Specialty Wood Products Research Partnership

FOREST GROWERS RESEARCH

The condition of Cypress with or without thermal modification L-joints after one year's field exposure

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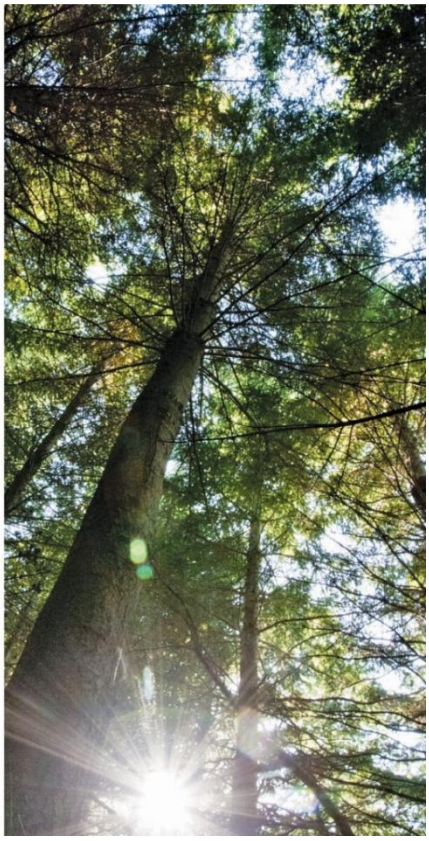

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EXECUTIVE SUMMARY

After one year's exposure, there was no decay on any of the untreated *Cupressus lusitanica* L-joint samples. No decay was observed on any of the thermally modified *Cupressus lusitanica*, L-joint samples No decay was observed on any of the commercial benchmark decking samples (Accoya).

No decay was observed on any of the untreated sapwood radiata pine samples. No decay was observed on any of the H3.1 LOSP treated radiata pine or H3 CCA treated radiata pine samples.

INTRODUCTION

A L-joint trial was installed for *Cupressus lusitanica*. Samples of *C. lusitanica* were thermally modified (TM) before exposure. Samples were either mixed sapwood/heartwood or heartwood, and were uncoated or painted. Untreated and treated (CCA) radiata pine were included in the trials for comparative purposes. A commercial benchmark of Accoya was included in the trial. The trials were installed in the Whakarewarewa test area on the Scion campus, Rotorua in February 2022. The L-joint groups included in the test are shown in Table 1.

Table 1: Groups of L-joints included in the test

Group	Species	Heart\sap mix	Treatment	Coating
1	*Cupressus lusitanica*	Mixed	-	None
2	*Cupressus lusitanica*	Mixed	-	Painted
3	*Cupressus lusitanica*	Heartwood	-	None
4	*Cupressus lusitanica*	Heartwood	-	Painted
5	*Cupressus lusitanica*	Mixed	TM[1] 220°C	None
6	*Cupressus lusitanica*	Heartwood	TM 220°C	None
7	Accoya	Sapwood	Acetylation	None
8	Accoya	Sapwood	Acetylation	Painted
9	Radiata pine	Sapwood	-	None
10	Radiata pine	Sapwood	-	Painted
11	Radiata pine	Sapwood	H3.1 LOSP	None
12	Radiata pine	Sapwood	H3 CCA	None
13	Radiata pine	Sapwood	H3 CCA	Painted

[1] TM indicates Thermal modification treatment

This report includes results for L-joint tests from the February 2023 assessment.

METHODS

Source of timber

Table 2 shows the source of the timber used in this study, where known. Further details are listed in Appendix 1.

Table 2: Source of timber used in this study

Species	Treatment	Source of timber
Cupressus lusitanica	-	South Auckland sawmill Thermally modified at Scion
Accoya radiata pine	Acetylation	Auckland retailer
Radiata pine	-	Rotorua sawmill
Radiata pine	H3 CCA	Rotorua sawmill, treated at Scion
Radiata pine	H3.1 LOSP	Rotorua timber retailer

Sample exposure

The L-joint trial was installed in the Whakarewarewa outdoor test area at Scion in February 2022 (Figure 1). Some of the L-joints were painted with a white acrylic paint (samples were painted as per AWPC protocol) prior to exposure, the other samples were uncoated.

Assessment methods

The L-joint samples were removed from the wooden rack (Figure 2) and assessed according to the rating systems in Appendix 2.

RESULTS

Assessment results

Table 3 shows a summary of the decking condition after one year's above ground exposure. A complete set of data is contained in Appendix 3.

No decay was observed on any of the untreated or thermally modified Cupressus *lusitanica* L-joint samples in this test. The surface of the samples had turned a grey\silver colour (Figure 2). Surface checking was very minor.

