

**APPENDIX 3. MECHANICAL PROPERTIES FOR REGROWTH AND
PLANTATION BLACKBUTT TIMBER IN NEW SOUTH WALES**

Table A3.1. Failure stress, failure strain, and modulus of elasticity for 12 regrowth
blackbutt trees (between—trees variability).

Board ID	Green Samples			Kiln—Dried Samples		
	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>
1(S)	4.30	0.0064	671	7.97	0.0048	1650
2(P)	4.25	0.0161	264	6.06	0.0047	1297
3(S)	6.01	0.0138	436	8.00	0.0057	1550
4(P)	5.25	0.0217	242	1.94	0.0160	1242
5(P)	4.45	0.0270	165			
6(S)	5.19	0.0165	315	4.72	0.0024	1939
7(P)	3.84	0.0224	172			
8(S)	4.37	0.0086	506	5.21	0.0072	709
9(S)	6.57	0.0169	389	6.89	0.0051	1352
10(P)	5.69	0.0106	537	3.65	0.0106	345
11(S)	4.90	0.0138	355	8.05	0.0063	1272
12(P)	4.79	0.0104	461	4.45	0.0051	916
13(S)	5.60	0.0090	619	8.88	0.0062	1426
14(P)	4.11	0.0213	194			
15(S)	6.15	0.0121	509	9.35	0.0079	1182
16(P)	4.74	0.0112	421	5.55	0.0032	1719
17(P)	5.40	0.0094	577	2.80	0.0073	382
18(S)	5.27	0.0146	360	6.68	0.0047	1425
19(S)	7.23	0.0107	674	9.56	0.0065	1478
20(P)	6.84	0.0143	477	2.16	0.0020	1056
21(P)	5.11	0.0115	445	5.95	0.0056	1066
22(S)	4.97	0.0135	369	6.73	0.0047	1438
23(S)	5.63	0.0158	356			
24(P)	5.44	0.0216	252			

Note: (S) – timber board close to the outer heartwood; (P) – timber board close to the pith.

Table A3.2. Failure stress, failure strain, and modulus of elasticity for two plantation blackbutt trees (within—tree variability).

Board ID	Green Samples			Kiln—Dried Samples		
	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>
1A	2.76	0.0141	199	7.96	0.0086	920
1E	2.12	0.0086	249	7.36	0.0055	1344
2A	3.15	0.0132	244	6.86	0.0050	1358
2E	2.97	0.0219	136	5.66	0.0053	1069
3A	2.65	0.0152	205	4.20	0.0041	1004
3E	2.42	0.0194	129	3.60	0.0064	595
4A	2.32	0.0259	90			
4E	2.08	0.0303	69			
5A	5.35	0.0107	553	8.44	0.0066	1290
5E	4.62	0.0130	355	7.75	0.0065	1198
6A	7.44	0.0175	426	6.78	0.0065	1057
6E	5.96	0.0124	501	6.24	0.0058	1089
7A	6.32	0.0085	775	7.32	0.0055	1337
7E	6.61	0.0168	488	9.53	0.0050	1886
8A	6.62	0.0164	427	5.38	0.0051	1056
8E	6.33	0.0146	434	9.54	0.0073	1320
9A	5.20	0.0129	404	6.07	0.0047	1292
9E	6.06	0.0176	344	2.73	0.0044	618
10A	6.82	0.0122	568	5.78	0.0084	968
10E	5.30	0.0105	530	5.39	0.0042	1281
11A	4.20	0.0119	354			
11E	4.78	0.0290	165			
12A	8.07	0.0111	727	3.94	0.0041	941
12E	6.21	0.0103	612	6.72	0.0045	1478

Table A3.3. Failure stress, failure strain, and modulus of elasticity for ten plantation blackbutt trees (between—trees variability).

Board ID	Green Samples			Kiln—Dried Samples		
	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>	<i>Failure Stress (MPa)</i>	<i>Failure Strain (mm mm⁻¹)</i>	<i>MOE (MPa)</i>
1(S)	5.31	0.0121	440	6.12	0.0050	1244
2(P)	4.41	0.0145	323			
3(S)	4.51	0.0103	440	6.23	0.0064	964
4(P)	4.80	0.0118	458	6.19	0.0050	1234
5(P)	7.13	0.0173	411	7.79	0.0062	1248
6(S)	8.22	0.0142	581	11.23	0.0082	1374
7(S)	6.02	0.0105	570	7.03	0.0077	919
8(P)	4.66	0.0077	555	12.01	0.0088	1370
9(S)	6.73	0.0203	333	7.94	0.0084	949
10(P)	5.64	0.0118	479			
11(P)	5.55	0.0110	506	7.20	0.0059	1244
12(S)	5.88	0.0142	417	7.48	0.0051	1515
13(S)	6.36	0.0114	562	6.87	0.0059	1197
14(P)	7.04	0.0106	664			
15(S)	6.49	0.0183	362	8.85	0.0070	1270
16(P)	5.90	0.0110	551	7.26	0.0070	1042
17(S)	5.00	0.0099	504	9.45	0.0075	1257
18(P)	5.35	0.0178	302			
19(S)	5.83	0.0226	274			
20(P)	4.13	0.0212	197			

Note: (S) – timber board close to the outer heartwood; (P) – timber board close to the pith.

Table A3.4. Shrinkage, predicted longitudinal MOE, velocity, and green density for each board in two regrowth blackbutt trees (within—tree variability).

