

The role of Canary Island date palms in physical amenity provisioning for urban landscape settings

Supplementary Data Tables and Images

Dirk HR Spennemann

Institute for Land, Water and Society; Charles Sturt University; PO Box 789; Albury NSW 2640, Australia
email: dspennemann@csu.edu.au
ORCID: 0000-0003-2639-7950

Supplementary data tables to
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Figure S1. Temperature and humidity sensors as deployed in Albury (NSW). Sensors 1–2 in palm; 3–on fence; 4–in birch tree. Base image: Land and Property Information.^[1]



Figure S2. Temperature and humidity sensors as deployed at Alma Park (NSW). Sensors 5–6 in palm; 7–on fence; 8–in eucalypt tree. Base image: Land and Property Information.^[2]



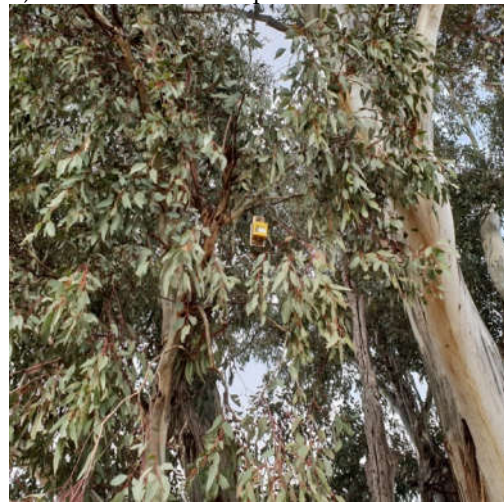
a) on stem of the palm in Albury.



b) in the crown of the palm at Alma Park.



c) *Betula pendula* at Albury.



d) *Eucalyptus melliodora* at Alma Park.

Figure S3. Examples of temperature recorder locations (photos by the author).

