

Aesthetic performance of commercial wood building materials for outdoors use in Sweden



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SP- Biobased Products

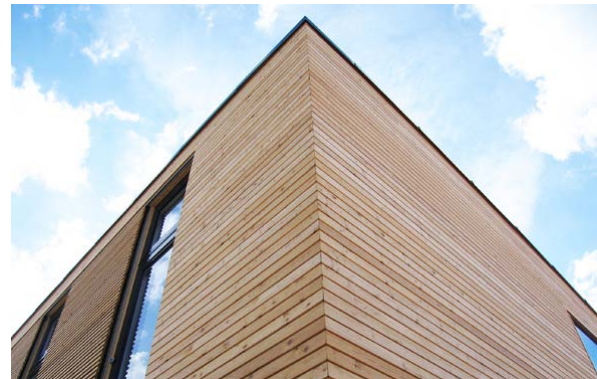
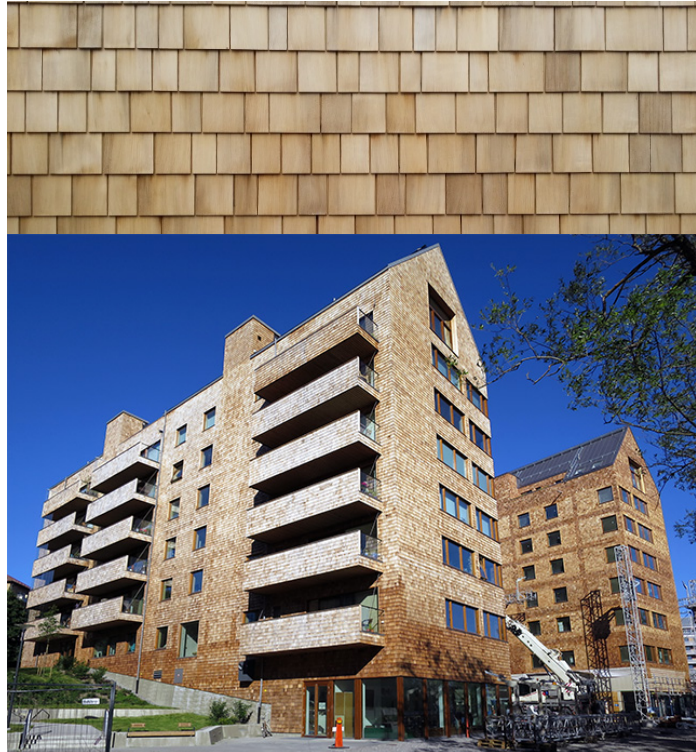
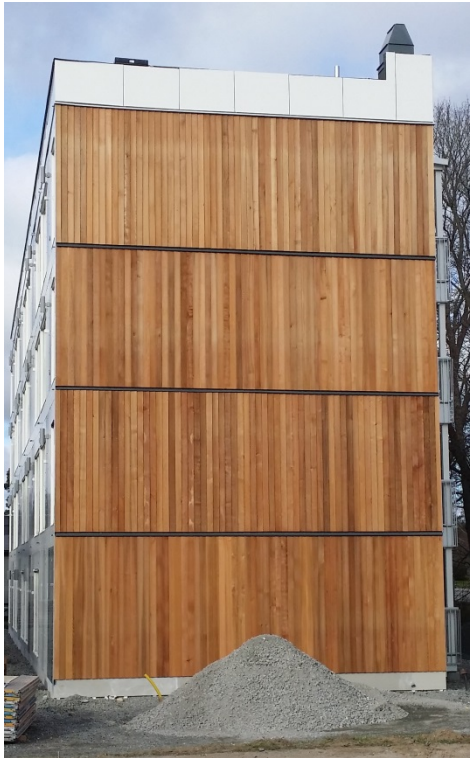


Joint conference of COST Action FP1303 & DURAWOOD Project –
HYGROTHERMAL PERFORMANCE OF BUILDINGS AND THEIR MATERIALS

30-31 August 2016, Poznan

Poland

Examples of "new" cladding products



New products in service...



