

## **Heat Units and Summer Rainfall**

### Background

In the establishment phase of the Gurra Downs nursery the Reilly family learnt quickly that there was little in industry literature of help in planning an Australian date fruit enterprise. We were faced with the choice of adapting northern hemisphere material, or developing our own. As it eventuated we did both.

The Heat Unit concept was devised by the US Department of Agriculture and in applying it to the Australian situation changes were required to allow for out-of-phase seasons. Our hottest months: October to March replaced the months used by Americans. Tallies were compiled to the USDA standard, and expressed in a chart format. In warmer districts it may be advantageous to consider September figures.

With early sales of nursery stock, industry enquiry picked up and we learnt from it that another parameter: rainfall, needed attention. Untimely rainfall events can prove detrimental to fruit quality, but we could find little dealing with the issue. We identified a need for a location-to-location analysis of the potential for damage to fruit from phenomena such as excessive humidity, hail, or local flooding. The Summer Rainfall concept is designed to compare mean monthly rain tallies over an approximate fruiting season. The period selected: December to March inclusive may be adjusted to best accord with local conditions.

### **Some considerations**

The charts and tables were developed to allow assessment of climatic viability of commercial date fruit production across a range of mainland locations. Production is favoured in warmer as against cooler, and Summer-arid rather than Summer-wet environs, and chart presentation is skewed to reflect this.

The listing of a location should not be seen as a climatic endorsement for it, nor should the non-listing be taken as a disqualifier. The colour-hatching indicates 'where-to-look-first' areas for those yet to commit to a location.

'Summer wet' areas on the Summer Rainfall chart need close attention. While the seasonal mean tallies may be high, year-against-year rainfall can vary widely; regions south of the monsoonal belt and west of the Divide may present opportunity. La Nina events are linked to enhanced cyclone activity, El Nino events to suppressed, and while big rains usually accompany ex-cyclones, their absence can result in drought.

In drier seasons rain-associated fruit damage is minimised. At locations where artesian or other water supply is assured, such conditions may be conducive to the growth of bountiful crops. Counter-cyclical income could result when other revenue streams have dried up.

When identifying districts suitable for date fruit production on a commercial basis extended sun-ripening and Summer aridity are prime determinants. Date palms grown as ornamentals are less demanding and may thrive in marginal environs. The dream of date palms arching exotically along a skyline may be realisable, while another, of harvesting fruit from your own date garden will rely on diligent site assessment.

At the end of the tables a path is traced into the Bureau of Meteorology data bank where mean monthly maximum temperatures and rainfall are listed. Work sheets demonstrate how to calculate Heat Unit and Summer Rainfall tallies. Where these are for a 'nearby' location, variation with distance should be taken into account for micro-climate effects. These include: rain shadow, elevation, local winds, proximity to water bodies and the like. Until wider planting experience becomes available educated assessment and trial and error will remain significant in site consideration.

### **About the author of the tables, and cartographer**

Brian Reilly enjoyed a long career as Senior Technical Officer [Meteorology], serving Bureau postings across the mainland states and territories and in Papua New Guinea. The final 18 years were spent at Alice Springs a location long associated with the date industry. The Arid Zone Research Institute is based at Alice, and is responsible for extensive trialling of the viability of the date palm in central Australia.

He wishes to thank the Bureau of Meteorology for access to the national climate data bank, and to extend best wishes to colleagues yet adding to it.

He trusts the information presented here facilitates the planning of your garden or plantation.

### **Statement of Interest:**

Brian Reilly is a part-owner of the Gurra Downs Date Palm Nursery based in South Australia's Riverland.

