Resistance to decay fungi of ammonium borate oleate treated wood

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Background and objectives

Boron compounds Boric acid (H_3BO_3)

- Efficient to prevent and cure degradations of wood by fungi and insects
- **Highly leachable**

Fix boron through ammonium borate oleate (Doc IRG/WP 07-30435)

• 1 mol Boric acid (aqueous solution) + 1 mol ammonia (27% m/m solution)
Stirring 80°C, 60 min

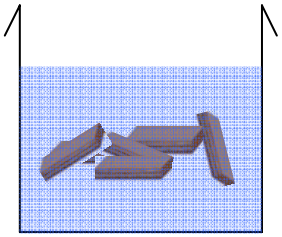
• Obtained product + 4 mol oleic acid
Strong mixing 80°C, 60 min

• Ammonium borate oleate ABO
$[CH_3\text{-}(CH_2)_7\text{-}CH{=}CH\text{-}(CH_2)_7\text{-}COO^-]_{1/2}\ NH4^+[O^-B(OH)_3]_{1/2}$

Decay resistance of ABO treated wood / EN113 & EN84 ?????

Treatment EN113 & Leaching EN84

2 weeks
20°C, 65% RH



Leaching according to EN 84

Treatment EN 113

50 x 25 x 15 mm (L, R, T)

Scotch Pine sapwood

Beech

ABO solutions

Initial reaction mix = 0.1 mol Boric acid + 0.4 mol Oleic acid

Diluted in Ethanol

C1 = 1100 mL Ethanol

C2 = 700 mL Ethanol

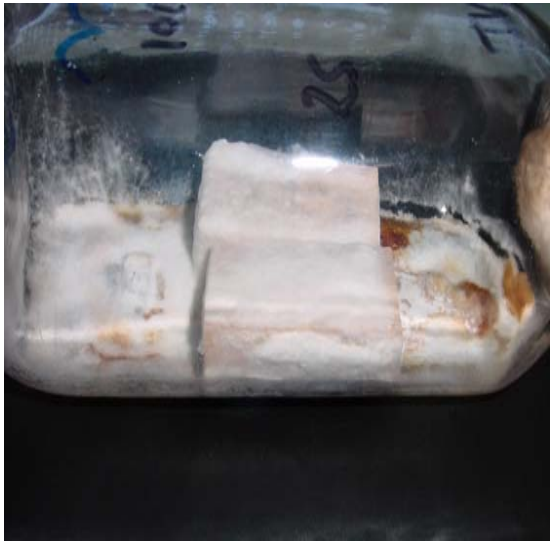
C3 = 450 mL Ethanol

C4 = 250 mL Ethanol **Control = Ethanol**

Fungal exposure EN113

- Leaching + Drying + Sterilization
- 16 weeks fungal exposure
- Coniophora puteana
  - treated pine sapwood
  - treated beech
- Coriolus versicolor
  - treated beech
- Performance

= mass loss %



Retentions

Pine

Retention load of unleached samples

Treatment	Kg/m3 BAE
C1	2.49 (0.58)
C2	4.57 (0.24)
C3	6.59 (0.35)
C4	9.30 (0.97)

→ Mean (20 replicates) (SD)

→ Coniophora

Beech

C1	1.84 (0.40)
C2	2.92 (0.65)
C3	4.61 (0.90)
C4	6.68 (2.45)

