Effects of Methyl Methacrylate impregnation on durability of timber.

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COST FP1303
6-7th September 2017
Zagreb, Croatia

Improving low quality timber

- Low quality timber has limited construction applications
- UK has large quantities of Sitka Spruce
- Wood modification may be an avenue to improve properties.

Wood modification

- Methyl methacrylate (MMA) impregnation selected as a potential method for timber quality improvement
- Scots Pine and Sitka Spruce wood
- Two formulations used varying with monomer and additive composition
  - Termed T1 and T2

Impregnation method

- Vacuum impregnation and heat curing
- Minimum target retentions by weight MMA
  - Pine 45%
  - Spruce 40%

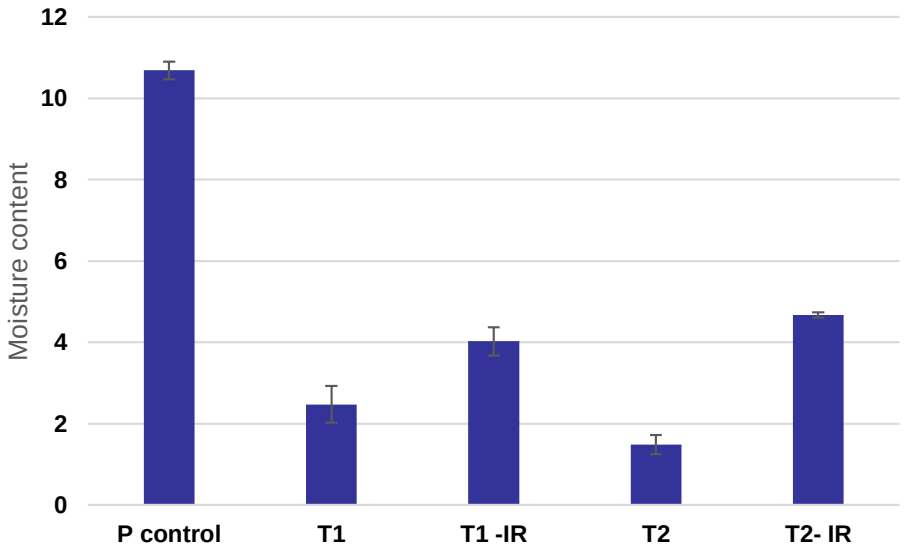
T1 gave higher retentions in Pine and T2 higher in spruce

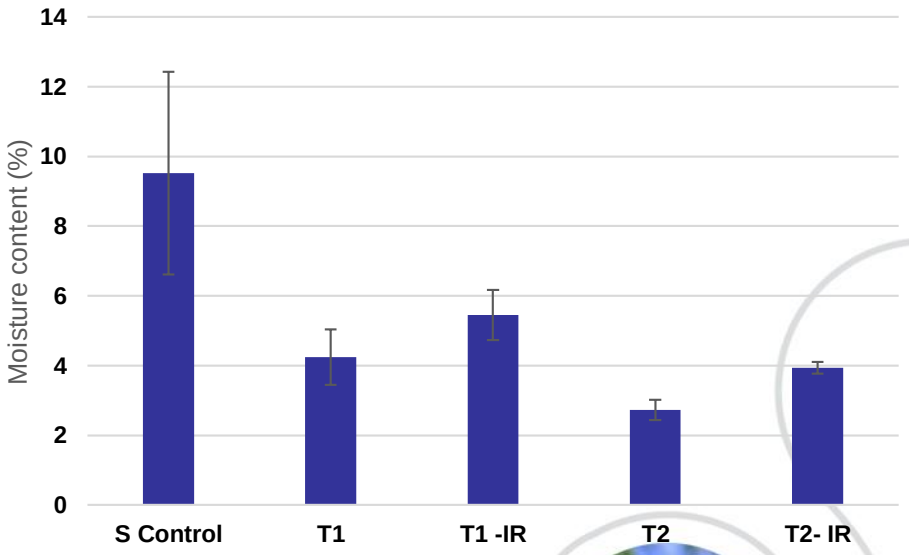
	Pine		Spruce	
	T1	T2	T1	T2
Retention [%]	47.71	46.92	48.95	55.81
WPG [%]	96.46	88.58	98.87	128.61

