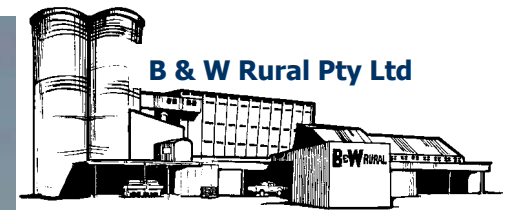


Water Use Efficiency in Sunflowers – an on farm perspective. How do Sunflowers compare with other summer crops.

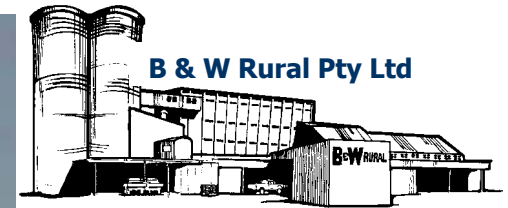


Rob Long
B&W Rural Moree



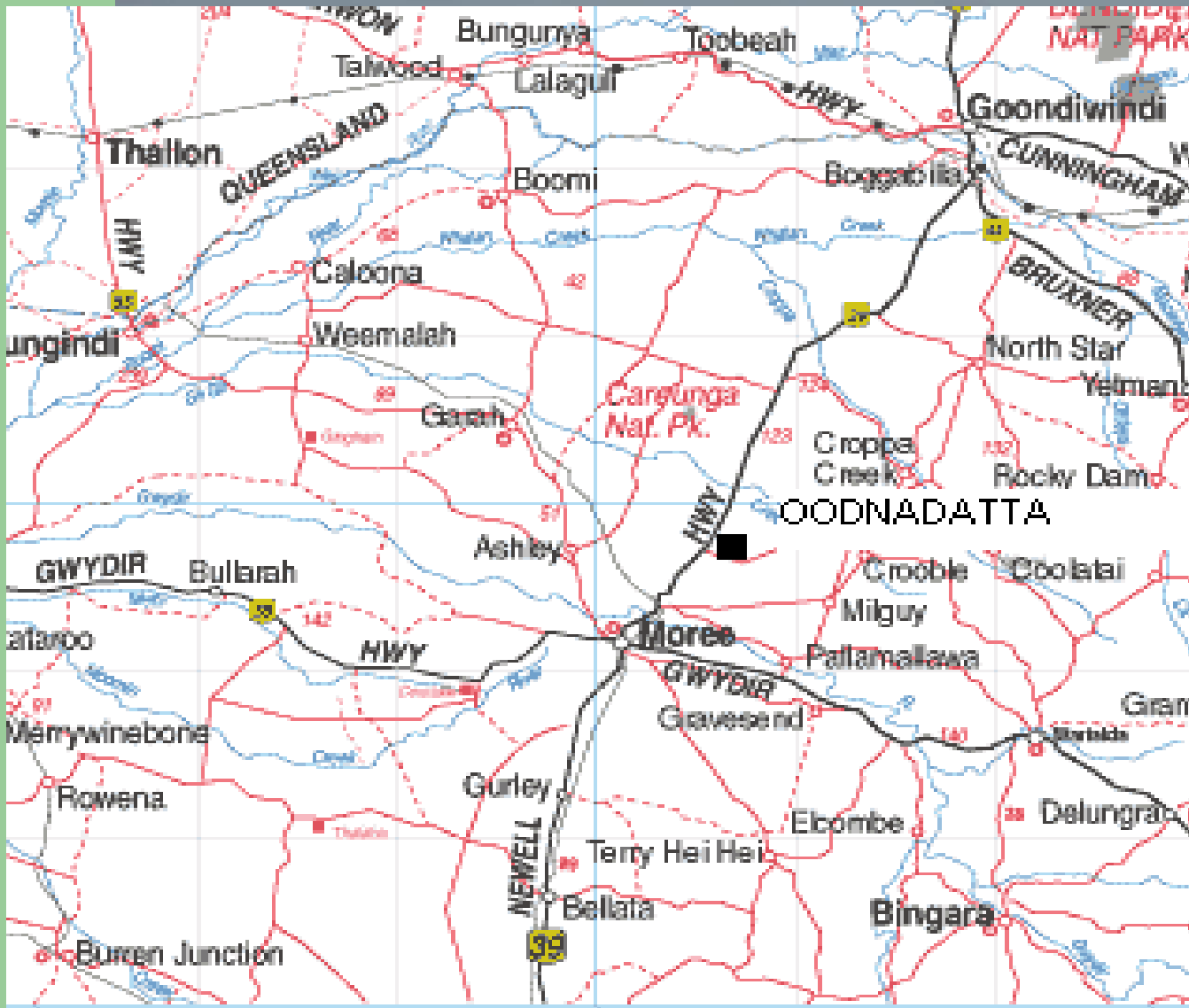
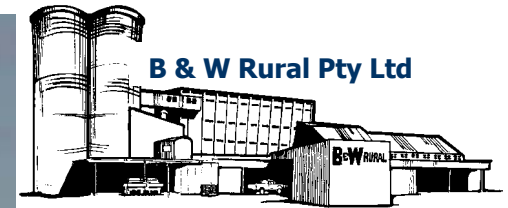
Acknowledgements