No decay was observed on any of the Accoya radiata pine L-joint samples in this test. The surface of the samples had turned a grey\silver colour (Figure 2). No surface checking was observed.

No decay was observed on any of the untreated or treated (H3.1 LOSP and H3 CCA) radiata pine L-joint samples in this test. The surface of the samples had turned a grey\silver colour (Figure 2). Surface checking was very minor.

Table 3: Summary of L-joint condition (Index of Condition[1]) after one year's exposure

Group	Species	Heart\sap mix	Treatment	Coating	Decay[1]	Surface	Checking
1	*C. lusitanica*	Mixed	-	None	10.0	2.0	1.1
2	*C. lusitanica*	Mixed	-	Painted	10.0	2.0	1.1
3	*C. lusitanica*	Heartwood	-	None	10.0	2.0	1.4
4	*C. lusitanica*	Heartwood	-	Painted	10.0	2.0	1.4
5	*C. lusitanica*	Mixed	TM 220°C	None	10.0	2.0	1.5
6	*C. lusitanica*	Heartwood	TM 220°C	None	10.0	2.0	1.5
7	Accoya radiata pine	Sapwood	Acetylation	None	10.0	2.0	1.0
8	Accoya radiata pine	Sapwood	Acetylation	Painted	10.0	2.0	1.0
9	Radiata pine	Sapwood	-	None	10.0	2.0	1.2
10	Radiata pine	Sapwood	-	Painted	10.0	2.0	1.0
11	Radiata pine	Sapwood	H3.1 LOSP	None	10.0	2.0	1.0
12	Radiata pine	Sapwood	H3 CCA	None	10.0	2.0	1.1
13	Radiata pine	Sapwood	H3 CCA	Painted	10.0	2.0	1.0

[1] Index of Condition is the average decay rating for all of the samples in a group.

CONCLUSIONS

After one year's exposure, no decay was observed on any of the untreated or thermally modified *Cupressus lusitanica* L-joint samples. No decay was observed on any of the commercial benchmark samples (Accoya). No decay was observed on any of the untreated sapwood radiata pine samples or the treated (H3.1 LOSP and H3 CCA) sapwood radiata pine samples.

ACKNOWLEDGEMENTS

The authors acknowledge the assistance of Rosie Sargent in sourcing the timber for this study and conducting the thermal modification of some samples.

Figure 1: General view of L-joint trial at the time of installation (February 2022).

Figure 2: General view of L-joint trial after one year's exposure (February 2023).

APPENDIX 1: SOURCE OF TIMBER FOR DECKING TEST

Table 5: Source of timber for L-joint tests

Type of wood \ Treatment	**Source of timber**	**Number of trees**	**Tree age (years)**	**Selected by**	**Approximate quantity of timber delivered**
Accoya	ITI Timspec	-	-	ITI Timspec	3-4 lengths
Cupressus lusitanica	MacDirect sawmill, South Auckland	-	-	Scion staff	40-60 lengths
Radiata pine, mixed heartwood\sapwood	Scion stock	-	-	Scion staff	-
Radiata pine, mixed heartwood\sapwood, H1.2 boron treated	Rotorua timber retailer	-	-	Scion staff	-

APPENDIX 2: RATING SYSTEM

Rating systems used for sample assessments

DECAY/INSECT DAMAGE

10 = No decay or insect damage.
T = “Trace” discolouration, decay suspected but not positively identified.
9 = Minor decay or damage at defects, less than 3% of the cross section.
8 = Minor but established decay, 3 - 10% of the cross section.
7 = Well established pockets or extensive surface damage, 10 - 30% of the cross section.
6 = Extensive established and deepening decay, 30 - 50% of cross section.
4 = Deep and severe decay, more than 50% of cross section.
0 = Disintegrating, failed.

UNCOATED SURFACES

1 = As new, no discolouration or mould.
2 = Slight surface mould or weathering, light even colour.
3 = Prominent mould or weathering, minor surface erosion.
4 = Extensive mould or lichen, uneven surface due to erosion.
5 = Extensive surface breakdown, original profile details gone.

SURFACE COATINGS

1 = Clean and intact, original colour and gloss retained.
2 = Surface dulling and colour loss, minor failure on sharp corners.
3 = Extensive discolouration, failure and minor loss at defects and sharp corners.
4 = Patches failed with substrate exposed over <50% of surface.
5 = Extensive failure, >50% of substrate exposed.

CHECKING

1 = No surface checks, fine knot checks not visible in damp weather.
2 = Minor checks to 0.5 mm wide, not obvious in damp weather.
3 = Well established checks to 1 mm wide and 50% board thickness.
4 = Many or deep and severe checks over 1 mm wide.
5 = Board completely split and allowing obvious water egress.