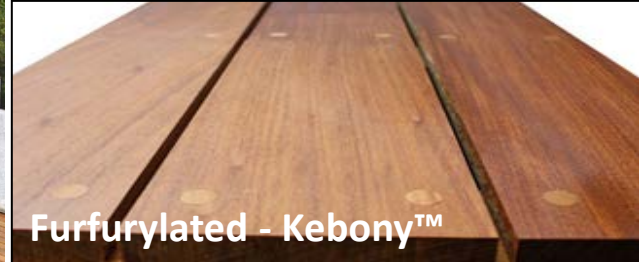
Examples of "new" decking products from brochures



Siberian larch



Cumaru



Furfurylated - Kebony™



Thermally treated



Ipê



Acetylated - Accoya™



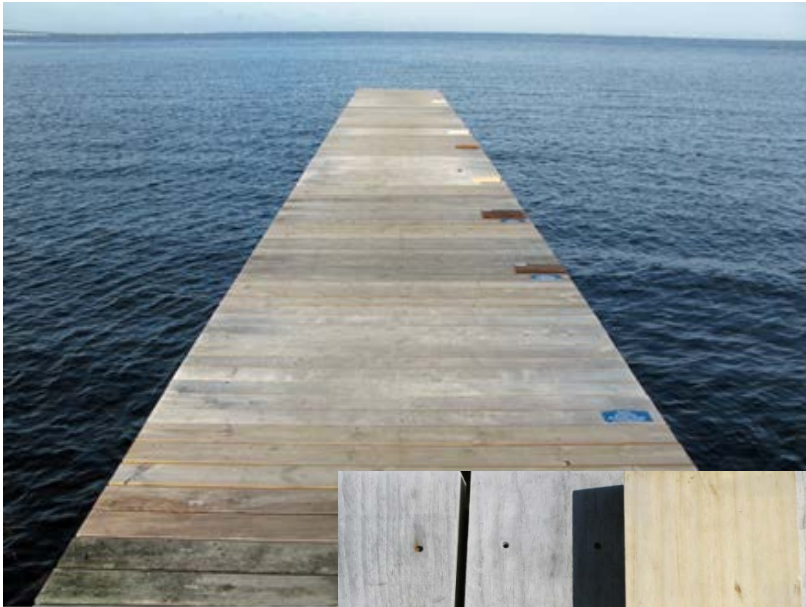
WPC- Wood plastic composites



Bankirai

**From brochure
picked up in a "DIY store**

In service...



In service...





Setup of this study

- Field test (Decking-cladding rigs)
- Artificial weathering
 - Weatherometer (WoM: water and UV)
 - QUV (Only UV)

Wood material studied:

Softwoods

- Pine and Spruce sapwood
- Siberian Larch

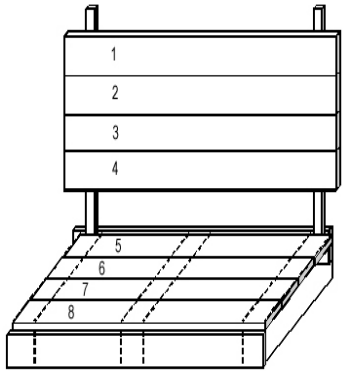
Modified wood

- Acetylated
- Furfurylated
- Thermally modified

Tropical wood

- Bankirai
- Cumaru
- Ipê

Decking-cladding rigs



- **Decking** = 4 horizontal samples (20x95x700 mm)
- **Cladding** = 4 vertical samples (20x95x700 mm)
- **Rig** = preservative treated wood
- **Orientation:** against south