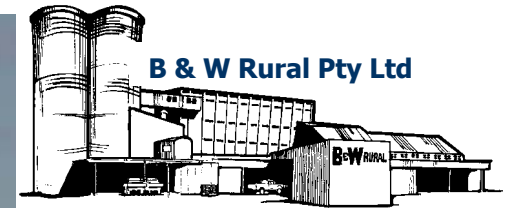
- Hugh Ball (Oodnadatta Farms)
- Liz McDonald (B&W Rural Moree)
- Stephanie Belfield, Nathan Ferguson, Russell Carty (NSW DPI)
- David Sloane, (Agrilink)



Background

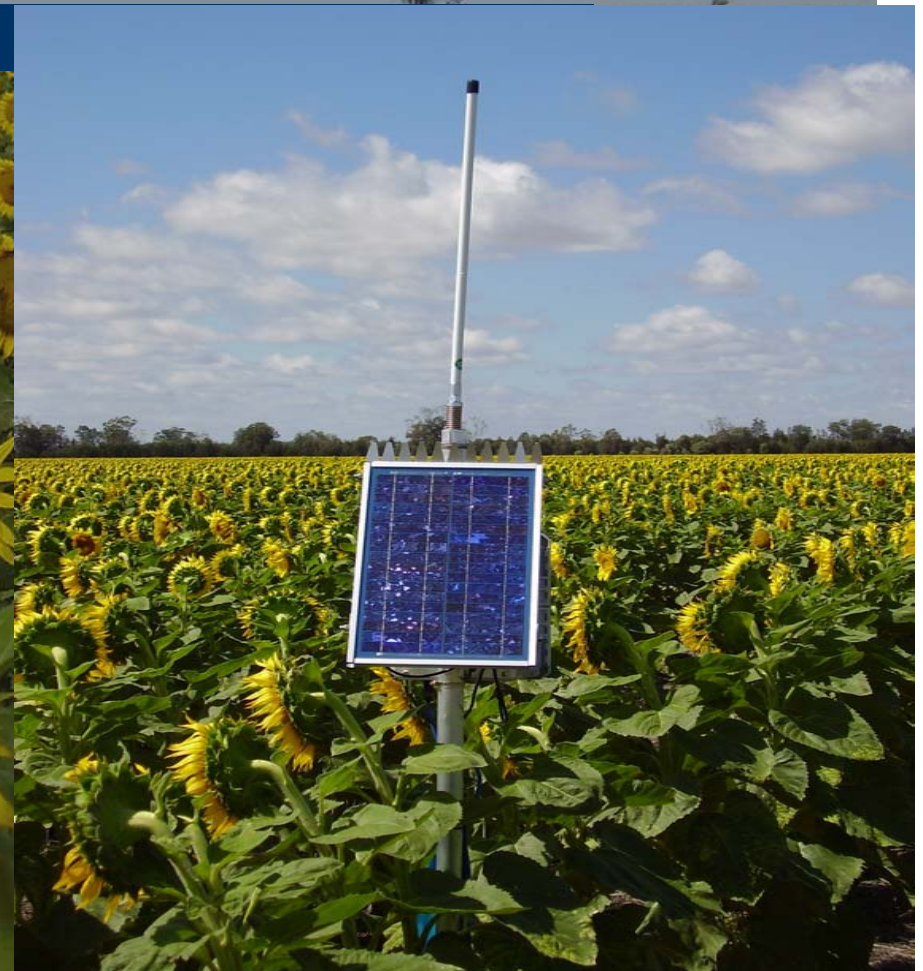
- Biggest Sunflower plant in northern NSW for 25 years.
 - Heavy June/July rain closed the winter planting window
 - Contracts for mono Sunnies @ \$430 del Newcastle.
- 05/06 was a very hot summer. Rainfall patchy.
- Rutherglen Bugs were prolific.
- Sunflower yields suffered – light test weights and low oil%. Sorghum suffered similarly.
- I suspect Starting Soil Water levels may not have been as full as growers anticipated.

