

Development of decay in preservative treated plywood

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Poplars, willows and people's wellbeing

23rd Session of the International Poplar Commission, Beijing, China, 26-30 October 2008



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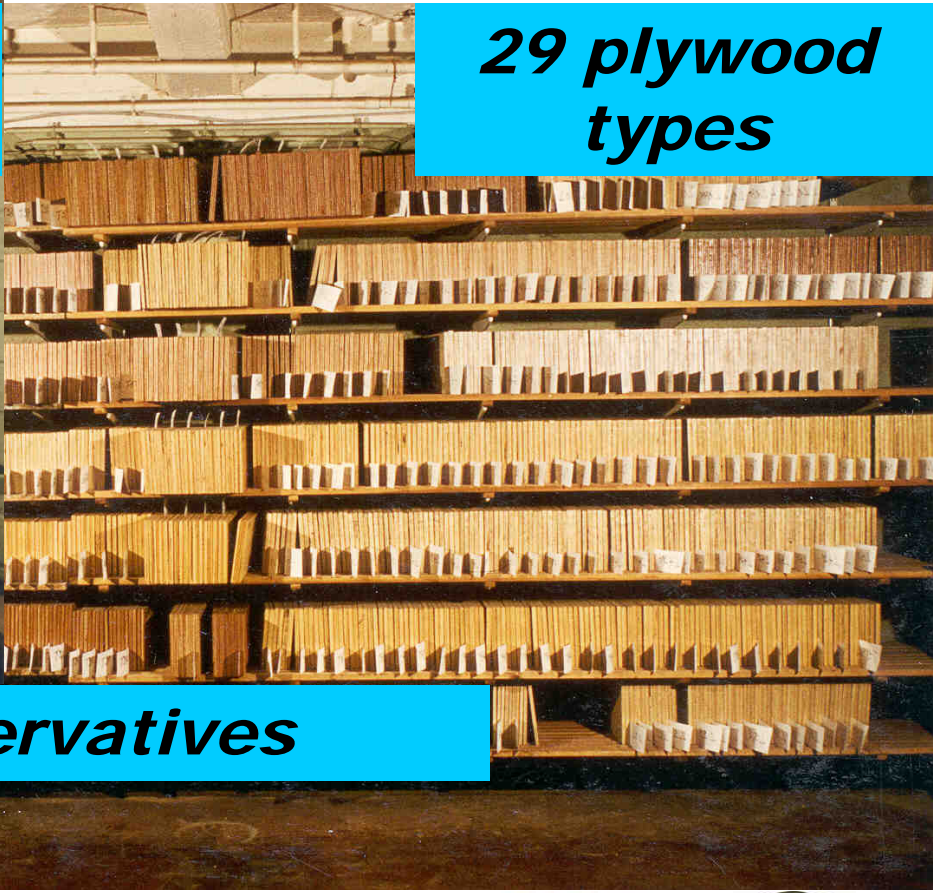
INTRODUCTION

- *Poplar is a non-durable wood species*
- *Poplar plywood can decay when exposed under semi-continuous wet conditions*
- *No risk strategy:
preservative treatment*

INTRODUCTION



14 treating processes



29 plywood types



21 wood preservatives



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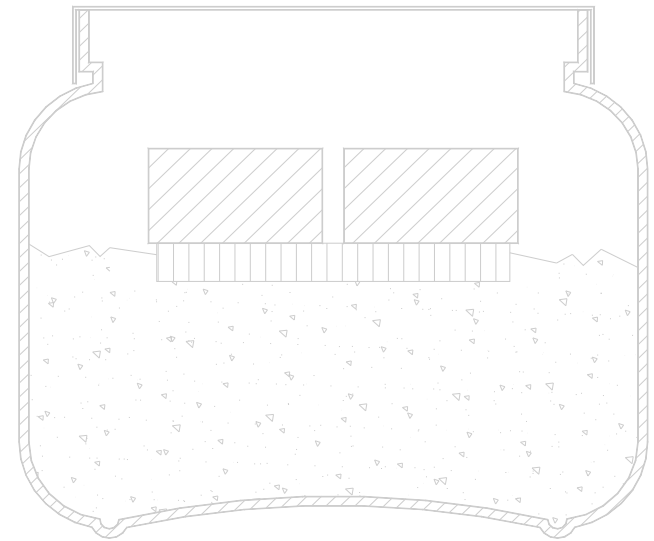