Artificial weathering

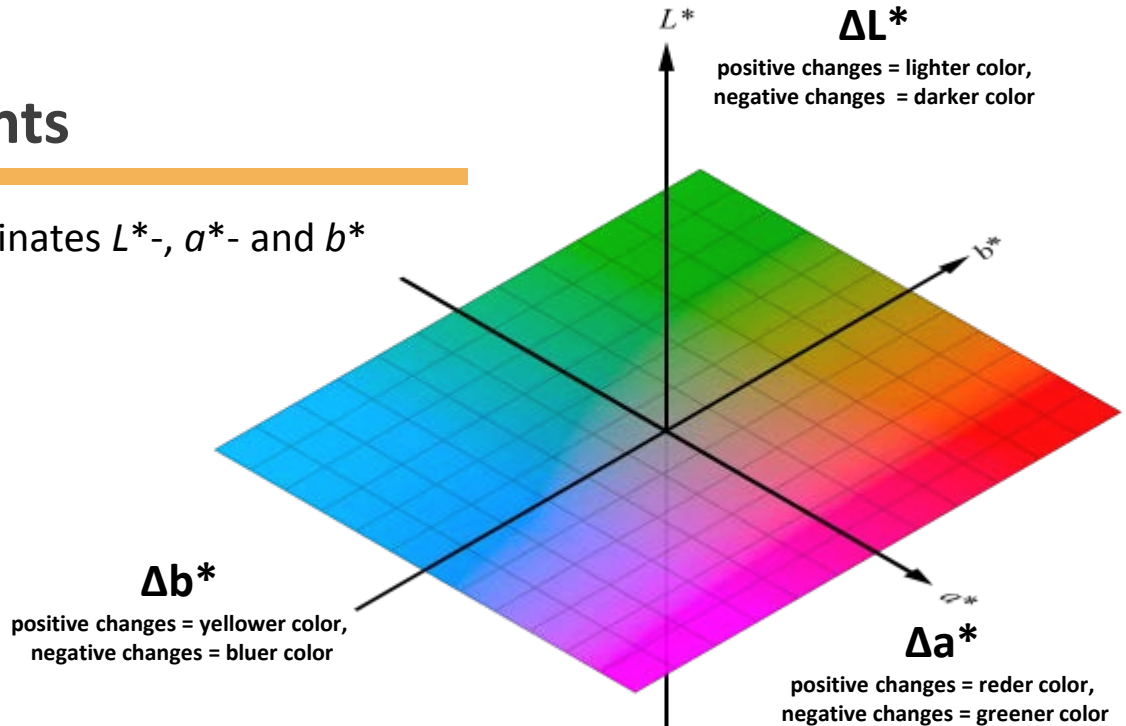
- **QUV** acc. to EN 927-6. Exposure to UV light without condensation and water spraying: 140, 200 and 400h
- **Weatherometer** acc. to ISO 11341:2004, Method A . Continuous exposure to UV light, cyclic water spraying: 140, 200 and 400h





Color measurements

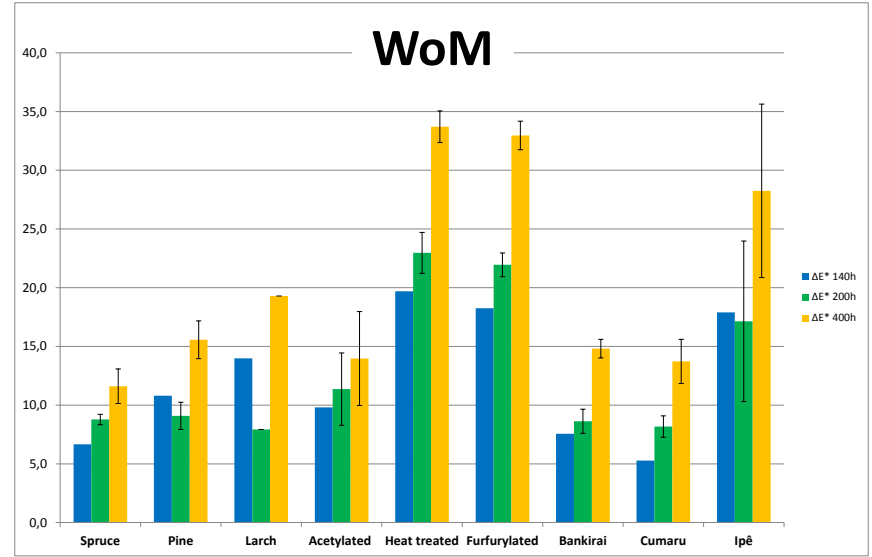
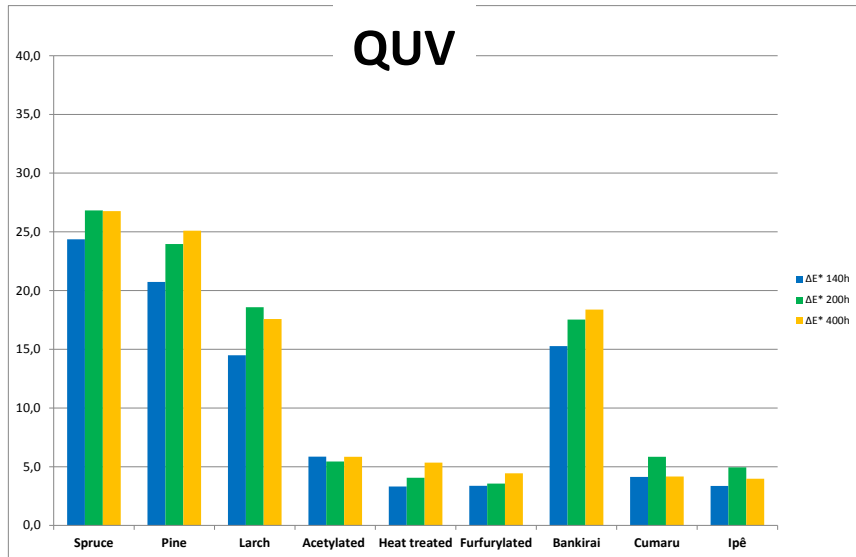
Using the **CIELAB** system with the co-ordinates L^* -, a^* - and b^*