Board ID	Tangential Shrinkage [%]	Radial Shrinkage [%]	Differential Shrinkage [T/R]	Board ID	Predicted Longitudinal MOE [MPa]	Acoustic Speed [km s⁻¹]	Green Density [kg m⁻³]
2 BH	6.92	3.89	1.78	2	18243	4.06	1107
2 D	6.59	3.45	1.91	3	19757	4.29	1074
3 BH	7.44	4.57	1.63	4	14775	3.94	952
3 D	7.36	4.43	1.66	5	15878	3.98	1002
4 BH	10.61	5.31	2.00	7	21387	4.33	1141
4 D	10.29	9.18	1.12	9	16606	4.04	1017
5 BH	11.54	7.10	1.63	10	21260	4.24	1183
5 D	17.25	7.48	2.31	12	19610	4.24	1091
7 BH	11.85	7.36	1.61	18	19701	4.14	1149
7 D	12.06	9.03	1.34	23	11196	3.47	930
9 BH	11.75	6.25	1.88	24	16068	4.00	1004
9 D	14.17	8.09	1.75	28	14223	3.70	1039
10 BH				30	13042	3.64	984
10 D				31	18139	4.08	1090
12 BH	8.42	5.68	1.48	32	15771	3.73	1134
12 D	7.14	4.47	1.60	33	13969	3.70	1020
18 BH	14.17	7.49	1.89	35	11571	3.50	945
18 D	12.50	8.27	1.51	36	16841	3.91	1102
23 BH	10.86	4.85	2.24				
23 D	8.90	4.43	2.01				
24 BH	8.38	4.51	1.86				
24 D	5.48	3.15	1.74				
28 BH	5.08	2.58	1.97				
28 D	6.40	2.42	2.64				
30 BH	7.53	2.57	2.93				
30 D	13.87	7.19	1.93				
31 BH	5.61	2.94	1.91				
31 D	6.32	3.70	1.71				
32 BH	4.84	2.63	1.84				
32 D							
33 BH	6.95	2.41	2.88				
33 D	8.91	3.99	2.23				
35 BH	13.04	5.67	2.30				
35 D	9.18	4.10	2.24				
36 BH	7.94	3.30	2.41				
36 D	6.30	3.46	1.82				

Table A3.5. Shrinkage values for 12 regrowth blackbutt trees (between—trees variability).

Board ID	Tangential Shrinkage [%]	Radial Shrinkage [%]	Differential Shrinkage [T/R]
1(S)	6.76	4.91	1.38
2(P)	15.55	9.36	1.66
3(S)	6.86	3.95	1.73
4(P)	15.74	8.60	1.83
5(P)	21.08	8.93	2.36
6(S)	10.41	7.64	1.36
7(P)	15.39	7.95	1.94
8(S)	13.33	8.00	1.67
9(S)	8.88	4.14	2.15
10(P)	9.01	4.16	2.17
11(S)	11.78	5.93	1.99
12(P)	9.88	4.42	2.24
13(S)	7.10	4.61	1.54
14(P)	14.47	7.41	1.95
15(S)	6.77	3.79	1.79
16(P)	12.30	5.82	2.12
17(P)	9.53	7.62	1.25
18(S)	12.93	6.88	1.88
19(S)	6.55	4.11	1.59
20(P)	8.47	5.04	1.68
21(P)	8.81	5.32	1.66
22(S)	8.84	5.94	1.49
23(S)	11.35	6.28	1.81
24(P)	9.53	6.75	1.41

Note: (S) – timber board close to the outer heartwood; (P) – timber board close to the pith.

Table A3.6. Shrinkage values for two plantation blackbutt trees (within—tree variability).

Board ID	Tangential Shrinkage [%]	Radial Shrinkage [%]	Differential Shrinkage [T/R]
1BH	7.29	3.71	1.96
1D	9.07	5.27	1.72
2BH			
2D	8.04	5.40	1.49
3BH	7.69	4.36	1.76
3D	10.58	9.06	1.17
4BH	13.21	5.12	2.58
4D	11.82	5.08	2.33
5BH	8.91	4.58	1.94
5D	9.68	5.39	1.80
6BH	7.42	3.97	1.87
6D	7.58	4.24	1.79
7BH	8.42	4.14	2.03
7D	12.02	6.70	1.79
8BH	7.32	5.19	1.41
8D	9.70	6.40	1.52
9BH	7.05	5.41	1.30
9D	11.72	7.38	1.59
10BH	6.83	5.46	1.25
10D	8.72	4.84	1.80
11BH	14.61	12.48	1.17
11D	13.27	7.93	1.67
12BH	7.21	5.01	1.44
12D	8.33	5.80	1.43

Table A3.7. Shrinkage values for ten plantation blackbutt trees (between—trees variability).

Board ID	Tangential Shrinkage [%]	Radial Shrinkage [%]	Differential Shrinkage [T/R]
1(S)	8.33	5.65	1.47
2(P)	15.41	9.76	1.58
3(S)	9.32	5.65	1.65
4(P)	11.40	6.04	1.89
5(P)	6.33	4.00	1.58
6(S)	7.15	3.86	1.85
7(S)	7.01	4.80	1.46
8(P)	6.89	4.82	1.43
9(S)	7.96	4.83	1.65
10(P)	11.96	6.11	1.96
11(P)	11.92	10.95	1.09
12(S)	11.40	7.88	1.45
13(S)	7.53	5.78	1.30
14(P)	7.36	6.66	1.11
15(S)	8.07	5.45	1.48
16(P)	6.72	3.93	1.71
17(S)	10.61	6.25	1.70
18(P)	17.11	10.13	1.69
19(S)	12.43	10.00	1.24
20(P)	24.87	8.53	2.92

Note: (S) – timber board close to the outer heartwood; (P) – timber board close to the pith.