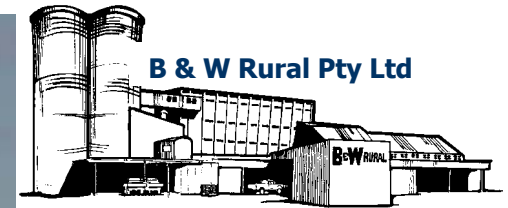




Method of assessment

- “Oodnadatta”, 30 km north east Moree
- Soil type is a heavy grey cracking clay. Some sodicity and chloride at depth.
- Water use assessed using
 - Neutron Probes (NSW DPI)
 - C-Probes (B&W / Agrilink)
 - Gravimetric soil cores (NSW DPI)
- Sorghum and Cotton grown in adjacent paddocks

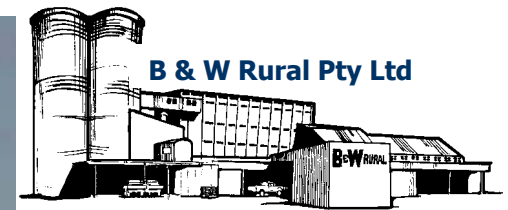




Soil details, Field 15

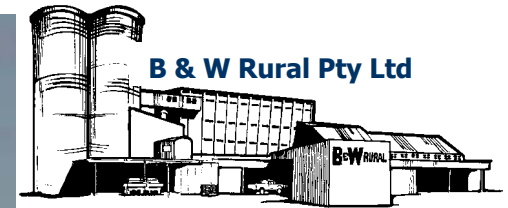
- 71 kg N available 0 – 100 cm
- P colwell 13ppm 0 – 10 cm

	Chloride mg/kg	ESP%
0-10	37	9.2
10-40	41	12
40-70	230	17
70-100	700	9.2
100-150	1200	15