Total color change ΔE^*

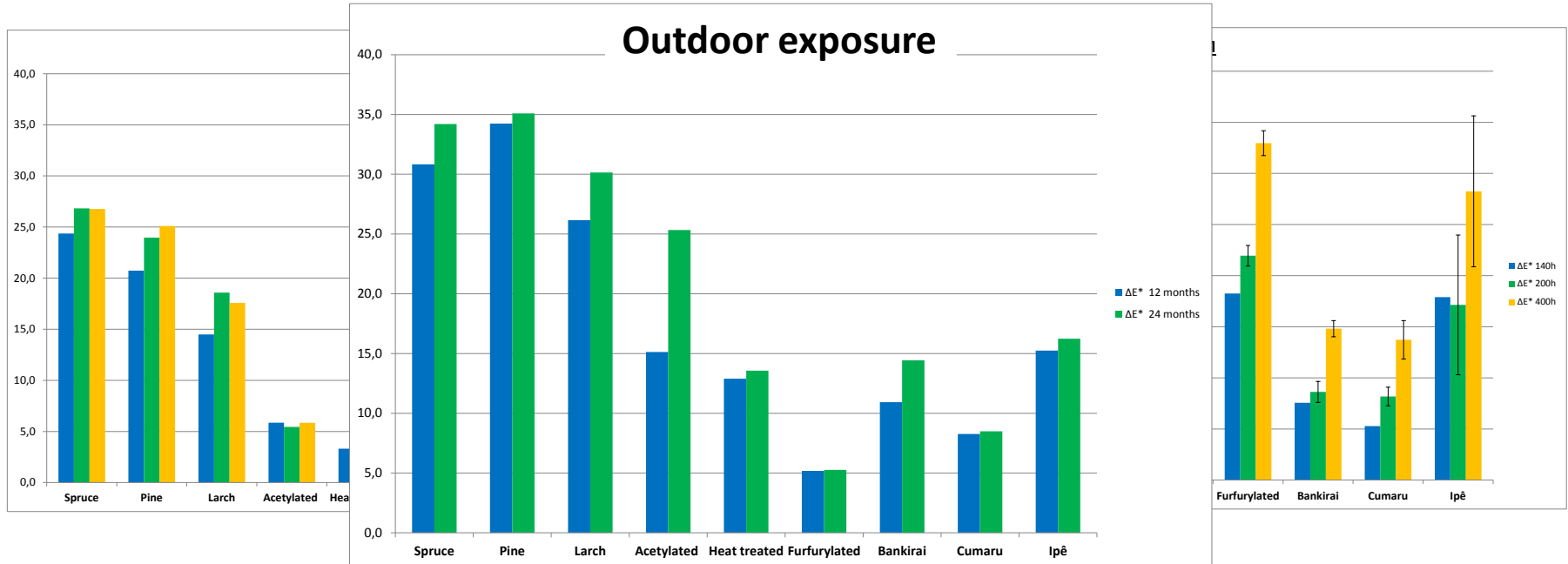
$$\Delta E_{ab}^* = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$$

