



Table Grape

Water Use Study West Swan, Western Australia



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This project is supported by Perth Region NRM, through funding from the Australian Government's Caring for our Country.

Irrigation System Details

The system is designed to irrigate 5.683ha of vineyard using low volume microsprinklers for established vines and drip tape for young vines. The pump used is a Grundfos 25hp (18.5kw) Submersible feeding into 100mm A/C mainline with 50mm class 9 PVC sub-mains and 25mm LDPE lateral lines. Sprinklers used are Wingfield Challenger 1.6mm Blue nozzle with a actual flow of 151L/hr @ 210kPa in the Crimson Seedless monitoring area. Sprinkler Spacing is 6.8m between the laterals and 5.4m between sprinklers.



Soil Moisture Monitoring

Sentek Enviroscan Plus with Easyag capacitance probe were installed to monitor irrigation levels and movement through the soil profile. The probe logs soil moisture at 10, 20, 30 and 50cm depths.

	Crimson Seedless Block
Mean Application Rate (mm/hr)	3.0
Distribution Uniformity	54%
Coefficient of Uniformity	64%
Scheduling Coefficient	1.8

Irrigation Audit Details for 2009

Row spacing is every 3.4m but the laterals are located every second row (6.8m apart). The current sprinklers have a radius of 4.8m @ 200kPa so the wetting patterns are not fully overlapping and this is reflected in the low Distribution Uniformity %.

2008-2009 Season Irrigation Schedule

	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Daily Evap (mm/day)	1.9	3.1	3.6	5.2	5.9	8.3	10.1	9.1	7.2	5.5	3.9	2.3
Crop Factor			0.1	0.15	0.25	0.3	0.35	0.4	0.4	0.4 to 0.5	0.1	
Crop Water Requirement (mm)			0.36	0.78	1.5	2.5	3.5	3.6	2.8	1.7	0.4	
Runtime (mins/day) @ 3mm/hr MAR			8	15	30	50	70	72	56	34	8	

Crimson Seedless Irrigation Scheduling (month by month)

October: Irrigations commenced on the 20th October. During this time daily evaporation averaged 5-6mm, crop water demand was under 1mm per day and rainfall totalled 30mm. During October and early November, most of the rainfall is effective due to the small leaf area of the shooting vines.

November: Rainfall delivered 54mm and the crop water requirement was 30mm. Irrigations were scheduled around rainfall events during November.

December: Crop water demand for December was 77mm and 66mm was delivered via irrigation and approx. 23mm by rainfall. Soil moisture levels at 30cm during Dec averaged 21-26mm compared to full point of 29mm.

January: Irrigation duration was increased during Jan to 3.5mm per day or a crop factor of 35% of evaporation (0.35). 98.5mm of irrigation was applied during Jan with several wetting fronts moving through to 30cm deep. At the end of January, soil moisture at 30cm had decreased to 11mm compared to a full point 29mm. Flat lines on the soil moisture graph at 30cm were evident at the end of Jan which indicated that the vine is not drawing soil water from that depth so the schedule needed to be changed so that there was readily available water at 30cm. Grapes are undergoing colour change during Jan and berry size is rapidly increasing.

February: Due to decreasing soil moisture and high crop water demand, 9mm irrigations were scheduled on consecutive days at the start of Feb. This increased soil moisture to 14mm at 30cm. A crop factor of 0.4 was applied during Feb which was equal to 112mm of water for the month. Evaporation from the 11th Feb to the 24th Feb was 131mm and the crop water requirement was 53mm but only 39mm was applied via irrigation. This caused a reduction in soil moisture through to 30cm. Irrigations were applied with a 0.4 crop factor but irrigation wetting fronts were not reaching 30cm but there was still readily available soil water at 10-20cm deep.

March: The crop was harvested (first pick) on the 10th March. As soon as the grapes were harvested, soil moisture increased dramatically at 20 and 30cm due to lower crop water demand and a 0.4 to 0.5 crop factor irrigation schedule. The irrigation schedule change from 0.4 to 0.5 was implemented to maximise berry size of the second crop to be harvested in April.

April: During the first two weeks of April, daily 3mm irrigations were scheduled until the harvest of the second crop on the 12th April. 3mm per day was sufficient to increase soil moisture at 30cm from 10mm to 18mm. Immediately after the second crop was picked, the schedule was altered to reflect low crop water demand and to maintain the vines through to leaf fall and dormancy. 55mm of irrigation was required for the month of April and 69mm was applied.

May: 2 irrigations were scheduled during May, each delivering approx. 11mm of irrigation. The irrigation season ended on the 21st May with 58mm of rainfall.