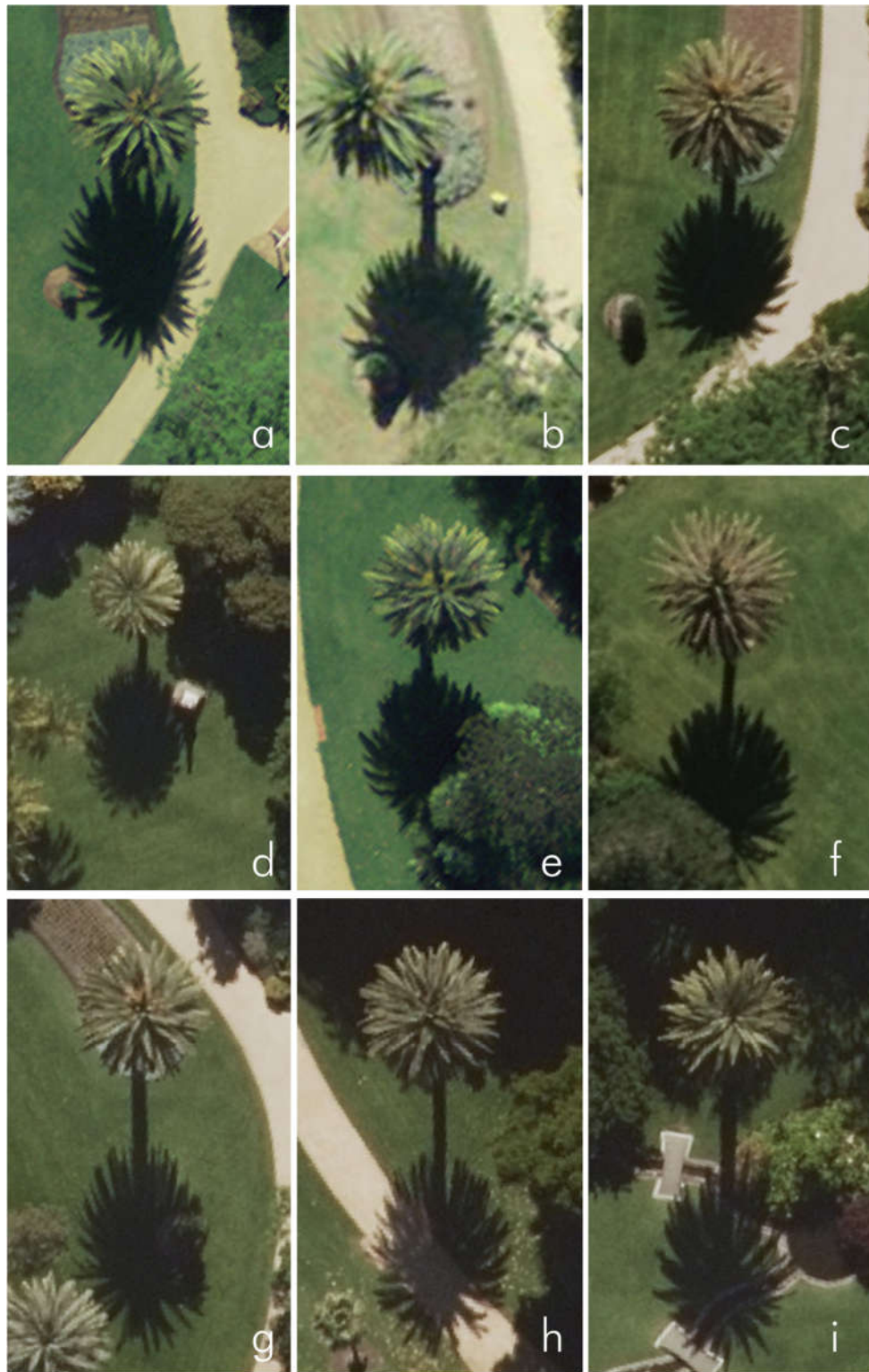


Figure S4. Aerial views of shadows cast by palms in the Albury Botanic Gardens 2011–a, e; 2014–b; 2015–c, f, g; 2017–d, h, i. Image sources: 2011, 2015 and 2017 aerial image Albury City; 2014 photo ^[1].

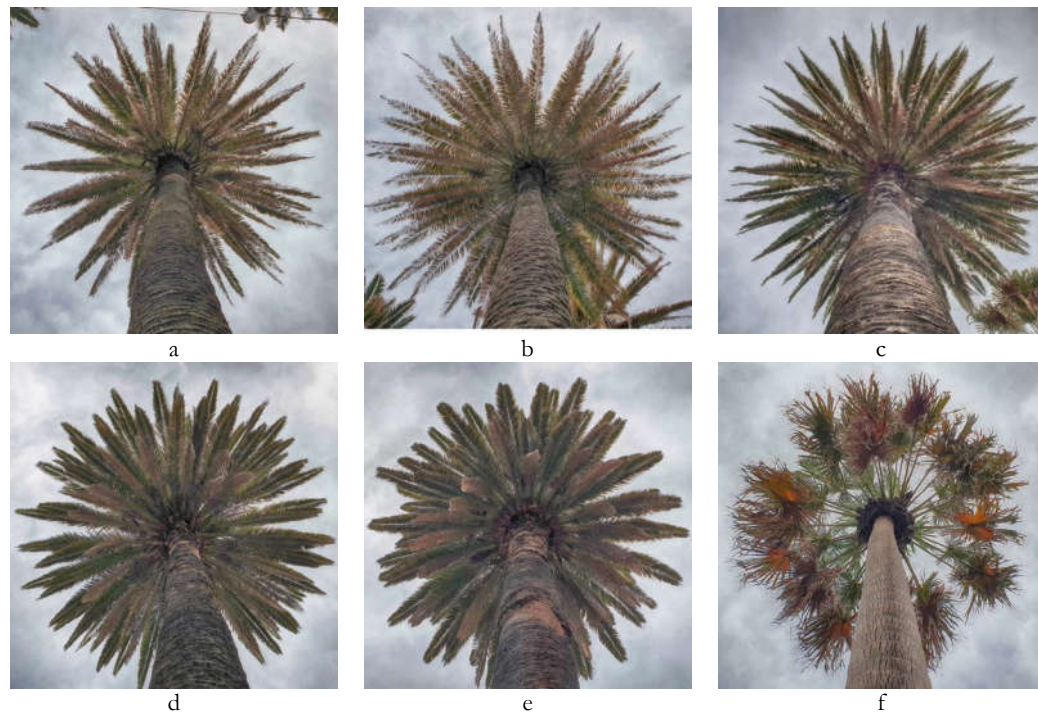


Figure S5. Examples of canopies seen from below. a–e Canary Island Date Palms; f–Mexican Fan Palm (The Corso, Manly, NSW, 8 June 2019).

