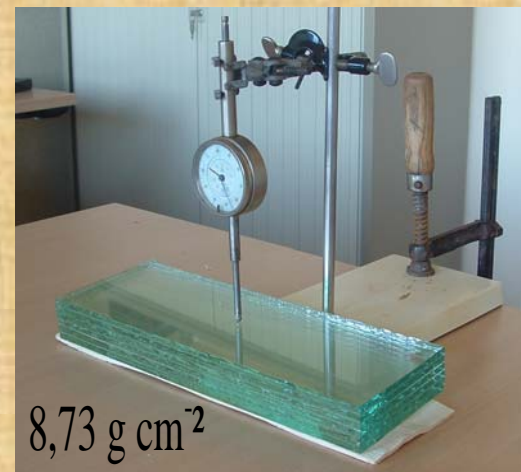
Open pollinated S620 with large variability of curve forms

Tendencies to be confirmed with new analysis

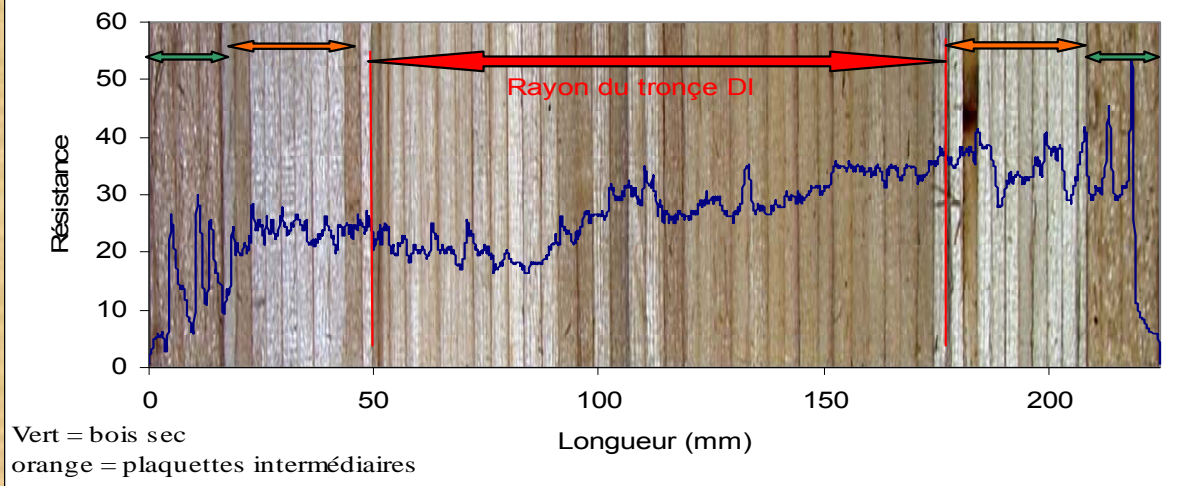
Type	Avg CP1	Sd CP1	Avg CP2	Sd CP2	Avg CP3	Sd CP3
A	29,24	3,89	-23,08	4,58	11,72	1,97
B	30,4	4,36	-25,27	8,7	11,99	3,3
C	42,57	1,68	-25,98	9,47	18,11	7,15
D	31,19	4,4	-27,7	1,88	11,36	2,29
E	22,18	0,31	-11,7	1,58	9,65	1,73
F	31.68	0.21	-30.27	0.25	8.47	1.58



Physical characteristics of peeled trees measurements



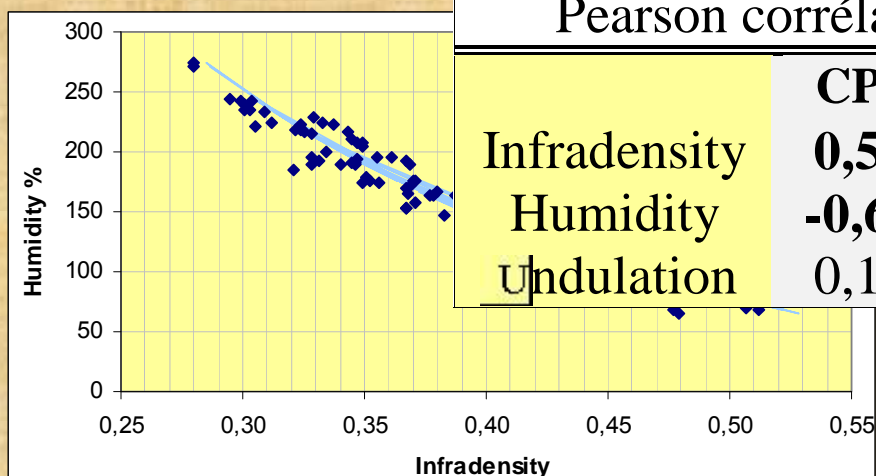
Résistance de la troncée DI en fonction du rayon du tronc.