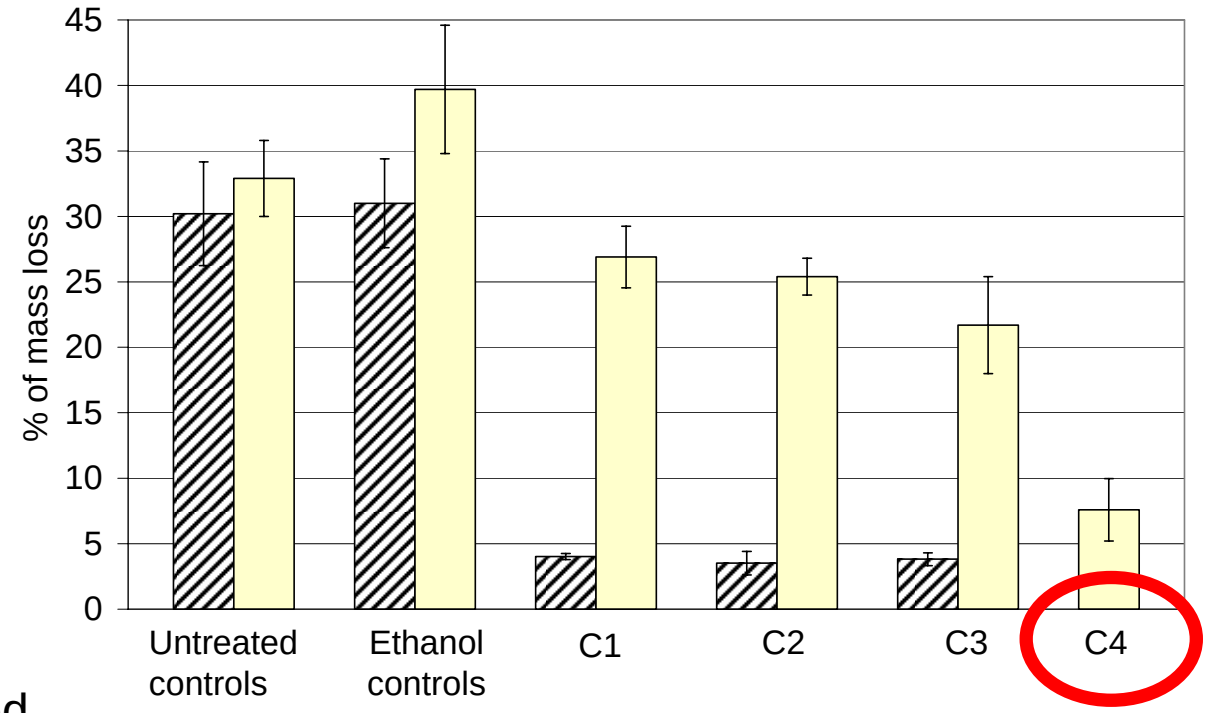
→ Coniophora

C1	1.78 (0.28)
C2	2.97 (0.96)
C3	4.79 (0.73)
C4	7.42 (1.53)

→ Coriolus

ABO treated Pine vs Coniophora

Pine (*Pinus sylvestris*)	Retention load of unleached samples
Treatment	Kg/m3 BAE
C1	2.49 (0.58)
C2	4.57 (0.24)
C3	6.59 (0.35)
C4	9.30 (0.97)

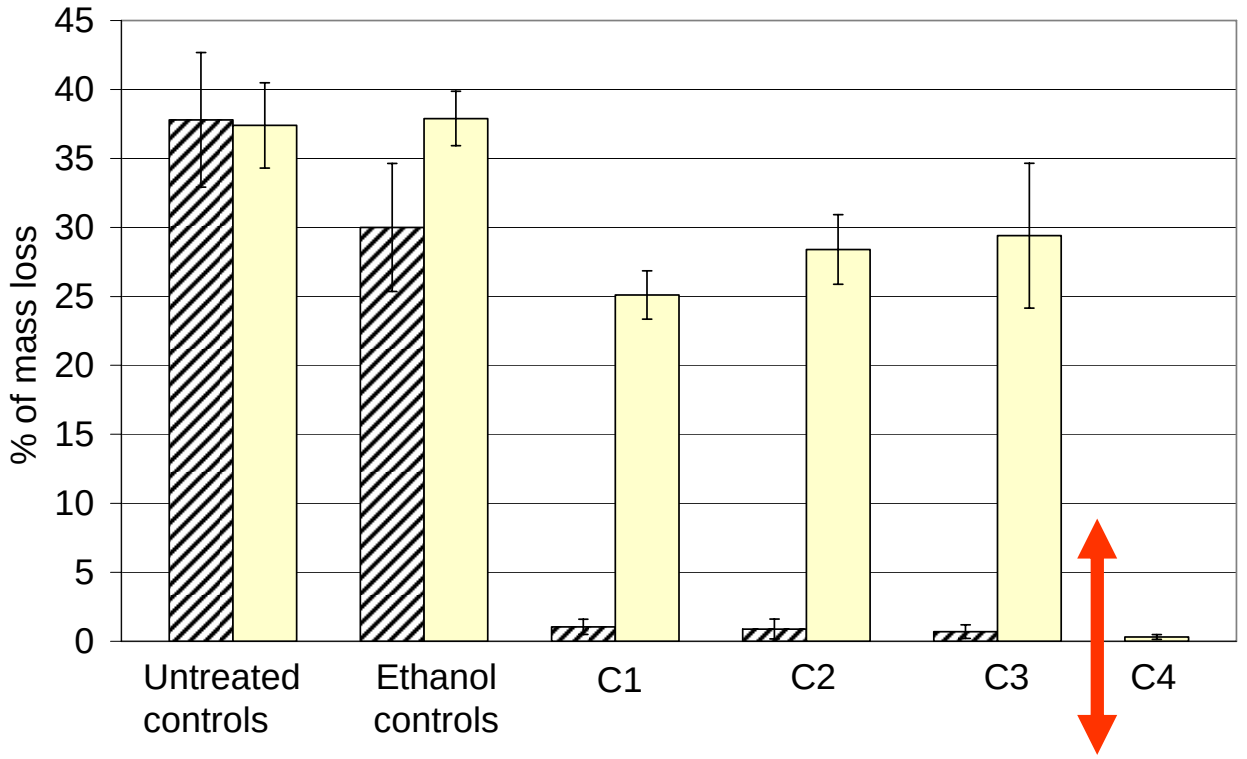


Mean mass loss
4 replicates

Leached
Unleached

ABO treated Beech vs Coniophora

Beech (*Fagus sylvatica*) Treatment	Retention load of unleached samples Kg/m3 BAE
C1	1.84 (0.40)
C2	2.92 (0.65)
C3	4.61 (0.90)
C4	6.68 (2.45)