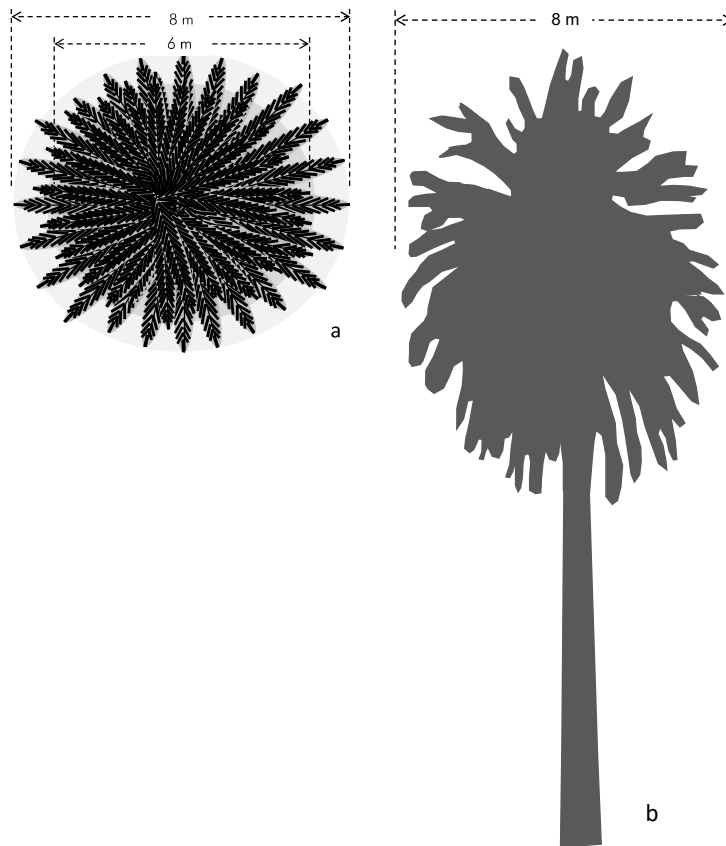


Figure S6. Schematic shadow pattern of a Canary Islands date palm. Top: vertical midday sun; right: low-angle late afternoon sun.

Table S1. Observed differences in average temperature by times of day (Albury)

	Dawn		Day		Dusk		Night	
	Avg \pm St D	n	Avg \pm St D	n	Avg \pm St D	n	Avg \pm St D	n
Crown vs. Control								
November	0.65 \pm 0.30	25	-1.91 \pm 2.10	342	0.64 \pm 0.43	31	0.56 \pm 0.28	178
December	0.50 \pm 0.22	147	-1.67 \pm 2.08	1811	0.86 \pm 0.63	136	0.61 \pm 0.36	882
January	0.45 \pm 0.27	138	-1.44 \pm 2.55	1808	0.94 \pm 0.49	132	0.61 \pm 0.36	898
February	0.52 \pm 0.22	210	-2.95 \pm 3.96	3243	0.73 \pm 0.38	233	0.67 \pm 0.23	1734
March	0.53 \pm 0.61	248	-2.46 \pm 4.29	4061	0.41 \pm 0.76	310	0.49 \pm 0.60	2821
April	0.33 \pm 0.29	121	-1.51 \pm 2.91	1220	-0.01 \pm 0.29	80	0.24 \pm 0.34	1115
Trunk vs. Control								
November	0.652 \pm 0.299	25	-1.91 \pm 2.10	342	0.64 \pm 0.43	31	0.56 \pm 0.28	178
December	0.499 \pm 0.216	147	-1.67 \pm 2.08	1811	0.86 \pm 0.63	136	0.61 \pm 0.36	882
January	0.453 \pm 0.275	138	-1.44 \pm 2.55	1808	0.94 \pm 0.49	132	0.61 \pm 0.36	898
February	-1.345 \pm 6.107	234	-4.90 \pm 8.05	3528	-1.50 \pm 7.66	253	-1.47 \pm 6.99	1922
March	0.526 \pm 0.606	248	-2.46 \pm 4.29	4061	0.41 \pm 0.76	310	0.49 \pm 0.60	2821
April	0.331 \pm 0.295	121	-1.51 \pm 2.91	1220	-0.01 \pm 0.29	80	0.24 \pm 0.34	1115
Tree vs. Control								
November	-0.18 \pm 0.39	25	1.01 \pm 2.74	342	0.04 \pm 0.18	31	-0.09 \pm 0.23	178
December	0.05 \pm 0.23	147	0.91 \pm 2.53	1811	0.11 \pm 0.54	136	0.06 \pm 0.31	882
January	0.02 \pm 0.23	138	0.93 \pm 2.35	1808	0.02 \pm 0.39	132	0.06 \pm 0.36	898
February	0.30 \pm 0.44	210	-1.14 \pm 3.73	3243	0.01 \pm 0.35	233	0.13 \pm 0.23	1734
March	-0.05 \pm 0.35	248	-0.89 \pm 2.97	4061	-0.04 \pm 0.37	310	-0.12 \pm 0.32	2821
April	-0.06 \pm 0.26	121	-0.25 \pm 2.11	1220	-0.19 \pm 0.21	80	-0.12 \pm 0.23	1115
Crown vs. Tree								
November	0.83 \pm 0.34	25	-2.92 \pm 2.77	342	0.60 \pm 0.46	31	0.65 \pm 0.42	178
December	0.45 \pm 0.28	147	-2.58 \pm 2.50	1811	0.74 \pm 0.66	136	0.55 \pm 0.40	882
January	0.43 \pm 0.32	138	-2.36 \pm 2.94	1808	0.92 \pm 0.60	132	0.55 \pm 0.39	898
February	0.22 \pm 0.46	210	-1.81 \pm 1.82	3243	0.72 \pm 0.56	233	0.54 \pm 0.31	1734
March	0.58 \pm 0.63	248	-1.57 \pm 2.90	4061	0.45 \pm 0.81	310	0.61 \pm 0.69	2821
April	0.39 \pm 0.41	121	-1.26 \pm 2.28	1220	0.18 \pm 0.38	80	0.36 \pm 0.46	1115

