



Sentek sensor technologies

Significant Increases in Grape Quality and a 30% Water Saving ... How?

Abstract

One of Australia's leading premium wine label's, embraces soil moisture monitoring for crop quality and substantial water savings. Sentek's continuous soil moisture monitoring solution, EnviroSCAN[®], has allowed Wirra Wirra Winery to save 30% on water use and significantly increase their production in grape quality from premium to super premium to now, ultra premium.

Wirra Wirra Winery

Wirra Wirra is one of Australia's leading vineyards and was founded in 1894. Situated in McLaren Vale in South Australia, Wirra Wirra wines are consistently rated among the finest not only in McLaren Vale, but the world. Since 2001, Wirra Wirra's Vineyard Manager Tony Hoare has been using Sentek's EnviroSCAN[®] to continuously measure soil moisture and schedule his irrigation strategies in the predominantly sandy loam over clay soils. Wirra Wirra winery uses drip irrigation through out the vineyard, with the Shiraz grape variety established in 1988, being monitored by the Sentek probes. Tony has 2 EnviroSCAN[®] loggers with four probes monitoring his Shiraz blocks, as well as a Diviner 2000[®] to monitor 42 sites throughout the remaining grape blocks on the Wirra Wirra property.

EnviroSCAN[®]

EnviroSCAN[®] is Sentek's flagship product and has become the most widely used continuously logging, irrigation management tool in Australia and has expanded around the world. The EnviroSCAN[®] is a complete and stand-alone soil moisture monitoring solution, taking remote data from the field and displaying it as an easy to use graph on the vineyard manager's computer. The EnviroSCAN[®] can be downloaded by the grower via a range of methods, while the Irrimax[®] 5.0 software gives growers a graphical, continuous and up to the minute understanding of moisture levels in the soil profile.

IrriMAX[®] 5.0 – Irrigation Scheduling Software

The manipulation of soil moisture contents at different phenological stages is an important part of a vineyard manager's art. With the use of IrriMAX[®] 5.0, three primary stages can be identified and irrigation applications used, with nutrient control and canopy architecture to produce the quality fruit sought by the wine maker.

Figure 1 below offers a brief explanation of Wirra Wirra's management strategy.

1. Flowering to fruit set

No moisture stress is allowed at this stage. Soil moisture is maintained at just below full-point.

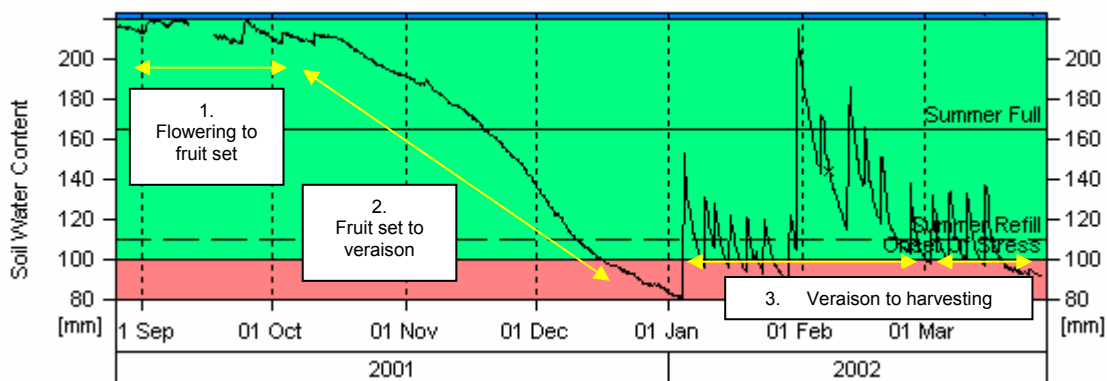
2. Fruit set to veraison

In only 6 weeks, stressed conditions must be gradually introduced by applying short deficit irrigations to bring down the soil moisture level, whilst maintaining the canopy. Smaller berry size results in an increased pulp to skin ratio and concentration of colour and flavour. Vegetative vigour is reduced with no apical or lateral shoot growth after 1 January.

3. Veraison to harvesting

Sufficient moisture is applied to maintain grape turgor through to harvest. Soil moisture levels are an integral part of strategy for managing sugar and anthocyanin during the initial stage of berry ripening, and flavour compounds during the latter stages. A post-harvest leaching of salts completes the seasonal management.

Figure 1: IrriMAX[®] 5.0 Screen Capture



When discussing IrriMAX[®] 5.0 Tony Hoare stated, *“It’s a great addition as it centralises all water applications to the vineyard during the season and allows us to measure the effectiveness of irrigations and the significance of rainfall events. The additional info on the printout is a very worthwhile addition to our seasonal irrigation record. It’s then used to help make future management decisions.”*

Quality Attributes

Wirra Wirra Winery use an array of quality attributes to ensure premium grape quality, as well as to help determine what benchmarks need to be set to achieve the best possible results.

Measured Quality Attribute	Benchmark	Measured at Which Crop Stage
1. Baume	14-15 baume	Weekly, 3 weeks pre harvest
2. Colour of Skins	Black and slippery	Weekly, 3 weeks pre harvest
3. Seed Maturity	Brown and crunchy	Weekly, 3 weeks pre harvest
4. Pulp separation	Pulp separated from seed	Weekly, 3 weeks pre harvest
5. Lignification of peduncle	Brown peduncle	Weekly, 3 weeks pre harvest
6. Flavour	Wine makers prerogative	Weekly, 3 weeks pre harvest

Quality attribute 1, baume was achieved by pruning bud numbers, canopy management, nutrition as well as deficit irrigation. Quality attributes 2 to 6 were achieved through canopy management, bunch exposure, bunch structure and berry size manipulated using deficit irrigation.