Physical characteristics of peeled trees related to borer strength

Borer strength variables	Coefficient	t_{obs}	p
Constant	-41,6	-2,76	0,007
Humidity	12,9	4,02	0,000
Infradensity	103,3	3,86	0,000
Shrinkage	8,0	0,29	0,775
Plate number	-0,128	-1,29	0,200
Undulation	0,814	3,09	0,002



Pearson correlation coefficient

	CP1	CP2	CP3
Infradensity	0,57	-0,26	0,30
Humidity	-0,63	0,13	-0,41
Undulation	0,13	-0,55	-0,24

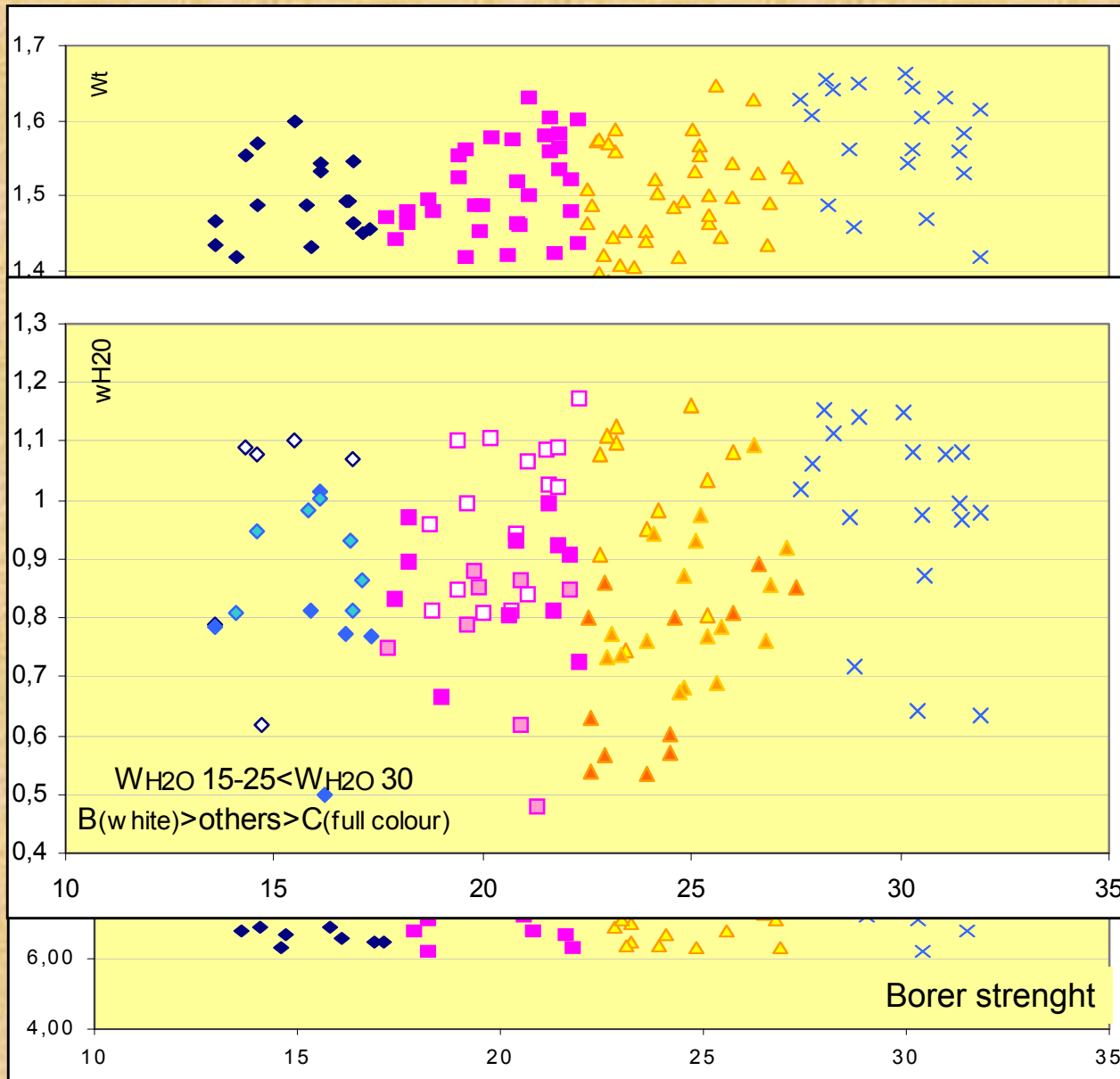


Shrinkage consequences



Borer strength, Total mass and Shrinkage

Borer strength	% tot H2OLoss Wt Shrinking
15	14
	0,428 1,473 7,884
20	26
	0,399 1,493 8,631
25	35
	0,438 1,466 8,406
30	16
	0,279 1,563 9,200
Average	23,35
	0,393 1,495 8,587