Field 15, Crop details

- Variety: Sunoleic 06
- Planting Date: 18th August 2005
- Planting rate: 2.5 kg/ha x 14,000 seeds/kg
- Solid (1 metre) row configuration
- Establishment: 3.0 plants/metre (30,000 ha)
- Fertilizer: 80 kg/ha Urea, 23 l/ha Flowphos Z in furrow at planting.
- Nutrient status – refer to soil tests.
- Herbicides: No residuals applied.
- Weeds: Scattered Fleabane.
- Insects: RGB, sprayed 3 times 9th Nov, 21st Nov, 8th Dec.



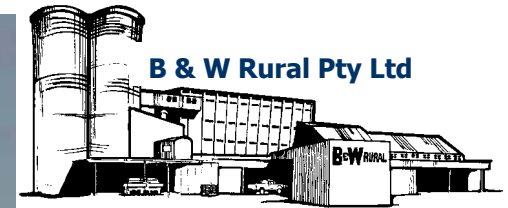
Crop results

Sunflower

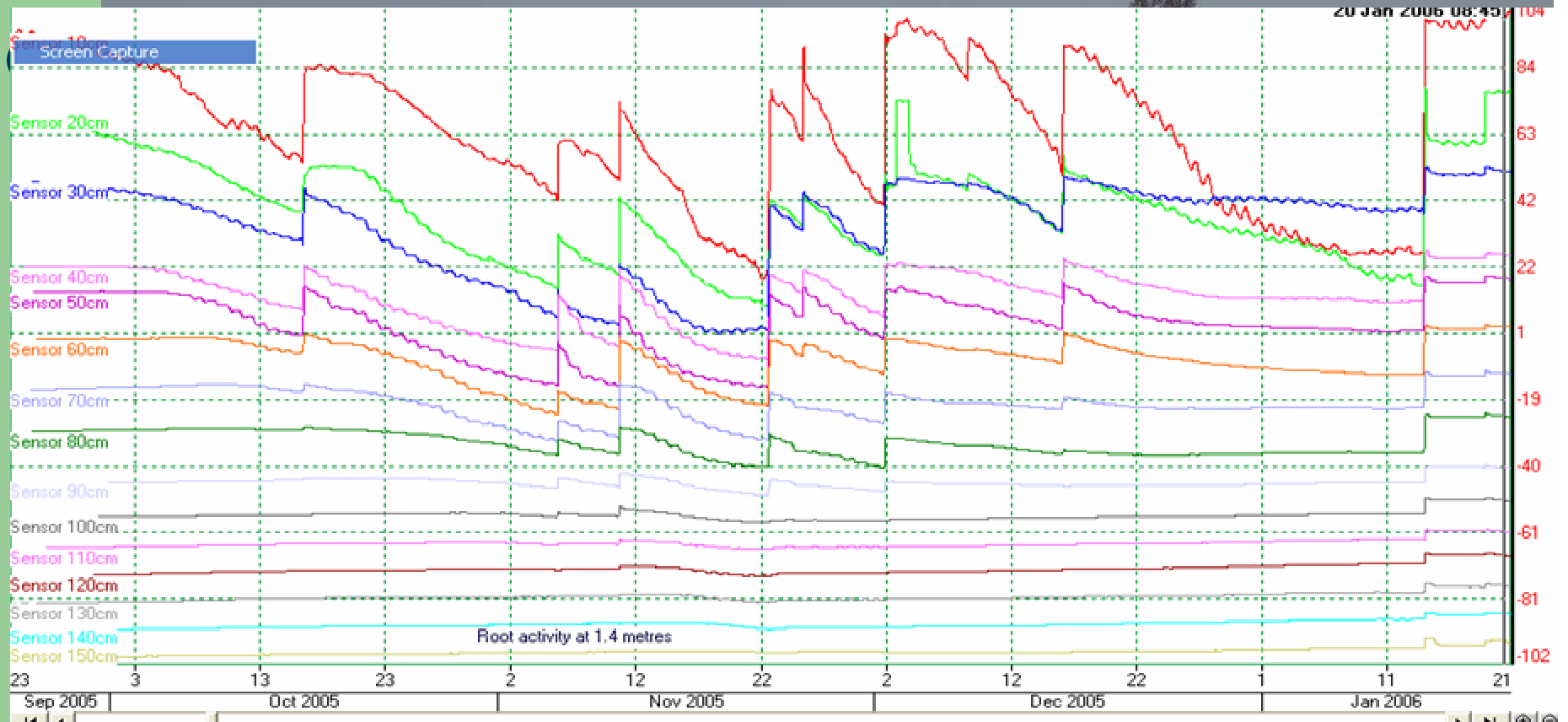
- Yield 1.86 t/ha
- Oil: 42.9 – 46.0%
- Avge T/W 40-42kg/hL
- Harvested 14/02/06