Moisture content

- Changing EMC of materials is a mechanism of adding protection
- EMC determined pre and post treatment and post gamma irradiation (used to sterilise material prior to decay test**)**

EMC (20°C, 65% RH)


Moisture content
12
10
8
6
4
2
0
P control
T1
T1 -IR
T2
T2- IR


Moisture content (%)
14
12
10
8
6
4
2
0
S Control
T1
T1 -IR
T2
T2- IR

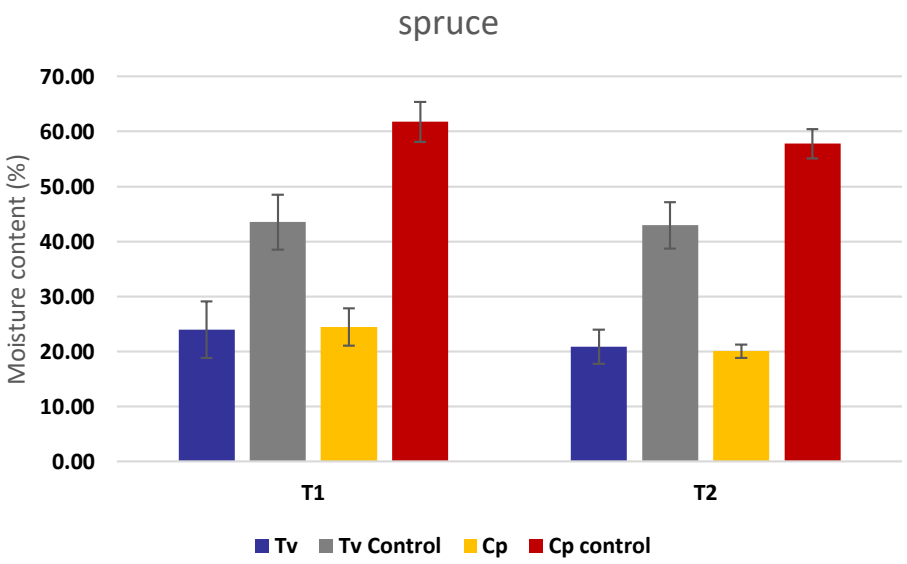
Durability testing

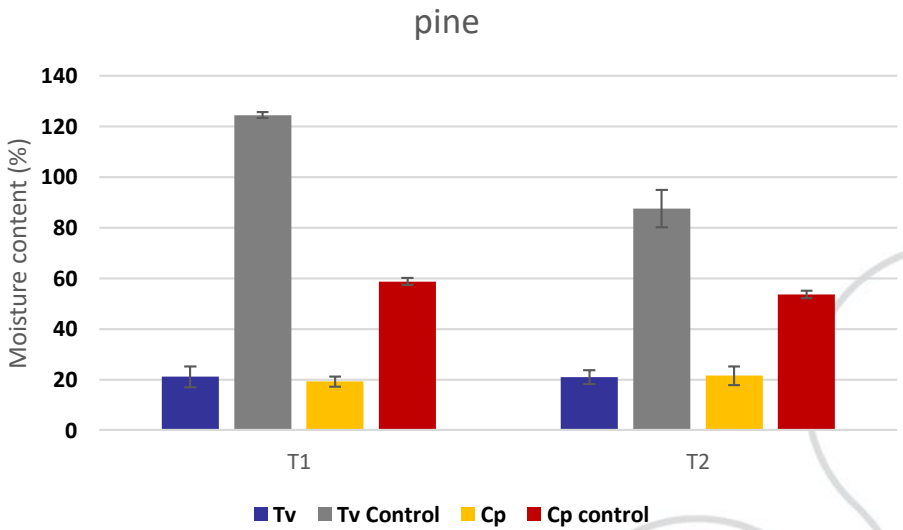
- Tested using EN113 test
- Brown rot – *Coniophora puteana*
- White rot – *Trametes Versicolor*
- 16 weeks exposure
- Visual and mass loss assessment
  - Mass loss based on mass loss of wood component