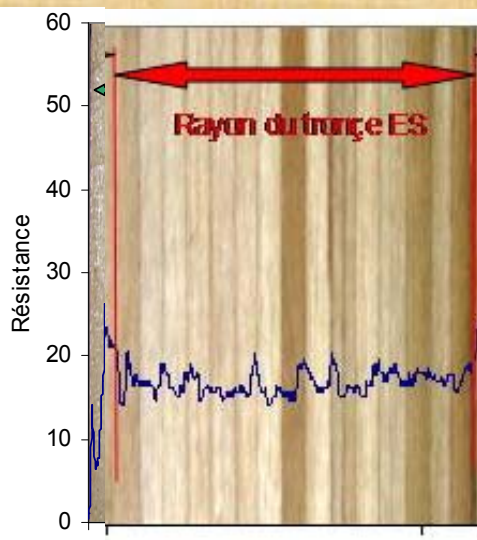




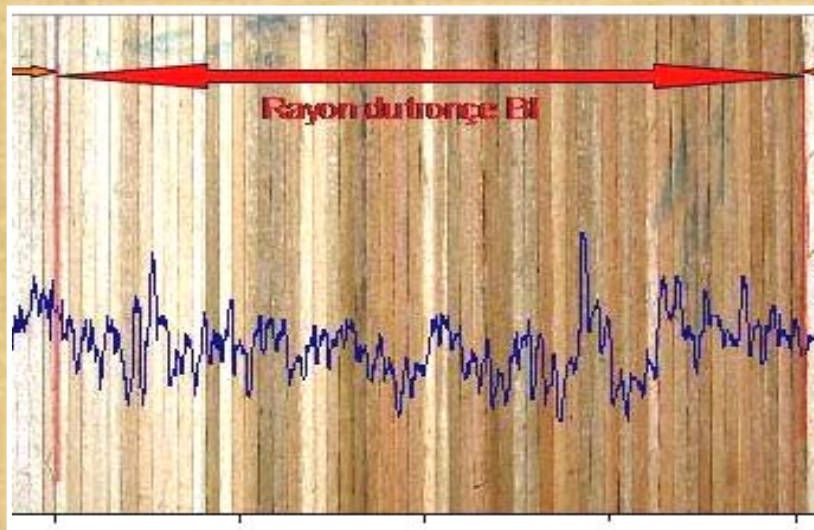
Borer strength, Total mass and Shrinkage

Summary

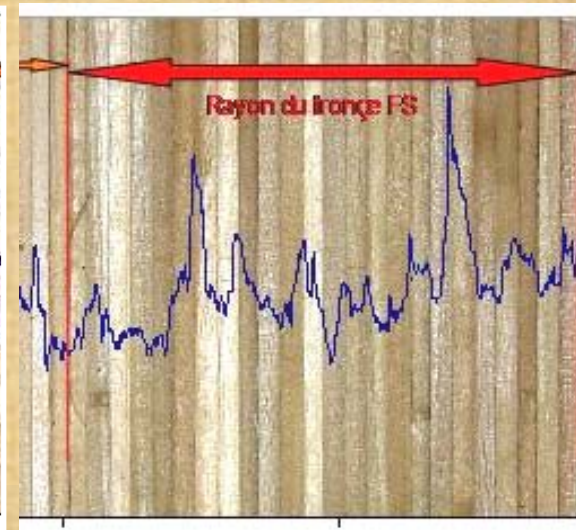
Borer strength	Wt	W _{H2O}	H ₂ O loss	Shrinking
15 %	Low	Low	High	Low
20 %	Low	Low	High	Average
25 %	Low	Low	High	Average
30%	High	High	Low	High



< average
E
17,6 %



average
B-C
21,4 %



>average
A-D-F
27,0 %



Physical characteristics of peeled trees Summary

	< average	average	>average
• Borer strength	E	B-C	A-D-F
• %	17,6	21,4	27,0
• Infradensity	E-B	D-F	A-C
• Keylwerth	0,36	0,40	0,44
• Humidity	B	A-D-E-F	C
• H ₂ O/DW	1,12	1,50	1,84
• Shrinkage	D-E	A-B-C-F	
• %	0,070	0,091	
• Undulation	C-D-E	A-B-F	
• mm	4,78	5,85	



Can you estimate the quality of peeled wood with a borer strength profile ?

Groups of clones
based on curve
types

Identification of
veneer quality
on the base of clone groups

Physical veneer
properties
relation with borer strength

<i>Borer curve</i>	Physical characteristics of veneer
<i>General dispersion</i>	Infradensity Humidity
<i>Form of curve</i>	Undulation
<i>Statistic adjustment</i>	Humidity

- Step 1 : selection of low average and homogeneous borer curves on standing tree
- Step 2 : results confirmation on veneer plates with undulation and infradensity tests
- Complementary visual control of color and surface condition



Thank you for your attention

p.mertens@mrw.wallonie.be