Sorghum

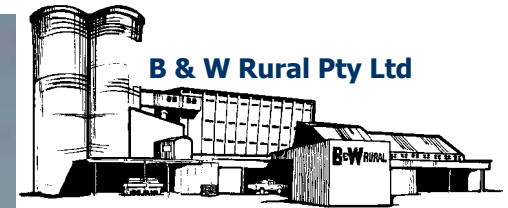
- Yield 4.1 t/ha
- Avge T/W 69 kg/HL
- Harvested 15/02/06



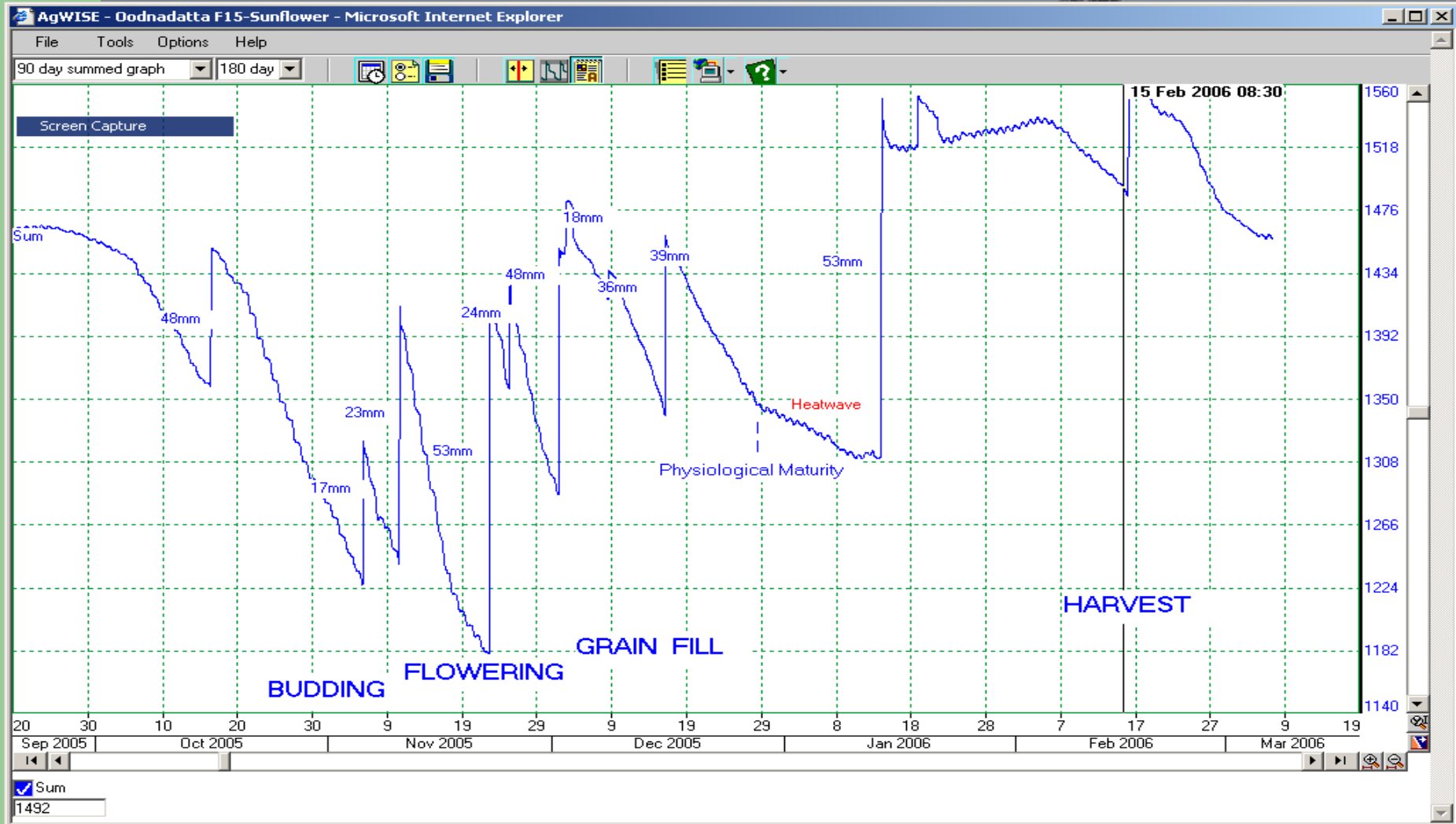
05/06 Sunflower Water Use - All depths

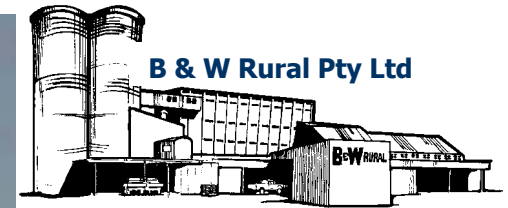


<input checked="" type="checkbox"/> Sensor 10cm 98.71	<input checked="" type="checkbox"/> Sensor 20cm 97.26	<input checked="" type="checkbox"/> Sensor 30cm 99.4	<input checked="" type="checkbox"/> Sensor 40cm 105.92	<input checked="" type="checkbox"/> Sensor 50cm 106.1	<input checked="" type="checkbox"/> Sensor 60cm 99.31	<input checked="" type="checkbox"/> Sensor 70cm 100.46
<input checked="" type="checkbox"/> Sensor 80cm 109.3	<input checked="" type="checkbox"/> Sensor 90cm 103.15	<input checked="" type="checkbox"/> Sensor 100cm 100.45	<input checked="" type="checkbox"/> Sensor 110cm 101.93	<input checked="" type="checkbox"/> Sensor 120cm 102.49	<input checked="" type="checkbox"/> Sensor 130cm 106.9	<input checked="" type="checkbox"/> Sensor 140cm 108.16
<input checked="" type="checkbox"/> Sensor 150cm 103.57						