PLYWOOD

Denomination	Glue	Total thickness (mm)	Veneer thickness (mm)
Poplar 1	UF	12	0.9/3.9/2.4
Poplar 2	UMF	12	2.7/1.8/3.0
Poplar 3	UMF	15	3.0/3.0/3.0

FUNGAL TESTING

*ENV 12038 Standard test method
early version*



FUNGAL DECAY

Plywood	ML % <i>Coriolus</i>	ML % <i>Poria</i>	ML % <i>Lentinus</i>
Poplar 1	30.0	46.2	28.9
Poplar 2	29.9	24.5	33.3
Poplar 3	26.5	39.1	25.1

PRESERVATIVES

Salts	Quats	Waterborne organic	Oilborne organic
CCA	AAC1	Aza / Li	XAI/Li
CCB	AAC2		AAC/Pe
CCF			

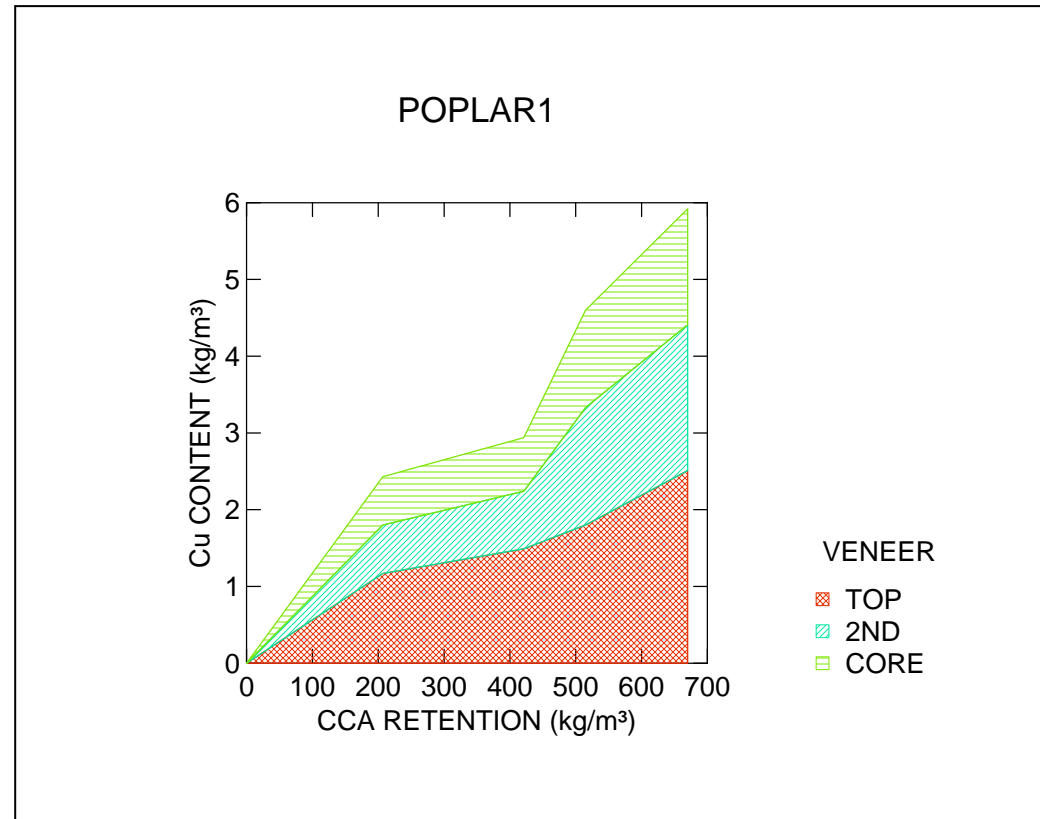


TREATING PROCESSES

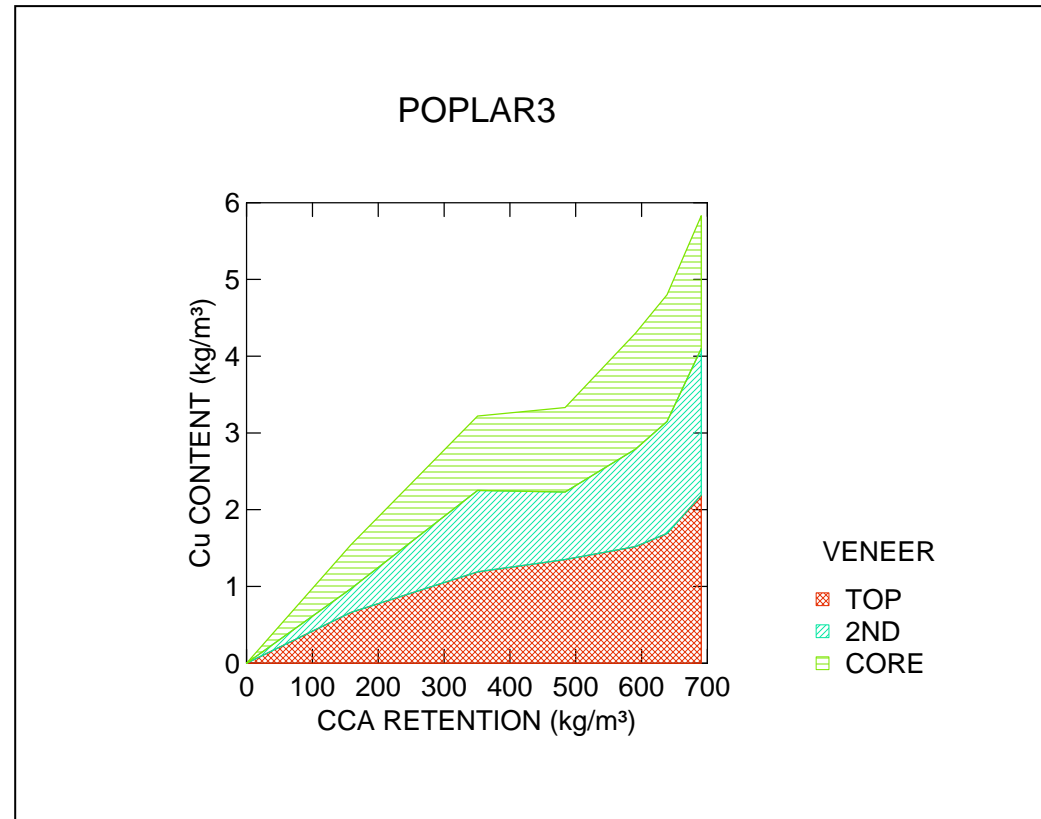
*Vacuumpressure or soaking treatments
for waterborne preservatives*