Table S2. Observed differences in average temperature by times of day (Alma Park)

	Dawn		Day		Dusk		Night	
	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n
Crown vs. Control								
November	1.68±0.97	89	1.38±0.75	12	-2.78±2.37	171	1.65±0.96	16
December	1.66±0.87	882	1.62±0.85	147	-2.34±2.52	1811	1.64±0.81	136
January	1.63±0.76	898	1.46±0.67	138	-2.06±2.30	1808	1.61±0.71	132
February	1.53±0.63	210	-2.04±2.52	3243	1.55±0.88	233	1.40±0.71	1734
March	1.27±0.61	248	-1.41±1.88	4061	1.49±0.78	310	1.34±0.67	2821
April	-5.21±5.81	121	-5.82±3.77	1220	-4.22±4.43	80	-4.66±5.13	1115
Trunk vs. Control								
November	1.3±0.68	12	-2.17±2.18	171	1.25±0.82	16	1.42±0.83	89
December	1.47±0.78	147	-1.81±2.31	1811	1.26±0.66	136	1.42±0.74	882
January	1.36±0.63	138	-1.38±2.02	1808	1.24±0.54	132	1.41±0.66	898
February	1.30±0.57	210	-1.09±2.10	3243	1.25±0.72	233	1.16±0.59	1734
March	1.07±0.54	248	-0.58±1.80	4061	1.19±0.67	310	1.08±0.56	2821
April	-5.31±5.76	121	-5.44±4.21	1220	-4.37±4.29	80	-4.81±5.01	1115
Tree vs. Control								
November	1.84±1.14	89	1.40±0.89	12	-2.95±3.04	171	1.86±1.08	16
December	1.83±1.02	882	1.81±1.06	147	-2.80±3.24	1811	1.77±0.93	136
January	1.77±0.88	898	1.55±0.76	138	-2.41±2.93	1808	1.76±0.87	132
February	1.87±0.79	210	-2.40±3.67	3243	1.84±1.00	233	1.64±0.90	1734
March	1.55±0.76	248	-1.41±2.98	4061	1.82±0.94	310	1.57±0.78	2821
April	-4.61±6.45	121	-5.85±4.00	1220	-4.11±4.64	80	-4.53±5.25	1115
Crown vs. Tree								
November	-0.16±0.32	89	-0.02±0.16	12	0.17±0.95	171	-0.21±0.31	16
December	-0.17±0.27	882	-0.19±0.32	147	0.46±0.99	1811	-0.13±0.21	136
January	-0.15±0.24	898	-0.09±0.21	138	0.36±0.88	1808	-0.15±0.25	132
February	-0.33±0.37	210	0.36±1.47	3243	-0.29±0.32	233	-0.24±0.30	1734
March	-0.28±0.33	248	0.00±1.47	4061	-0.33±0.29	310	-0.24±0.26	2821
April	-0.60±1.08	121	0.03±1.07	1220	-0.11±0.33	80	-0.13±0.19	1115