**South Australia**

<b>Location</b>			<b>Rain mm</b>	<b>Heat Units</b>
Adelaide aero			82.9	1306
35.0S	138.5E	6.0m		
Andamooka			81.7	2714
30.5S	137.2E	76.0m		
Arkaroola			130.7	2321
30.3S	139.3E	340.0m		
Caliph			57.8	1928
34.6S	140.2E	68.0m		
Ceduna			61.8	1574
32.1S	133.7E	15.3m		
Clare			104.4	1522
32.8S	138.6E	385.0m		
Cleve			84.9	1403
33.7S	136.5E	193.0m		
Coober Pedy			70.5	2779
29.0S	134.8E	215.0m		
Cook			58	2277
30.6S	130.4E	120.0m		
Ernabella			134.9	2581
26.3S	132.1E	676.0m		
Eudunda			89	1393
34.2S	139.1E	415.0m		
Gawler Ranges (Nonning)			64.4	2179
32.5S	136.5E	205.0m		
Georgetown			83.7	1804
33.4S	138.4E	273.0m		
Hawker			78.1	2281
31.9S	138.4E	315.0m		
Kadina			70.5	1730
34.0S	137.7E	44.0m		
Kimba			74.4	1862
33.1S	136.4E	263.0m		

Kyancutta 33.1S	135.6E	57.0m	63.3	2157
Lameroo 35.3S	140.5E	99.0m	84	1762
Leigh Creek 30.5S	138.4E	194.0m	84	2542
Lenswood Research 34.9S	138.8E	480.0m	146.5	839
Maitland 34.4S	137.7E	185.0m	82.6	1428
Maralinga 30.2S	131.6E	290.0m	76.3	2242
Marla 27.3S	133.6E	323.0m	111	2913
Maree 29.6S	138.1E	50.0m	69.7	2983
Minnipa 32.8S	135.1E	168.0m	64.4	1963
Moomba 28.1S	140.2E	39.0m	103.6	3041
Nullabor Roadhouse 31.5S	130.9E	64.0m	56.8	1552
Oodnadatta 27.6S	135.4E	116.5m	84.8	3028
Port Augusta 32.5S	137.8E	5.0m	64.7	2041
Port Pirie 32.2S	138.0E	4.0m	75.9	2025
Renmark 34.2S	140.7E	20.0m	67.8	2058
Tarcoola 30.7S	134.6E	119.5m	56.9	2575
Waikerie 34.3S	140.0E	25.0m	69.9	1927
Whyalla 33.1S	137.5E	6.5m	86.1	1709

Woomera			63.4	2356
31.2S	136.8E	166.6m		

Yunta			79.2	2008
32.6S	139.6E	303.0m		

**Northern Territory**  
**Location**

**Rain mm**

**Heat Units**

Alice Springs			152.5	2897
23.8S	133.9E	546.0m		

Ayers Rock			164.5	3066
25.3S	131.1E	526.0m		

Barrow Creek			203.9	3143
21.5S	133.9E	510.5m		

Curtin Springs			115.1	3083
25.3S	131.8E	488.0m		

Finke			95.8	3051
25.6S	134.6E	267.0m		

Kulgera			143.7	2864
25.8S	133.3E	508.6m		

Ringwood			159.6	3023
23.8S	135.0E	416.0m		

Watarrka			156.4	3241
24.3S	131.5E	614.0m		

Yuendumu			219.2	3098
22.3S	131.8E	661.0m		

**Western Australia**  
**Location**

**Rain mm**

**Heat Units**

Badgingarra			53.3	2393
30.3S	115.5E	275.0m		

Balgo Hills			244.4	3615
20.1S	128.0E	420.0m		

Balladonia			81.9	1952
32.5S	123.9E	148.0m		

Bencubbin			73.4	2336
30.8S	117.9E	359.0m		

Booylgoo Spring			107.1	2712
27.8S	119.9E	610.0m		
Brickhouse Woolshed			66.7	2925
24.8S	113.8E	17.0m		
Carnamah			55.8	2580
29.7S	115.9E	268.0m		
Carnarvon			50.6	2110
24.9S	113.7E	4.0m		
Carnegie			127.2	3200
25.8S	122.8E	448.0m		
Cashmere Downs			97.4	2582
29.0S	119.6E	450.0m		
Condon			212.4	2969
20.0S	119.4E	unknown		
Coolgardie			90.5	2229
30.9S	121.2E	427.0m		
Cossack			169.9	3233
20.7S	117.2E	7.0m		
Cue			92.3	2963
27.4S	117.9E	453.0m		
Dalwallinu			66.6	2437
30.3S	116.7E	325.0m		
Dampier Salt			151.2	3117
20.7S	116.7E	6.0m		
Denham			37.7	2009
25.9S	113.5E	9.0m		
Diemals			81.6	2616
29.7S	119.3E	434.0m		
Earaheedy			127.1	3221
25.6S	121.6E	523.0m		
Eneabba			42.4	2591
29.8S	115.3E	100.0m		
Errabiddy			95.1	3300
25.5S	117.1E	450.0m		
Esperance			97.2	1158
33.8S	121.9E	25.0m		