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ABO treated Beech vs Coriolus

Beech (*Fagus sylvatica*) Treatment	Retention load of unleached samples Kg/m3 BAE
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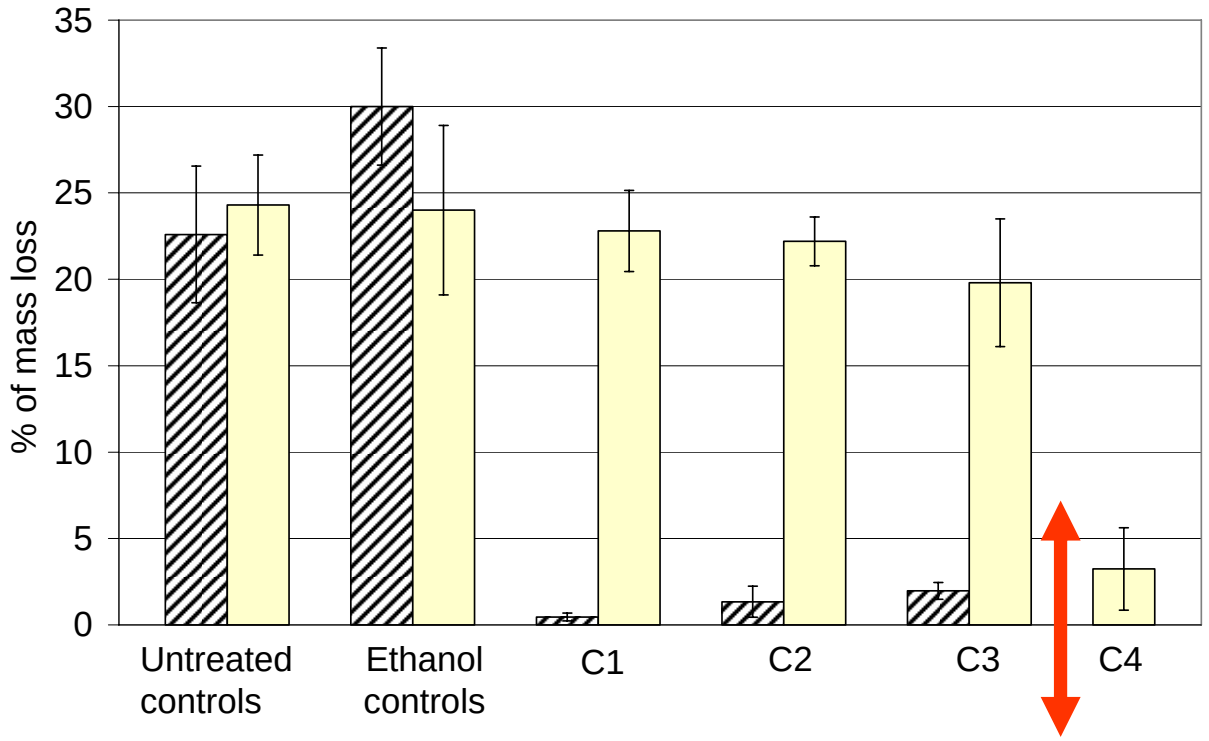
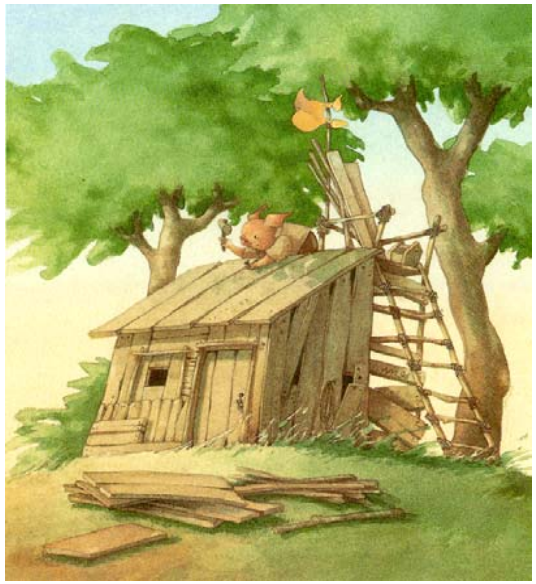


Mean mass loss
4 replicates

Leached
Unleached

Conclusion



- Threshold not found in the case of treated pine / Coniophora
- Higher concentrations of ABO ?
- Improvements / ABO ?
- Boron leaching data are missing
- ABO Biocide/Coating system performed differently JIS / EN standards
- Still to be done…

Acknowledgements
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