APPENDIX 3: INDIVIDUAL ASSESSMENT DETAILS

Individual L-joint sample assessment details after one year's exposure

Sample number	Decay	Surface	Checking	Comments[1]
Group 1: *Cupressus lusitanica*, mixed, no coating				
4461	10	2	1	
4462	10	2	1	
4463	10	2	1	
4464	10	2	1	
4465	10	2	1	
4466	10	2	1	
4467	10	2	1	
4468	10	2	1	
4469	10	2	1	
4470	10	2	2	Check on edge
Group 2: *Cupressus lusitanica*, mixed, painted				
4471	10	2	1	
4472	10	2	1	
4473	10	2	2	
4474	10	2	1	
4475	10	2	1	
4476	10	2	1	
4477	10	2	1	
4478	10	2	1	Discolouration in joint
4479	10	2	1	
4480	10	2	1	
Group 3: *Cupressus lusitanica*, heartwood, no coating				
4481	10	2	1	
4482	10	2	1	
4483	10	2	1	
4484	10	2	2	
4485	10	2	1	
4486	10	2	1	
4487	10	2	1	
4488	10	2	3	
4489	10	2	1	
4490	10	2	2	
Group 4: *Cupressus lusitanica*, heartwood, painted				
4491	10	2	1	
4492	10	2	2	
4493	10	2	1	Check on tongue
4494	10	2	2	
4495	10	2	1	
4496	10	2	1	
4497	10	2	3	
4498	10	2	1	Large split
4499	10	2	1	
4500	10	2	1	

[1] Comments include other observations.

Sample number	Decay	Surface	Checking	Comments[1]
Group 5: *Cupressus lusitanica*, mixed, 220°C TM, no coating				
4501	10	2	3	Large check on edge
4502	10	2	1	
4503	10	2	2	
4504	10	2	1	
4505	10	2	1	
4506	10	2	2	
4507	10	2	1	
4508	10	2	1	
4509	10	2	2	
4510	10	2	1	
Group 6: *Cupressus lusitanica*, heartwood, 220°C TM, no coating				
4511	10	2	2	Knot
4512	10	2	2	Knot
4513	10	2	1	
4514	10	2	1	
4515	10	2	2	Checks around knot
4516	10	2	3	
4517	10	2	1	
4518	10	2	1	
4519	10	2	1	Small knots
4520	10	2	1	Small knots

[1] Comments include other observations.

Sample number	Decay	Surface	Checking	Comments[1]
Group 7: Accoya radiata pine, sapwood, no coating				
4441	10	2	1	
4442	10	2	1	
4443	10	2	1	
4444	10	2	1	
4445	10	2	1	
4446	10	2	1	
4447	10	2	1	
4448	10	2	1	
4449	10	2	1	
4450	10	2	1	
Group 8: Accoya radiata pine, sapwood, painted				
4451	10	2	1	
4452	10	2	1	
4453	10	2	1	
4454	10	2	1	
4455	10	2	1	
4456	10	2	1	
4457	10	2	1	
4458	10	2	1	
4459	10	2	1	
4460	10	2	1	
Group 9: Radiata pine, sapwood, no coating				
4421	10	2	1	
4422	10	2	1	
4423	10	2	1	
4424	10	2	1	
4425	10	2	1	
4426	10	2	1	
4427	10	2	2	
4428	10	2	1	
4429	10	2	2	
4430	10	2	1	
Group 10: Radiata pine, sapwood, painted				
4431	10	2	1	
4432	10	2	1	
4433	10	2	1	
4434	10	2	1	
4435	10	2	1	
4436	10	2	1	
4437	10	2	1	
4438	10	2	1	
4439	10	2	1	
4440	10	2	1	

[1] Comments include other observations.

Sample number	Decay	Surface	Checking	Comments[1]
Group 11: Radiata pine, sapwood, H3.1 LOSP, no coating				
4411	10	2	1	
4412	10	2	1	
4413	10	2	1	
4414	10	2	1	
4415	10	2	1	
4416	10	2	1	
4417	10	2	1	
4418	10	2	1	
4419	10	2	1	
4420	10	2	1	
Group 12: Radiata pine, sapwood, H3 CCA, no coating				
4541	10	2	1	
4542	10	2	1	
4543	10	2	1	
4544	10	2	1	
4545	10	2	1	
4546	10	2	1	
4547	10	2	2	
4548	10	2	1	
4549	10	2	1	
4550	10	2	1	
Group 13: Radiata pine, sapwood, H3 CCA, painted				
4551	10	2	1	
4552	10	2	1	
4553	10	2	1	
4554	10	2	1	
4555	10	2	1	
4556	10	2	1	
4557	10	2	1	
4558	10	2	1	
4559	10	2	1	
4560	10	2	1	

[1] Comments include other observations.