EnviroSCAN[®] was used by Tony Hoare and his team at Wirra Wirra to control crop stages, shoot development and berry sizing by observing vine phenology and irrigating according to growth stage. EnviroSCAN[®] allowed for careful monitoring and implementing of deficit irrigation practices to decrease berry size, open bunch structure control and vegetative vigour.

Wirra Wirra Winery achieved major improvements in proportionally quality-graded fruit with the use of the EnviroSCAN[®] system. Prior to using the EnviroSCAN[®], the grade of fruit being produced from the Shiraz block was premium quality which was

100% low Church Block quality, which is one of Wirra Wirra's most popular brand names. Since using the EnviroSCAN® the Shiraz block had improved initially to a 100% super premium standard, ideal for the McLaren Vale Shiraz brand name. Currently this Shiraz block has progressed to now producing 100% Ultra Premium grape quality, now used to produce the RSW brand name which is one of Australia's leading Shiraz's. EnviroSCAN® provided the vineyard with a substantial increase in the amount of quality graded fruit available for production. The revenue implications for Wirra Wirra as a result of the significant increase in quality are a staggering rise in income from \$1800 to \$4000 per ton.

Tony Hoare stated, "EnviroSCAN® allowed us to better understand moisture movement and availability in our various soil types. This information then allows us to make informed decisions as to maximizing our limited water resources to best achieve quality fruit production. The information from EnviroSCAN® probes also allows for more sustainable long term viability of our vineyards through efficient use of our water resources and better soil conversation management practices."

Pest and Disease Control

In addition to significant increases in quality, EnviroSCAN® also aided Wirra Wirra with their disease and pest control. By cutting the growth at veraison, the balance of growth is shifted from the leaves to the fruit which cuts the trimming requirement from 3 to a single operation and allows for more controlled canopy vigour. By controlling canopy vigour and hence ventilation the risk of disease conditions, is reduced.

Furthermore the more open canopy allows for easier and better spray penetration to where one is targeting and the fruit ripens quicker as a result of the greater exposure.

Nutrition

Management of fertigation tasks is facilitated through the use of Sentek's EnviroSCAN® system. The information obtained from Sentek systems are used in conjunction with growth stage, to make nutrient application decisions. Petiole tests showed this balanced approach resulted in less deficiency and ensured that the correct position in the root zone is targeted to maximize uptake and efficiency. Canopy vigour is controlled, decreasing Nitrogen requirements, the leaching of which can also be carefully monitored.

Labour

Due to significant improvements in grape quality and water savings, Wirra Wirra has employed a dedicated staff member to take additional soil moisture readings twice a week through out the property at some 42 sites with the portable Diviner 2000[®] probe. An advantage for Wirra Wirra with the use of the portable Diviner 2000[®] probe, has been that whilst the user is taking the readings they can also look at vine growth and make any other condition observations, for example blocked dripper lines or higher than anticipated evapotranspiration rates.

Markets

Due to sound irrigation scheduling techniques, through the use of the EnviroSCAN[®] system, Wirra Wirra were able to improve the production quality and quantity of their ultra premium product and therefore increase profitability in the top end marketplace. Increased demand for ultra premium wine with limited supply meant that Wirra Wirra were able to increase supply of this ultra premium Shiraz to better satisfy demand.

Water Savings

Due to current water allocations the regional cap of 1.1ML is what Wirra Wirra are licensed to use per hectare per annum. Since they have been using the EnviroSCAN[®] system, the annual irrigation water requirement (ML per ha) has been greatly reduced to an average of 0.77 ML per ha, depending upon season. This has saved Wirra Wirra 30% of water usage, or some 6 ML per annum, thus allowing them to on-sell, as a license transfer, this surplus to neighbouring vineyards for approximately \$800 to \$1000 per ML.

Summary

Wirra Wirra Winery is unquestionably one of the finest wineries in the region. It has been on the cutting edge of regional style for quite some time as it continuously rates highly in both national and international competitions. Coupled with the Sentek product's Wirra Wirra Winery have experienced three primary gains from using the EnviroSCAN[®]:

1. Significant Increase in Grape Quality
2. Significant Water Savings
3. Increased profitability with the sustainable production of ultra premium grapes

4. Increased profitability with the on-sale of surplus water from their allocation

Using the EnviroSCAN[®] showed Wirra Wirra Winery that soil moisture monitoring ensures that the vineyards needs are met, with little wastage through drainage below the root zone. It also proved to Tony Hoare just how much of a difference effective irrigation scheduling could make in terms of water use efficiency and significant improvements in fruit quality.

Acknowledgements

Sentek would like to thank Tony Hoare of Wirra Wirra Winery for taking the time to pass on the success he has had using the EnviroSCAN[®], Diviner 2000[®] and the IrriMAX[®] 5.0 software solution.

For further information on Sentek Sensor Technologies please contact Sentek's Marketing Coordinator Adrian Manera at amanera@sentek.com.au, free call 1-800-SENTEK (1-800-736-835) or visit www.sentek.com.au to arrange a product information pack to be sent to you.