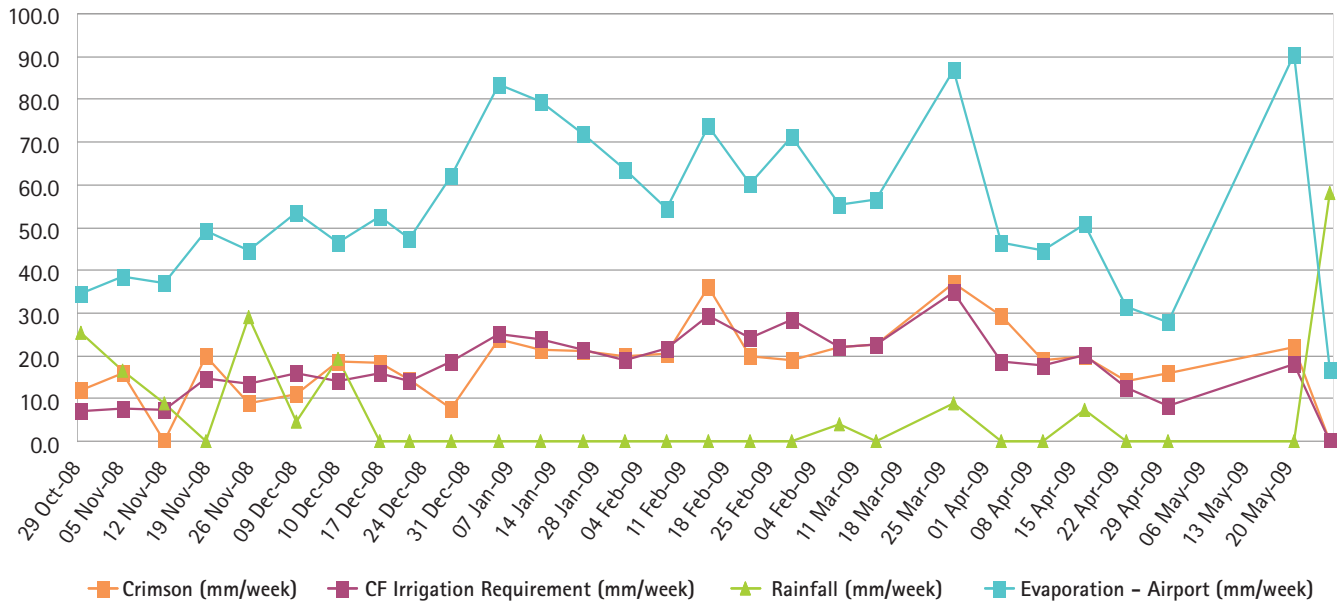
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Crimson Seedless Irrigation Results 08-09



Irrigation Efficiency Upgrades

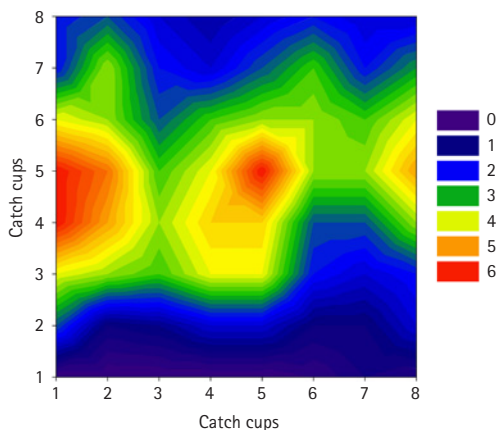
Hydroplan Irrigation Consultants were approached to conduct an investigation into the feasibility of some irrigation system upgrades and results indicated that there would be some large increases in irrigation efficiency if the system was changed. In October 2009, the old sprinkler system was removed and a new system was installed. The new system included telescopic sub main, new lateral lines and new 70L/hour sprinklers spaced at 2.75m between sprinklers and 3.5m between laterals.

Based on data from Hydroplan, the theoretical distribution uniformity (DU) was calculated to be 90% with a mean application rate (MAR) of 7.7mm/hour. Actual in-field catch cup tests recorded a DU of 82% and a MAR of 7.1mm/hour which was very close to the consultants predictions. There was only an 8.6% variation in line pressure from the closest sprinkler to the inlet to the furthest sprinkler away. There was a 33% sprinkler flow variation across the block with the old sprinklers, now with the upgrade, there is only a 2% variation.

Irrigation Tips

- Depending on your soil type, it may be necessary to schedule irrigations in January and February using soil based methods (Rootzone Readily Available Water and soil moisture monitoring) rather than just using crop factors and evaporation figures. Applying irrigation using Evaporation and Crop Factors may not be adequate to irrigate to a depth of 30-40cm (dependant on soil type and soil moisture status).
- Anecdotal evidence suggests that Crimson Seedless may use up to 20% more water than the recommended crop factor irrigation requirements.
- Make sure you know the depth of your active rootzone so you can schedule irrigations to minimise leaching.
- Get to know the Mean Application Rate (MAR) of your irrigation system so you know what is applied in mm/hour.

Crimson Seedless Block
Irrigation Application Graph (mm/hour)
7m x 5m sprinkler spacing



Water Use Results

Rain: 182mm
(58mm in final week of season)
Evaporation: 1530 mm

Crop Water Demand: 500 mm
Irrigation Applied: 511.3 mm (5113 kL/ha)
Total Water Applied: 693.3 mm



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