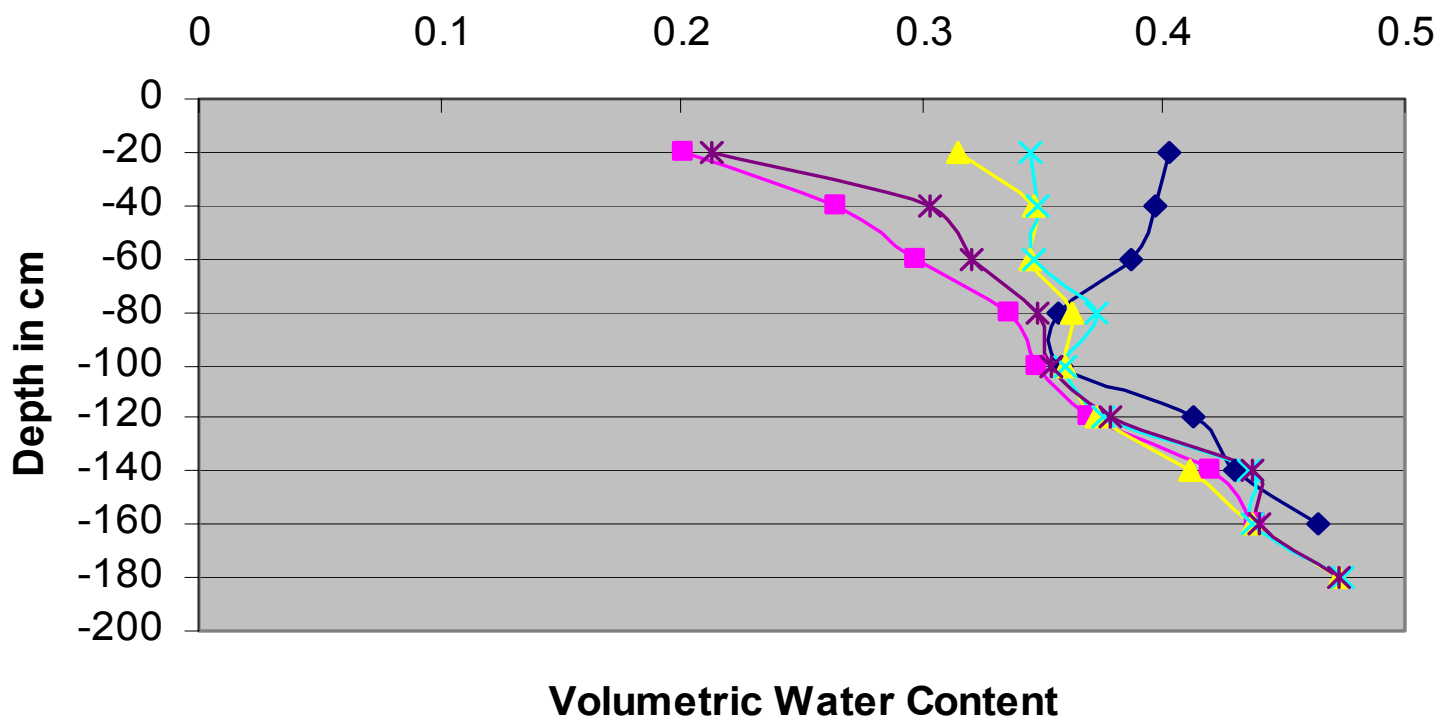
05/06 Sunflower Water Use - Summed





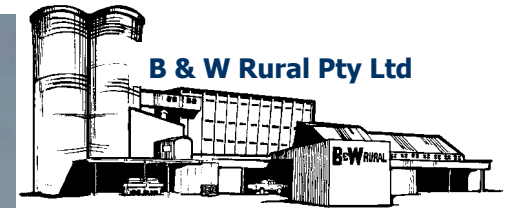
Neutron Probe graphs - Sunflowers

Oodnadatta Sunflower



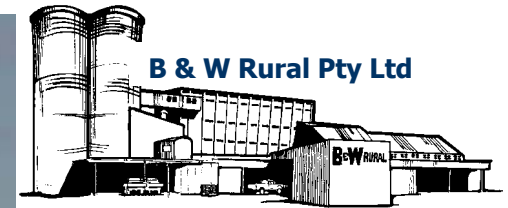
PAWC	
(0-70)	104
(0-110)	120
(0-130)	133
(0-170)	154