Forrest			64.4	2159
30.8S	128.1E	156.0m		
Gascoyne Junction			87.6	3517
25.1S	115.2E	144.0m		
Geraldton			40.4	2055
28.8S	114.7E	33.0m		
Giles			149.6	3050
25.0S	128.3E			
Goldsworthy			248.9	3838
20.3S	119.5E	45.0m		
Goomalling			52.4	2262
31.3S	116.8E	239.0m		
Hamelin Pool			38.8	2886
26.4S	114.1E	15.0m		
Hyden			73.5	2179
32.4S	118.9E	299.0m		
Kalgoorlie			92.9	2229
30.8S	121.5E	365.3m		
Lake Grace			72.4	1842
33.1S	118.5E	286.0m		
Laverton			98.5	2710
28.6S	122.4E	461.0m		
Lawlers			93.5	2748
28.1S	120.6E	unknown		
Leonora			96.8	2829
28.9S	121.3E	376.0m		
Mandora			279.2	3288
19.7S	120.8E	7.0m		
Marble Bar			258.8	3994
21.2S	119.7E	182.3m		
Mardie			153	3476
21.2S	116.0E	11.0m		
Meekatharra			100.9	3016
26.6S	118.5E	517.0m		
Menzies			84.4	2526
29.7S	121.0E	425.9m		

Morawa			65	2705
29.2S	116.0E	274.0m		
Mount Magnet			87.4	2998
28.1S	117.8E	426.0m		
Mount Phillip			115	3458
24.4S	116.3E	300.0m		
Mullewa			58	2735
28.5S	115.5E	268.0m		
Mundiwindi			163.5	3282
23.8S	120.2E	571.0m		
Murchison			104.3	3191
26.9S	116.0E	288.0m		
Murgoo			67.7	2969
27.4S	116.4E	303.0m		
Nabawa			39.7	2365
28.5S	114.8E	145.0m		
Narembeen			64.4	2207
32.1S	118.4E	276.0m		
Newman			198	3409
23.4S	119.7E	544.0m		
Nokanena			34.7	2341
28.4S	114.6E	60.0m		
Norseman			89.5	2056
32.2S	121.8E	277.0m		
Nullagine			224.4	3620
21.9S	120.1E	380.0m		
Nyang			169.9	3701
23.0S	115.0E	111.0m		
Onslow			183.4	3013
21.7S	115.1E	3.4m		
Pannawonica			284	3814
21.6S	116.3E	200.0m		
Paraburdoo			168.4	3710
23.2S	117.7E	391.0m		
Peak Hill			120.3	3091
25.6S	118.7E	unknown		



Perth			50.9	1856
31.9S	116.0E	15.4m		
Port Hedland			218.9	3292
20.4S	118.6E	6.4m		
Rawlinna			73.4	2244
31.0S	125.3E	182.0m		
Redmont			219	3685
22.0S	119.0E	387.0m		
Roebourne			198	3588
20.8S	117.1E	12.0m		
Sand Hill			237.6	3664
22.8S	119.6E	433.0m		
Sandstone			102.6	2754
28.0S	119.3E	533.0m		
Southern Cross			71.8	2381
31.2S	119.3E	355.0m		
Telfer			230.4	3778
21.7S	122.2E	291.9m		
Three Rivers			120.6	3320
25.1S	119.1E	520.0m		
Vlamingh Head			112.3	2480
21.8S	114.1E	12.0m		
Walebing			54	2178
30.7S	116.1E	300.0m		
Wandering			60.5	1813
32.7S	116.7E	280.0m		
Warburton			88.7	3078
26.1S	126.6E	459.0m		
Wiluna			126.8	3066
26.6S	120.2E	521.0m		
Winning			128.3	3584
23.2S	114.5E	75.0m		
Wittenoom			328.5	3596
22.2S	118.3E	463.0m		
Wongan Hills			58.2	2328
30.9S	116.7E	283.0m		