Total colour change (ΔE^*)

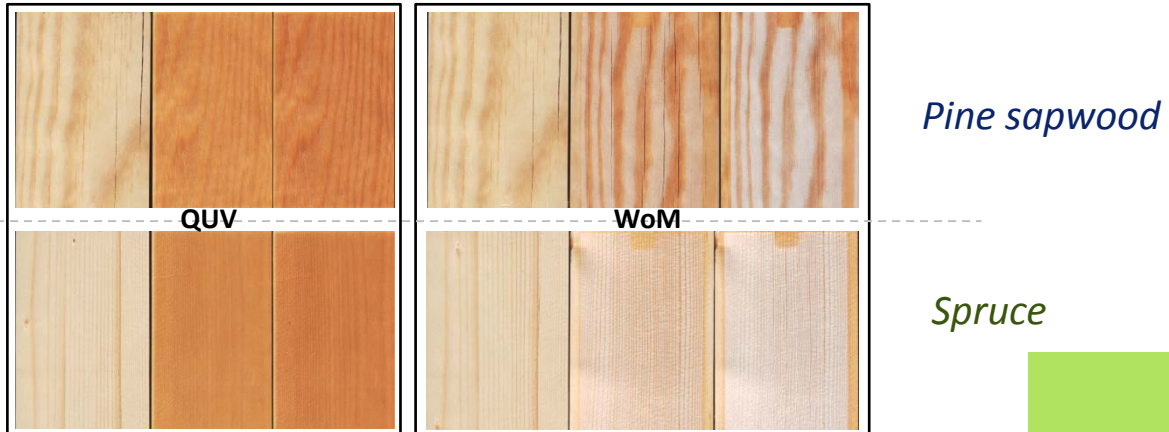




Total colour change (ΔE^*)

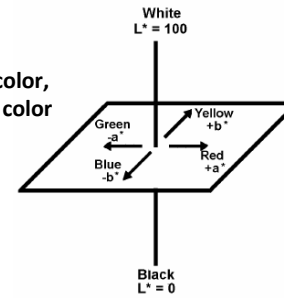


Softwoods: example.



Change in lightness (ΔL^*)

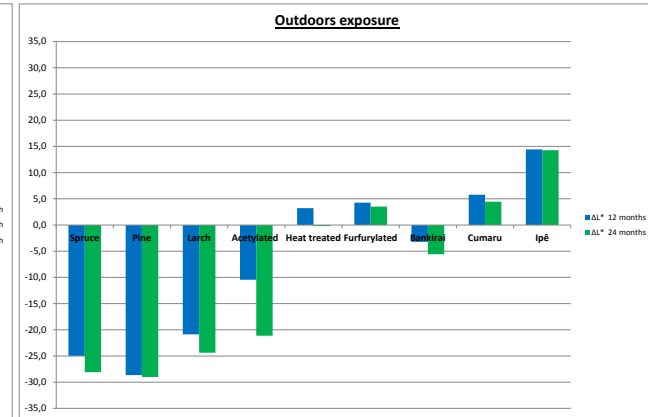
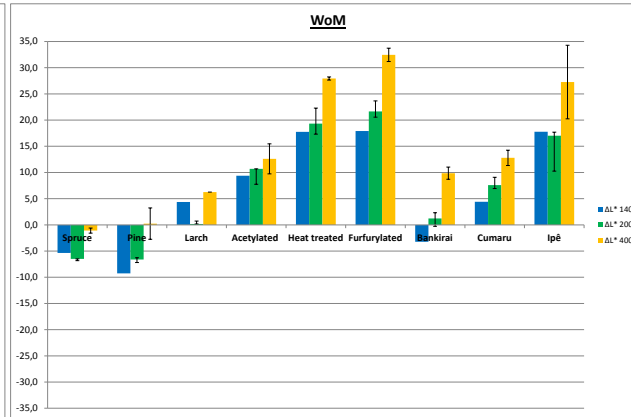
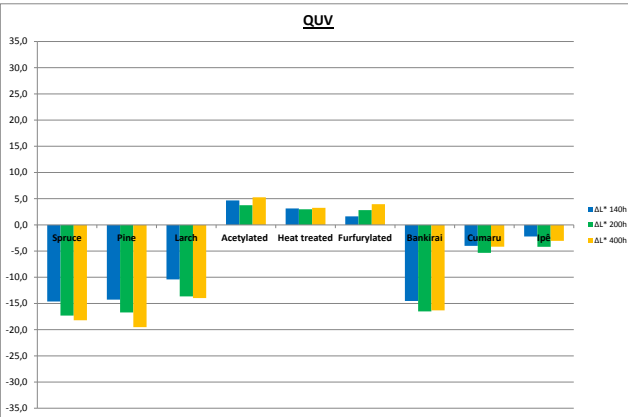
ΔL^*
 positive changes = lighter color,
 negative changes = darker color