- ◆ 5/10/2005
- 22/11/2005
- ▲ 30/11/2005
- ✕ 19/12/2005
- * 6/01/2006

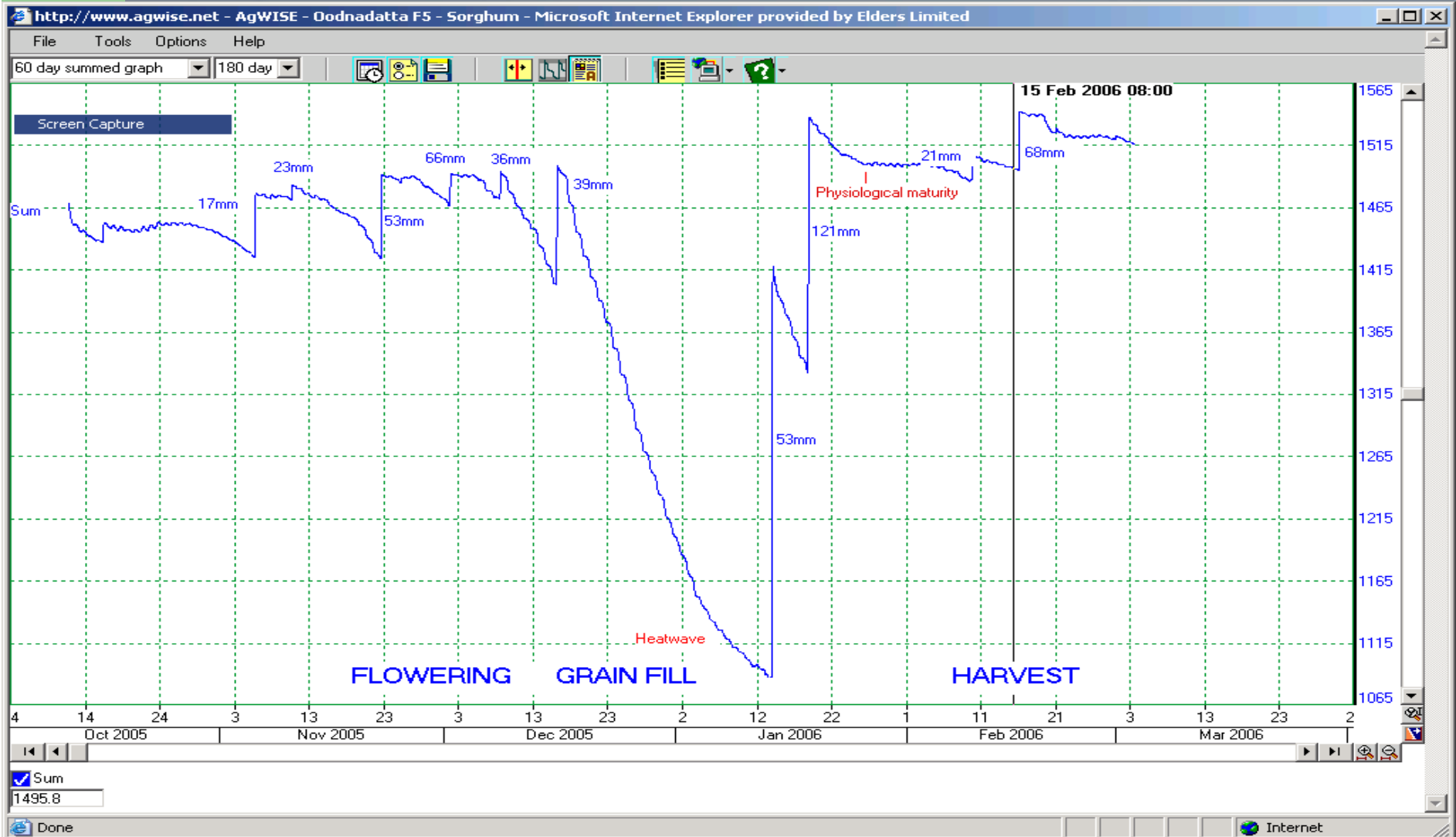


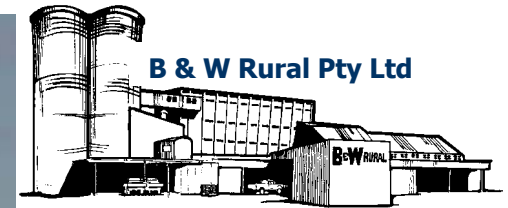
Estimated WUE – Solid Sunflowers

- Starting Soil Water (0-130) 133mm PAWC
- Total in-crop rain 545mm
- Effective in-crop rain est. 220mm
- Total avail water = $133+220 = 353$ mm
- Peak Water Use 7.5mm per day
- Yield 1.86t/ha
- $WUE = 1860\text{kg} / 353\text{mm} = 5.3$ kg per mm.
i.e every 100mm (4 inches) should add 0.5 t/ha