Table S3. Observed differences in average humidity by times of day (Albury)

	Dawn		Day		Dusk		Night	
	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n
Crown vs. Control								
November	-4.00±56.62	25	-3.04±22.15	342	-7.41±10.53	31	-5.48±32.32	178
December	-2.78±35.54	147	-2.15±23.49	1811	-11.23±15.87	136	-3.00±23.80	882
January	-8.62±28.68	138	-8.79±18.12	1808	-15.36±12.56	132	-13.01±23.31	898
February	-26.70±13.32	210	-19.16±11.10	3243	-26.26±7.15	233	-27.22±11.06	1734
March	-18.80±28.01	248	-10.43±27.23	4061	-18.57±29.12	310	-19.85±28.79	2821
April	-23.62±32.84	121	-7.44±16.89	1220	-10.35±6.82	80	-17.87±26.69	1115
Trunk vs. Control								
November	-12.59±24.55	25	-4.22±15.52	342	0.68±2.30	31	-1.74±23.01	178
December	2.28±25.86	147	-1.92±15.46	1811	3.97±10.79	136	4.21±21.90	882
January	4.26±19.41	138	-0.73±7.02	1808	2.65±2.22	132	1.49±13.65	898
February	7.00±32.14	234	-2.19±17.19	3528	2.81±12.41	253	3.15±20.71	1922
March	12.04±38.94	248	-1.30±26.24	4061	0.58±25.16	310	6.49±30.81	2821
April	5.52±30.03	121	-7.16±20.36	1220	-10.33±8.68	80	9.97±34.71	1115
Tree vs. Control								
November	12.01±31.67	25	-6.80±10.43	342	-3.73±1.21	31	1.79±18.52	178
December	-1.92±29.40	147	-6.54±14.76	1811	-3.16±4.95	136	-2.56±19.66	882
January	0.14±14.35	138	-6.01±8.82	1808	-3.67±2.44	132	-1.11±14.34	898
February	-1.12±2.37	210	-2.90±4.85	3243	-2.20±1.78	233	-1.14±6.23	1734
March	2.74±27.35	248	-3.39±16.60	4061	-0.10±12.99	310	3.71±18.27	2821
April	-2.32±16.08	121	-2.62±5.80	1220	-0.50±3.04	80	0.82±9.68	1115
Crown vs. Tree								
November	-16.01±45.38	25	3.76±22.16	342	-3.69±9.96	31	-7.26±26.02	178
December	-0.87±36.41	147	4.39±24.81	1811	-8.06±14.88	136	-0.45±22.62	882
January	-8.76±24.21	138	-2.78±19.35	1808	-11.69±12.70	132	-11.91±16.37	898
February	-25.58±13.73	210	-16.26±10.29	3243	-24.06±7.35	233	-26.09±9.56	1734
March	-21.54±32.98	248	-7.04±30.00	4061	-18.47±33.02	310	-23.56±27.34	2821
April	-21.30±37.86	121	-4.82±18.66	1220	-9.85±4.54	80	-18.69±27.45	1115

Table S4. Observed differences in average humidity by times of day (Alma Park)