QUV

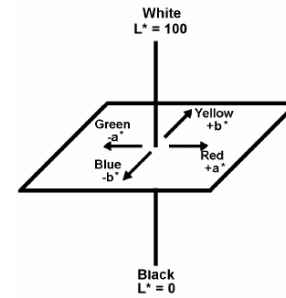
WoM

Outdoors exposure



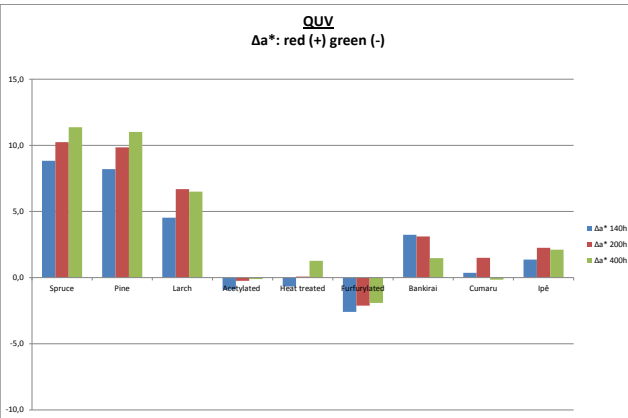
Change in a^*

Δa^*
 positive changes = reder color,
 negative changes = greener color



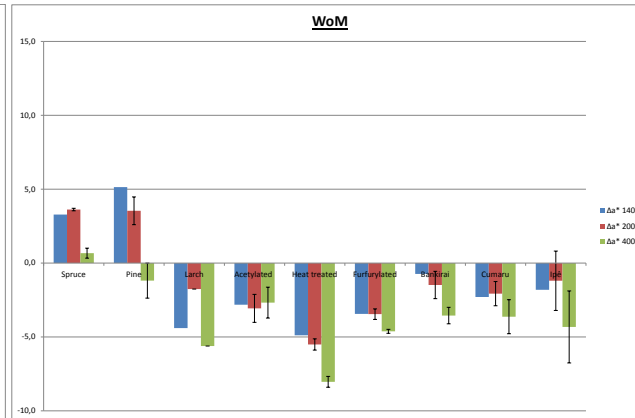
QUV

QUV
 Δa^* : red (+) green (-)