*Dipping or dip-vacuum treatments for
oilborne preservatives*

Cu content of CCA treated POPLAR1 plywood



Cu content of CCA treated POPLAR3 plywood



ASYMMETRIC TRANSITION FUNCTIONS

(1) *the Weibull cumulative function*

$$Y = a [1 - \exp(-((X + c (\ln 2)^{1/d} - b) / c)^d)]$$

(2) *the asymmetric sigmoid function*

$$Y = a / [1 + \exp(-(X - c \ln (2^{1/d} - 1) - b) / c)]^d$$

(3) *the logistic dose response (LDR) function.*

$$Y = a / (1 + (X/b)^c)$$

(4) *growth relationship, model of Richards*

$$Y = a \cdot (1 - (1 + b \cdot \exp(-c \cdot X))^{-1/d})$$

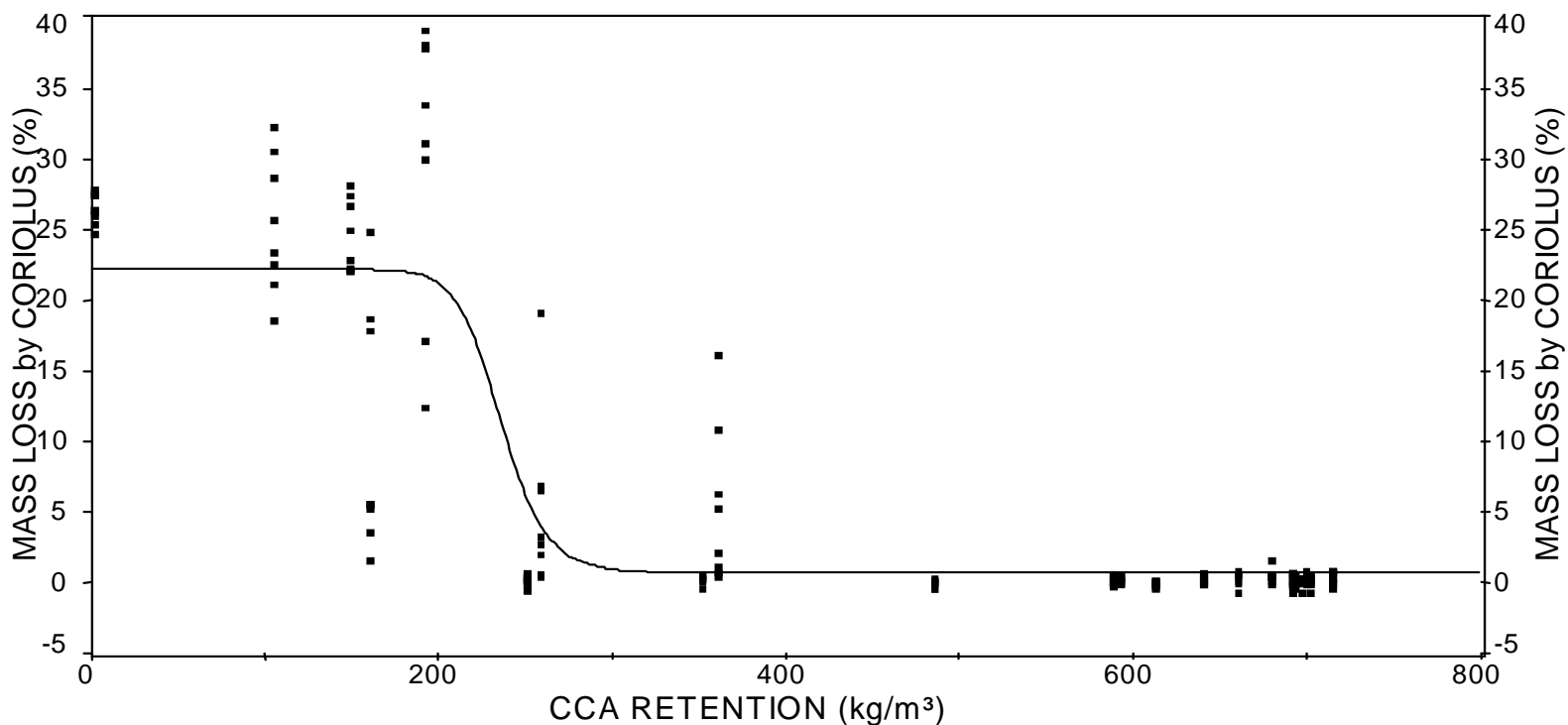
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Y = mass loss (%)

X = preservative retention (kg/m³)

DECAY BY CORIOLUS

LOGIST DOSE RESP



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'PRACTICAL' Toxic Threshold Values for CCA – POPLAR plywood

(1) *Coriolus versicolor*

retention of 240 kg/m³ or salt **8** kg/m³

(2) *Poria placenta*

retention of 400 kg/m³ or salt **13** kg/m³

(3) *Lentinus cyathiformis*

retention of 220 kg/m³ or salt **7** kg/m³

These are derived from 5 % mass loss levels and can be implemented as such....

CONCLUSIONS

To achieve full biological protection of poplar plywood a high loading of preservative is required.

Deriving 'practical' toxic threshold values for a wood preservative should be recommended as better option than deriving values based on standard Basidiomycete testing of solid timber (EN 113,...)

CONCLUSIONS

Poplar plywood possesses very good starting properties to produce durable (treated) plywood of low density



*THANK YOU FOR
YOUR ATTENTION*

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