	Dawn		Day		Dusk		Night	
	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n	Avg ± St D	n
Crown vs. Control								
November	29.36±51.77	12	4.1±29.25	171	13.8±11.29	16	39.48±18.67	89
December	21.09±35.48	147	-13.1±37.30	1811	4.3±24.67	136	15.09±32.60	882
January	21.88±28.37	138	-25.9±39.39	1808	-16.33±25.23	132	2.29±24.87	898
February	32.54±28.05	210	-8.13±32.68	3243	9.34±20.35	233	22.78±23.34	1734
March	19.51±38.42	248	-2.71±33.18	4061	16.43±27.03	310	19.18±30.68	2821
April	22.94±36.62	121	31.37±24.71	1220	40.19±21.44	80	30.43±28.73	1115
Trunk vs. Control								
November	39.73±28.40	12	7.89±29.10	171	18.63±14.45	16	23.83±32.47	89
December	25.31±33.15	147	-9.30±39.85	1811	8.96±29.53	136	22.22±31.80	882
January	22.67±27.57	138	-26.87±39.91	1808	-16.30±28.92	132	2.82±26.61	898
February	32.11±39.13	210	-8.90±34.88	3243	6.57±23.80	233	26.79±23.53	1734
March	14.29±43.99	248	-4.79±33.56	4061	6.84±26.37	310	16.62±31.13	2821
April	29.73±28.42	121	25.56±24.43	1220	31.91±20.61	80	26.53±26.92	1115
Tree vs. Control								
November	36.03±42.32	12	8.49±27.42	171	16.31±11.07	16	41.13±20.15	89
December	25.93±36.89	147	-8.70±38.20	1811	6.93±23.82	136	22.88±31.00	882
January	28.28±30.45	138	-21.73±38.79	1808	-12.35±24.75	132	7.03±27.22	898
February	31.39±31.63	210	-5.58±30.40	3243	12.31±21.18	233	25.25±24.05	1734
March	25.57±35.63	248	0.15±30.30	4061	12.12±24.38	310	18.63±31.69	2821
April	16.06±37.97	121	27.82±17.73	1220	27.27±22.82	80	25.60±28.84	1115
Crown vs. Tree								
November	-6.67±9.73	12	-4.35±13.74	171	-2.44±0.72	16	-1.64±11.14	89
December	-4.84±36.57	147	-4.46±20.27	1811	-2.55±3.09	136	-7.79±23.35	882
January	-6.40±21.60	138	-4.19±13.77	1808	-3.98±8.80	132	-4.74±16.12	898
February	1.15±26.84	210	-2.55±18.59	3243	-2.96±10.74	233	-2.47±20.08	1734
March	-6.05±41.39	248	-2.86±26.97	4061	4.31±22.71	310	0.54±33.49	2821
April	6.88±38.65	121	3.55±24.17	1220	12.92±16.61	80	4.83±34.13	1115

Table S5. Significance of temperature differences between measurement locations: months.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
Nov	0.000	0.000	0.000	0.000	0.000	0.023
Dec	0.000	0.000	0.000	0.000	0.000	0.000
Jan	0.000	0.000	0.000	0.000	0.000	0.000
Feb	0.000	0.000	0.000	0.000	0.000	0.000
Mar	0.000	0.000	0.000	0.000	0.000	0.000
Apr	0.000	0.000	0.000	0.000	0.000	0.000

Table S6. Significance of temperature differences between measurement locations: hours of day.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
00:00	0.000	0.000	0.000	0.000	0.000	0.000
01:00	0.000	0.000	0.000	0.000	0.000	0.000
02:00	0.000	0.000	0.000	0.000	0.000	0.000
03:00	0.000	0.000	0.000	0.000	0.000	0.000
04:00	0.000	0.000	0.000	0.000	0.000	0.000
05:00	0.001	0.000	0.027	0.000	0.000	0.000
06:00	0.000	0.000	0.000	0.000	0.000	0.000
07:00	0.000	0.000	0.000	0.000	0.906	0.000
08:00	0.000	0.000	0.000	0.000	0.000	0.000
09:00	0.000	0.000	0.000	0.000	0.000	0.000
10:00	0.000	0.000	0.000	0.000	0.000	0.000
11:00	0.000	0.000	0.000	0.000	0.000	0.000
12:00	0.867	0.000	0.000	0.000	0.000	0.000
13:00	0.000	0.000	0.000	0.000	0.000	0.000
14:00	0.000	0.000	0.000	0.000	0.000	0.000
15:00	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.000	0.000	0.000	0.000	0.000	0.000
17:00	0.000	0.000	0.000	0.000	0.000	0.000
18:00	0.000	0.000	0.000	0.000	0.000	0.000
19:00	0.000	0.000	0.000	0.000	0.000	0.000
20:00	0.000	0.000	0.000	0.000	0.000	0.000
21:00	0.000	0.000	0.000	0.000	0.000	0.000
22:00	0.000	0.000	0.000	0.000	0.000	0.000
23:00	0.000	0.000	0.000	0.000	0.000	0.000