Visual assessment

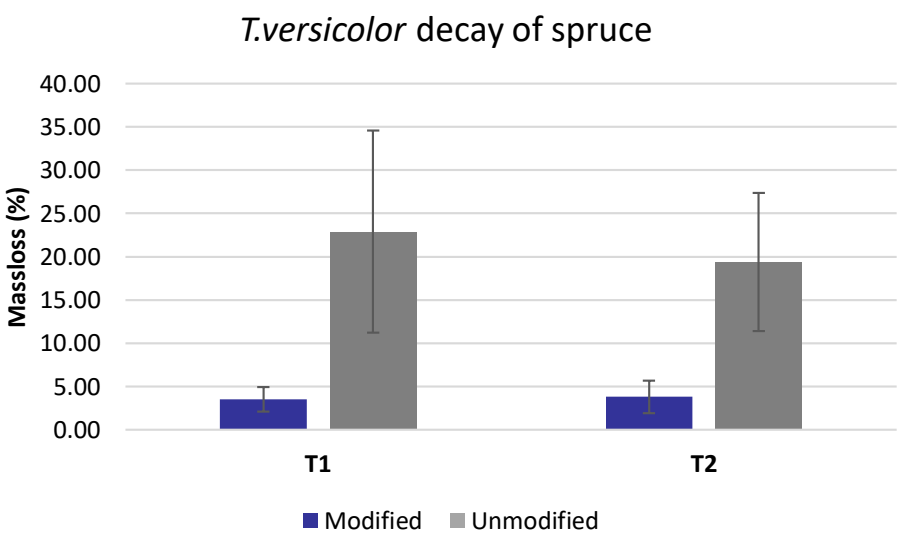
No difference between growth on treated and untreated for either formulation