Yalgoo			74.3	2843
28.3S	116.7E	318.0m		
Yamarna			94.5	2732
28.2S	123.7E	446.1m		
Yeelirrie			108.3	2939
27.3S	120.1E	487.0m		

### Queensland

Location			Rain mm	Heat Units
Birdsville			88.3	3298
25.9S	139.3E	46.5m		
Boulia			166.7	3409
22.9S	139.9E	161.8m		
Cunnamulla			176.3	2896
28.1S	145.7E	188.7E		
Eulo			167	2872
28.2S	145.0E	137.2m		
Thargomindah			139.1	2933
28.0S	143.8E	128.7m		
Urandangie			205.1	3471
21.6S	138.3E	173.9m		
Windorah			162	3219
25.4S	142.7E	126.3m		
Winton			273.4	3349
22.4S	143.0E	181.9m		

### New South Wales

Location			Rain mm	Heat Units
Balranald			92.2	2144
34.6S	143.6E	61.0m		
Bourke			151.1	2815
30.1S	145.9E	106.0m		
Broken Hill			90.1	2136
32.0S	141.5S	315.0m		
Cobar			166.5	2299
31.5S	145.8E	260.0m		
			85.2	2074

Euston					
34.6S	142.7E	61.0m			
Griffith			122.5		2022
34.3S	146.1E	126.0m			
Hay			109.9		2140
34.5S	144.9E	93.3m			
Hillston			118.5		2143
33.5S	145.5E	122.0m			
Ivanhoe			110.6		2432
32.9S	144.3E	85.0m			
Lake Cargelligo			146.6		2337
33.3S	146.4 E	169.0m			
Lake Victoria			71.6		1962
34.0S	141.3E	43.0m			
Menindee			84.3		2393
32.4S	142.4E	61.0m			
Narrabri			276.9		2432
30.3S	149.8E	212.0m			
Narrandera			133.7		1940
34.7S	146.5E	145.0m			
Tibooburra			104.5		2740
29.4S	142.0E	183.0m			
Wentworth			83.6		2126
34.1S	141.9E	37.0m			
White Cliffs			102.9		2658
30.9S	143.1E	151.0m			
Wilcannia			101		2587
31.6S	143.4E	75.0m			
<b>Victoria</b>					
<b>Location</b>			<b>Rain mm</b>		<b>Heat Units</b>
Echuca			113.6		1725
36.2S	144.8E	96.0m			
Kerang			100.8		1847
35.7S	143.9E	77.7m			
Mildura			84.3		1953
34.2S	142.1E	50.0m			

Nhill 36.3S	141.6E	133.0m	92.1	1537
Ouyen 35.1S	142.3E	50.3m	88.5	1962
Swan Hill 35.3S	143.6E	70.0m	91.8	1874

### Work Sheet for Summer Rain and Heat Unit Tallies

Example location:

Renmark

34.2S      140.4E      31.5m

Rain in mm                      January to March, and December

January	February	March	October	November	December	<b>Total:</b>
15.9	19.4	14.2	n/a	n/a	18.3	<b>67.8mm</b>

Mean Maximum daily temperatures                      Degrees C

32.5	32.2	28.8	24.4	27.8	30.4
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To calculate Heat Units:

Subtract 18 from monthly figure and multiply resultant by days in month

Example: for January: (31.3 - 18) multiplied by 31 = 13.3 x 31, or: 412.3

Heat Units: January to March plus October to December

449.5	397.6	334.8	198.4	294	384.4
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Heat Unit Tally for Renmark:                      2059

To obtain data for a location near you:

On the Bureau of Meteorology home site ([www.bom.gov.au](http://www.bom.gov.au)), click on Climate Averages

Under Climate Graphs and Tables, select a state or region

From the list of reporting stations, select a location

Data available in: Mean Daily Max Temp, and Mean Rainfall

Work sheet follows:

J	F	M	O	N	D	Total
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Observational material courtesy Bureau of Meteorology

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