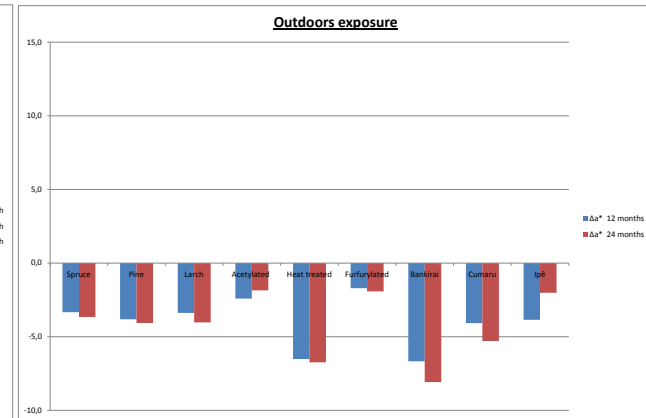
WoM

WoM



Outdoors exposure

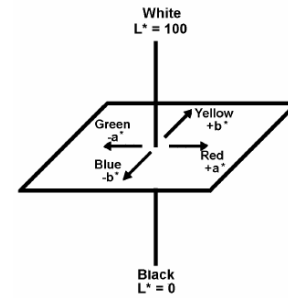
Outdoors exposure



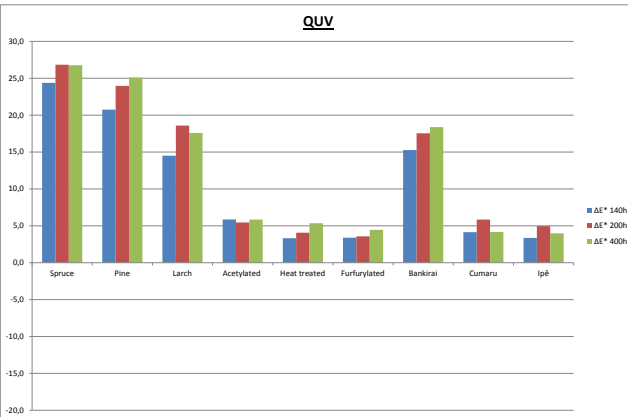
Change in b^*

$$\Delta b^*$$

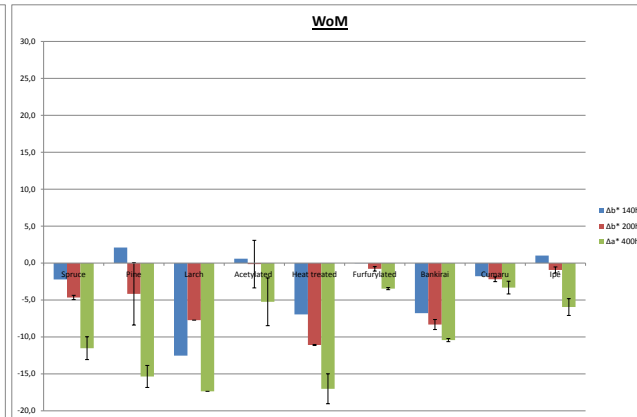
positive changes = yellow color,
negative changes = bluer color