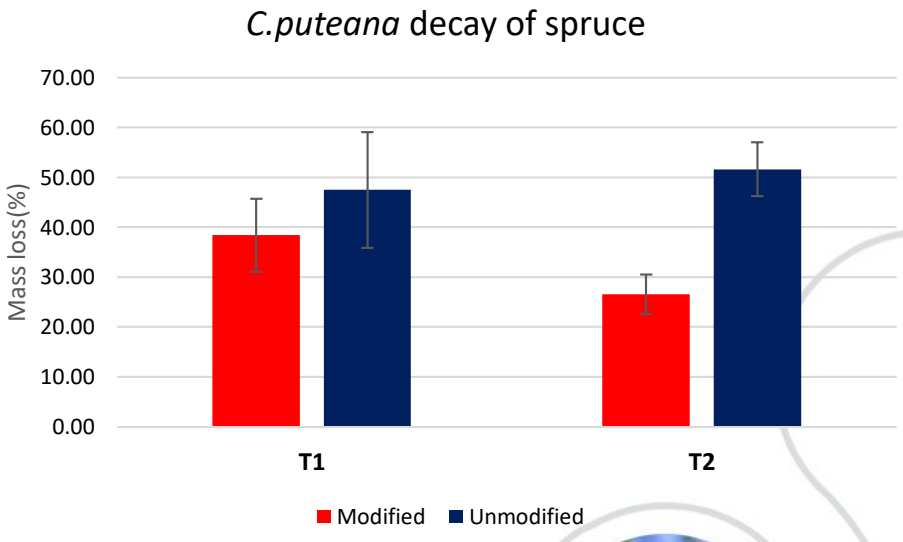
Post decay moisture



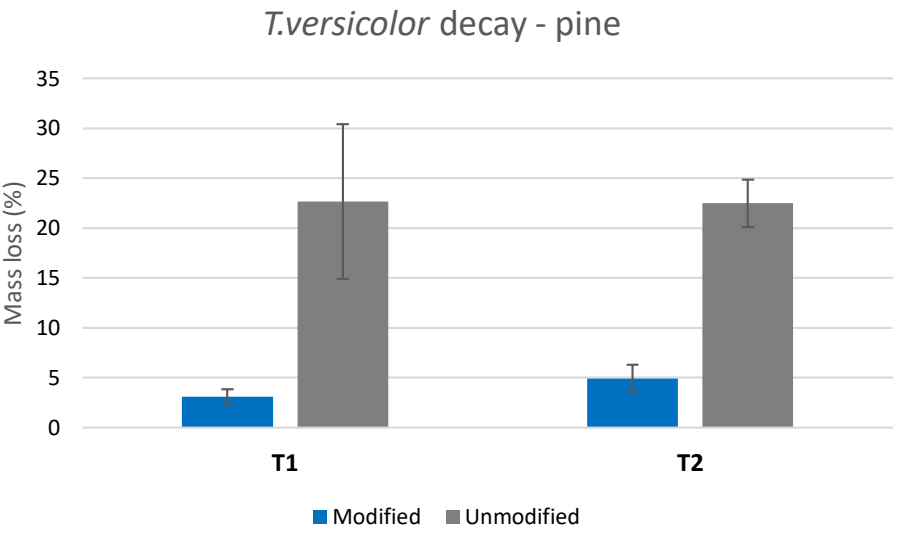


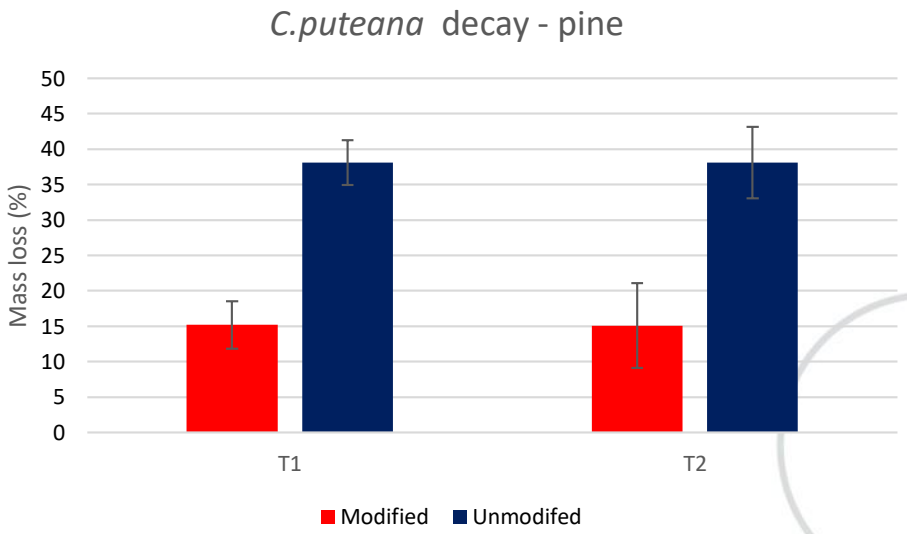
Decay of spruce





Decay of pine





Durability class

	T1		T2	
	T. versicolor	*C. puteana*	*T. versicolor*	*C. puteana*
Pine	1	3	2	3
Spruce	1	5	3	3

Conclusions

- MMA impregnation increased the durability of both Scots pine and Sitka spruce

- Varied by decay type and by MMA formulation

Opportunity!

- Position for a wood chemist available soon
  - Wood bleaching

- Project working with luxury furniture and indoor design company

Thank you to COST 1303 organising committee
and
Thank you for listening

- Any questions