Table S7. Significance of humidity differences between measurement locations: months.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
Nov	0.002	0.000	0.946	0.000	0.000	0.000
Dec	0.000	0.838	0.000	0.006	0.002	0.000
Jan	0.000	0.426	0.000	0.000	0.000	0.000
Feb	0.000	0.813	0.000	0.000	0.000	0.000
Mar	0.000	0.000	0.000	0.000	0.000	0.000
Apr	0.000	0.565	0.000	0.000	0.000	0.000

Table S8. Significance of humidity differences between measurement locations: hours of day.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
00:00	0.000	0.000	0.000	0.000	0.000	0.013
01:00	0.000	0.000	0.000	0.000	0.000	0.139
02:00	0.000	0.000	0.000	0.000	0.000	0.000
03:00	0.000	0.000	0.000	0.000	0.000	0.001
04:00	0.000	0.000	0.000	0.000	0.000	1.000
05:00	0.000	0.000	0.000	0.000	0.000	0.044
06:00	0.000	0.000	0.000	0.000	0.000	0.036
07:00	0.000	0.000	0.000	0.000	0.000	0.000
08:00	0.000	0.973	0.002	0.000	0.000	0.160
09:00	0.000	0.000	1.000	0.000	0.000	0.014
10:00	0.000	0.000	0.996	0.002	0.012	0.538
11:00	0.000	0.000	0.018	0.000	0.000	0.022
12:00	0.000	0.000	0.000	0.000	0.000	0.000
13:00	0.000	0.000	0.000	0.000	0.000	0.000
14:00	0.000	0.000	0.000	0.000	0.000	0.000
15:00	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.000	0.000	0.000	0.000	0.000	0.000
17:00	0.000	0.000	0.000	0.000	0.000	0.108
18:00	0.000	0.935	0.000	0.000	0.000	0.056
19:00	0.000	0.060	0.000	0.325	0.003	0.970
20:00	0.000	1.000	0.000	0.000	0.000	0.190
21:00	0.000	0.007	0.000	0.000	0.000	0.567
22:00	0.000	0.281	0.000	0.000	0.000	1.000
23:00	0.000	0.000	0.000	0.000	0.000	1.000

Table S9. Significance of humidity differences between measurement locations: months.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
Nov	0.000	0.000	0.000	0.400	0.000	0.000
Dec	0.000	0.000	0.000	0.151	0.000	0.000
Jan	0.000	0.000	0.000	0.000	0.000	0.000
Feb	0.000	0.000	0.000	0.000	0.000	0.000
Mar	0.000	0.000	0.000	0.000	0.160	0.000
Apr	0.000	0.000	0.000	0.000	0.802	0.000

Table S10. Significance of humidity differences between measurement locations: hours of day.

	Albury			Alma Park		
	Crown vs. Control	Trunk vs. Control	Crown vs. Tree	Crown vs. Control	Trunk vs. Control	Crown vs. Tree
00:00	0.000	0.000	0.100	0.000	0.026	0.000
01:00	0.000	0.000	0.000	0.000	0.988	0.000
02:00	0.000	0.000	0.000	0.975	0.622	0.000
03:00	0.000	0.000	0.000	0.000	0.926	0.000
04:00	0.000	0.000	0.000	0.000	0.999	0.000
05:00	0.000	0.000	0.000	0.000	1.000	0.000
06:00	0.000	0.000	0.768	0.006	0.055	0.000
07:00	0.000	0.000	0.000	0.955	0.000	0.000
08:00	0.000	0.000	0.000	0.130	0.000	0.000
09:00	0.000	0.000	0.000	0.698	0.919	0.000
10:00	0.000	0.000	0.000	0.000	1.000	0.004
11:00	0.000	0.000	0.000	0.000	0.000	0.000
12:00	0.000	0.000	0.000	0.000	0.000	0.000
13:00	0.000	0.000	0.000	0.000	0.000	0.000
14:00	0.000	0.000	0.000	0.000	0.000	0.000
15:00	0.000	0.629	0.000	0.000	0.000	0.000
16:00	0.000	0.606	0.000	0.000	0.000	0.000
17:00	0.000	0.000	0.000	0.000	0.000	0.000
18:00	0.000	0.000	0.000	0.000	0.000	0.000
19:00	0.000	0.000	0.000	0.000	0.000	0.000
20:00	0.000	0.000	0.158	1.000	0.304	0.000
21:00	0.000	0.000	0.000	1.000	1.000	0.995
22:00	0.000	0.005	0.000	0.953	0.082	0.005
23:00	0.000	0.003	0.000	0.000	0.983	0.000

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