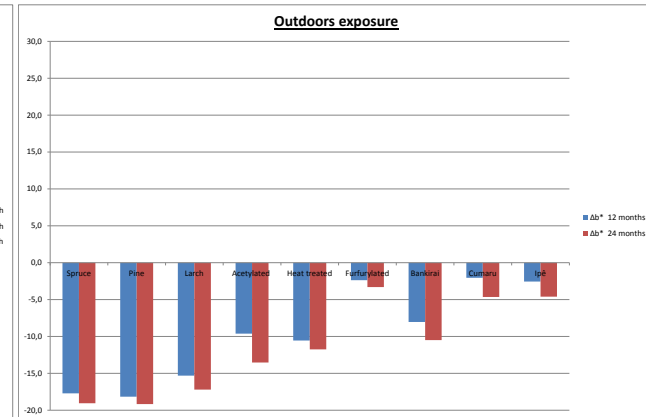
QUV



WoM



Outdoors exposure



Softwoods



Non exposed

400h QUV

400h WoM

2 years DRY

2 years WET

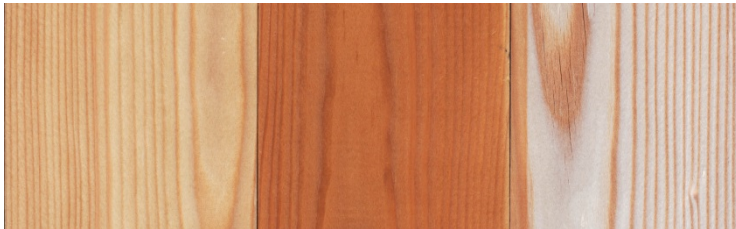
Pine



Spruce



Larch



Modified wood



Non exposed

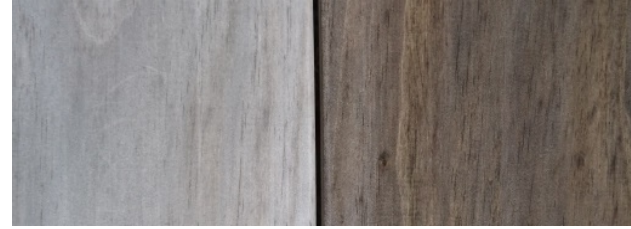
400h QUV

400h WoM

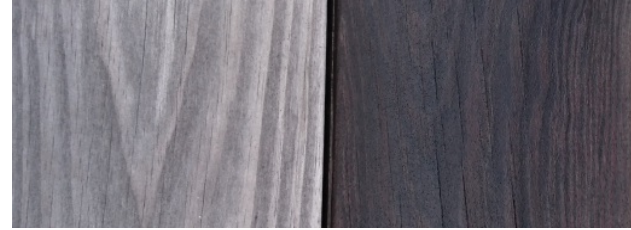
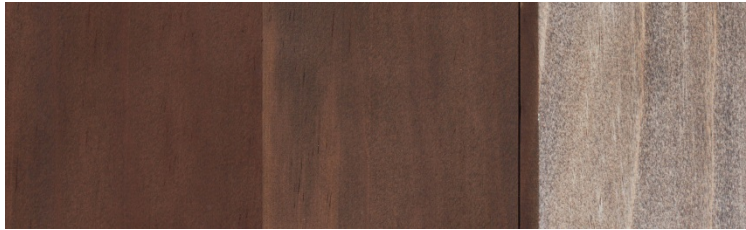
2 years DRY

2 years WET

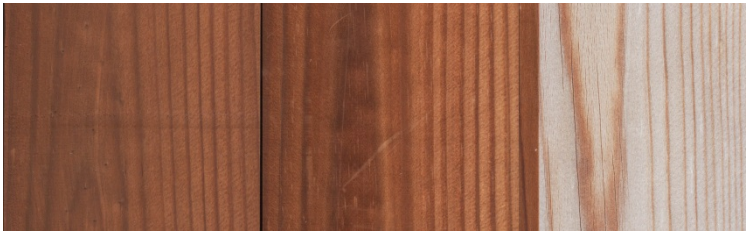
Acetylated



Furfurylated



Therm. Mod.



Tropical wood



Non exposed

400h QUV

400h WoM

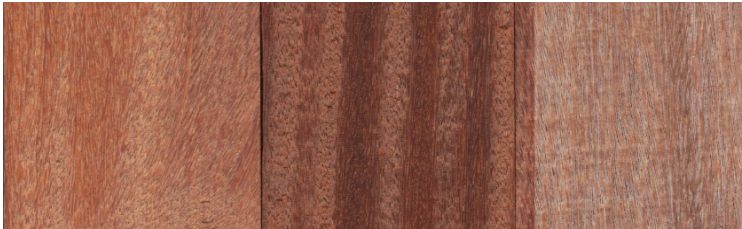
2 years DRY

2 years WET

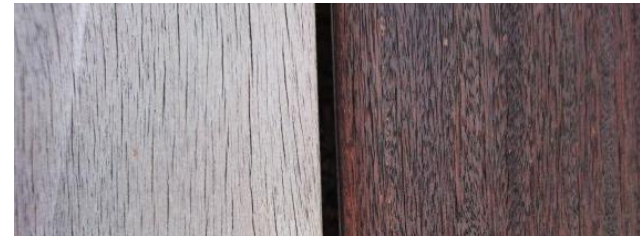
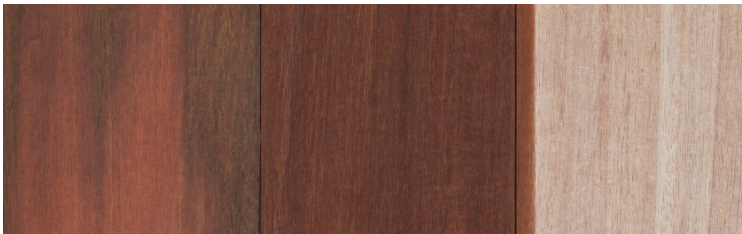
Bankirai



Cumaru



Ipê



Concluding remarks

- There should **not** be a difference between what the producer sell and what the costumer have to live with.
- It is important to determine material capability in a broader way in order for a successful introduction on the market with satisfied costumer
- We have just looked at color changes. Where are other important aspects
 - Dimensional stability – not always easy to predict from literature data
 - Climatic factors- where the material are to be exposed
 - Importance of treatments: impregnation/coatings



Thank you, for your attention!
Questions and Comments??