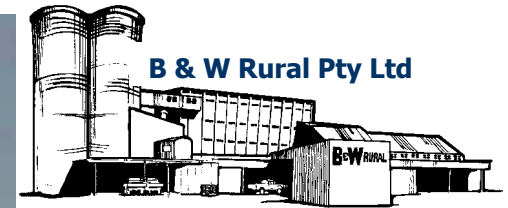
05/06 Sorghum Water use - Summed





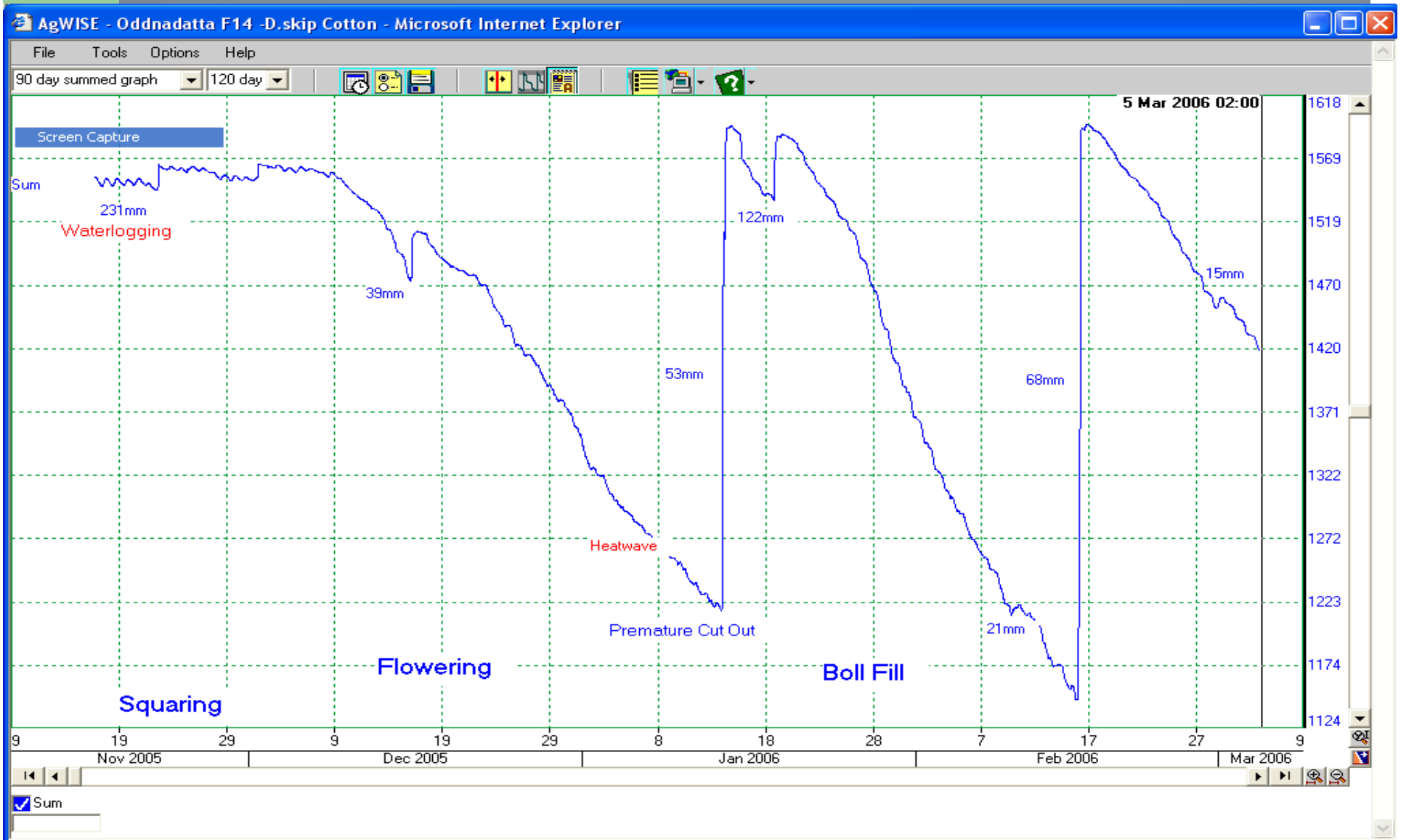
Estimated WUE – Single Skip Sorghum

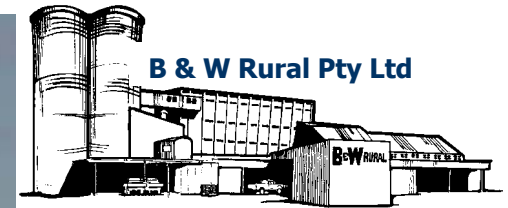
- Starting Soil Water (0-110) 93mm PAWC
- Total in-crop rain 531mm
- Effective in-crop rain est. 280mm
- Total avail water = $93+280 = 373$ mm
- Peak Water Use 4.4mm per day
- Yield 4.1t/ha
- $WUE = 4100\text{kg} / 373\text{mm} = 11.0$ kg per mm.
i.e every 100mm (4 inches) should add 1.1 t/ha



B & W Rural Pty Ltd

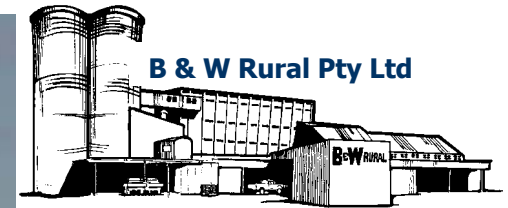
05/06 Cotton Water Use – Summed





Take Home Messages

- Sunflowers use soil water earlier than sorghum or cotton – a function of fast early growth and higher leaf area. Maximising Plant Available Water at planting reduces production risk.
- Sunflowers can use up to 7.5 mm/day during Peak Water Use at flowering.
- Sunflowers can extract water from soil with Chloride levels of 1200ppm and sodicity (ESP) of 17%.



Take Home Messages

- The relative yield and quality performance of summer crops in the Moree district depends on the amount of Plant Available Water and the evaporative demand at flowering and early grainfill.
- Water Use Efficiency of summer crops is of limited value unless some account is taken of “rainfall effectiveness”
- Further work should be done to monitor water use patterns and WUE for Sunflowers on wider row configurations.