

Wastewater Management Editorial

BRL Hardy Winery Berri Woodlot – A Case Study

Sentek Sensor Technologies save BRL Hardy over \$1 million in infrastructure costs by maximising irrigation efficiency.

Introduction

BRL Hardy's Berri Estates Winery is one of the largest wineries in the Southern Hemisphere. The winery is located at Glossop in South Australia's Riverland and crushes about 110,000 tonnes of grapes per year to produce grape juice, a range of table and fortified wines, brandy and fortifying spirit. This study will address:

- BRL Hardy's current wastewater position
- Look at BRL Hardy's objectives of implementing **Sentek's Best Management Practice**
- Discuss how they achieved the benchmark of **Sentek's Best Management Practice**.

The Current Problem

Berri Estates' Winery produces around 200 Megalitres (ML) per annum of low-level wastewater with a biochemical oxygen demand (BOD) of about 2,500mg/L. Primary treatment of the wastewater consists of screening and settling the larger solids in a pond. From here, the wastewater is pumped some 5 kilometres to a 40 hectare woodlot plantation, where it is distributed onto the woodlot using flood irrigation. The trees in the woodlot are primarily *Eucalyptus camaldulensis* with some *Casuarina* species and other *Eucalypt* species in trial blocks. The age of the trees varies from 2 years to 16 years old.

Application of wastewater onto land is an increasingly popular option for the disposal of industry and municipal wastewater. The sustainability of such a practice relies on the effective rates of utilization of water and nutrients by crops, such as trees and pasture.

Prior to planting the woodlot in 1986, Berri Estates had been using evaporative lagoons, which was the traditional approach of managing wastewater in the winemaking industry. Wastewater was collected in drains which discharged into a common sump and then into three storage and evaporation lagoons at the rear of the winery. The three lagoons operated in series and the last lagoon was pumped into a drain flowing to the Berri Evaporation Basin (Winkie Lagoon). Odours were generated in both the lagoons behind the winery and at the Winkie Lagoon.

The Objective of Implementing Best Management Practice

The aim of an effective wastewater disposal system is to optimize plant growth and maximize the uptake of water and nutrients, while at the same time, avoiding water logging of soil or contamination of groundwater or surface water, or evolution of odours. Rigorous monitoring of the key environmental and agronomic indicators enables a management program such as **Sentek's Best Management Practice**, to be implemented to react to any early warning signs of detrimental effects. At the same time it provides a focus on positive management actions.

To meet the EPA's new environmental standards, Berri Estates considered numerous options for the disposal of the wastewater. In 2001, BRL Hardy in conjunction with soil moisture monitoring specialists Sentek Sensor Technologies embarked on a program to utilize new technologies that would facilitate the adoption of Best Management Practice in irrigation management at the Berri Woodlot. This was undertaken in order to maximize the productivity and long-term viability of the woodlot without damaging the environment.

How did BRL achieve the Best Management Practice

Step 1:

The first step was to commission a soil survey of the woodlot to identify the key soil properties affecting wastewater disposal and to map the soils into distinct irrigation management units. Next, eleven continuous soil moisture-monitoring **EnviroSCAN®** and **EnviroSMART™** probes were installed at strategic locations within each of the irrigation management units. South Australian based company, **Yandilla Park Services**, undertook both of these processes.

Step 2:

The information collected from the probes is used on a regular basis to fine-tune the amount of wastewater applied to each major management unit. This enables water to be applied to the bottom of the primary rootzone, or slightly deeper where a leaching factor is required, without deeper percolation into the underlying water table. It also enables the precise amount of water to be applied to each site within the woodlot that the trees are able to utilize hence maximizing tree growth and water and nutrient uptake.

Step 3:

All the soil moisture data collected is incorporated into a rigorous monitoring program, encompassing wastewater quality and volumes generated, soil status (pH, salinity, sodicity and nutrient), watertable height and quality, weather data and plant health and nutritional status. All data collected is tracked both on a temporal and spatial basis to ensure fine-tuning to the overall woodlot management practices.

Any anomalies in the data collected can be used as an early warning and problems can be tracked down before they have a major impact. Regular measurement also enables good practice to be identified and improved upon.

As part of the Best Management Practice for wastewater disposal, continuous profile monitoring of soil moisture using EnviroSCAN® or EnviroSMART™ probes enabled BRL Hardy to:

- Allow wastewater to be targeted to the depth of the plant root zone
 - Avoid leaching irrigation events
 - Track the vertical movement of the water through the profile
 - Detect and control deep drainage
- Maximise the rate of water and nutrient uptake by plants
 - Avoid water logging
 - Avoid plant water stress
 - Adjust the upper and lower irrigation thresholds according to the rate of plant water uptake at different times of the growing season
- Meet current EPA standards

This facilitates the detection of any water movement out of the disposal site and enables the rate of water and nutrient uptake by the plants to be maximized.

Figure 1 shows data collected from a site where irrigation events were applied without the use of the EnviroSCAN® data as a scheduling tool. Displayed is a graph showing the soil moisture content within the active tree root zone over time. Each solid blue bar shows the missed opportunities for applying wastewater to the site, where the soil moisture has been allowed to drop below the refill point.

Figure 1

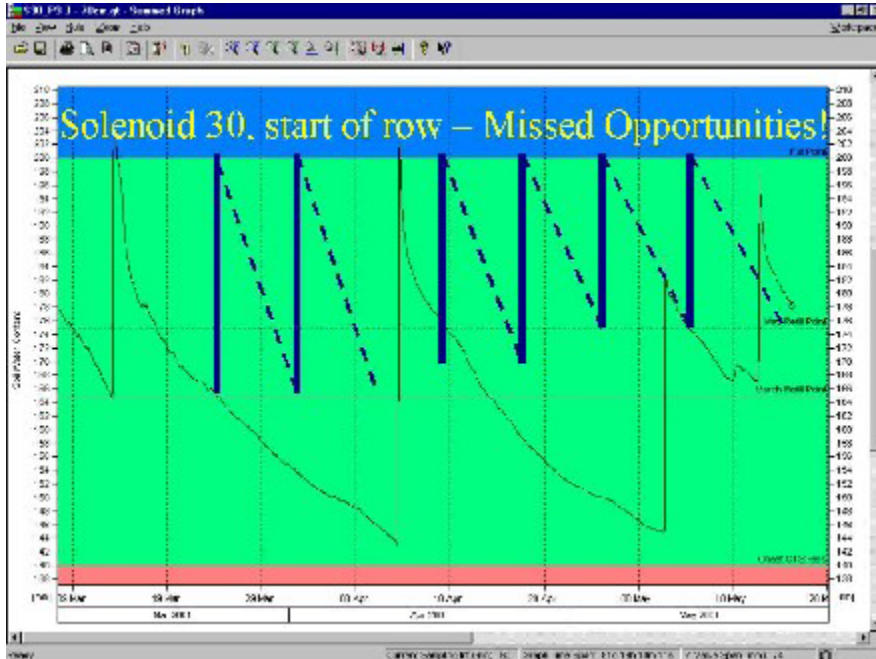
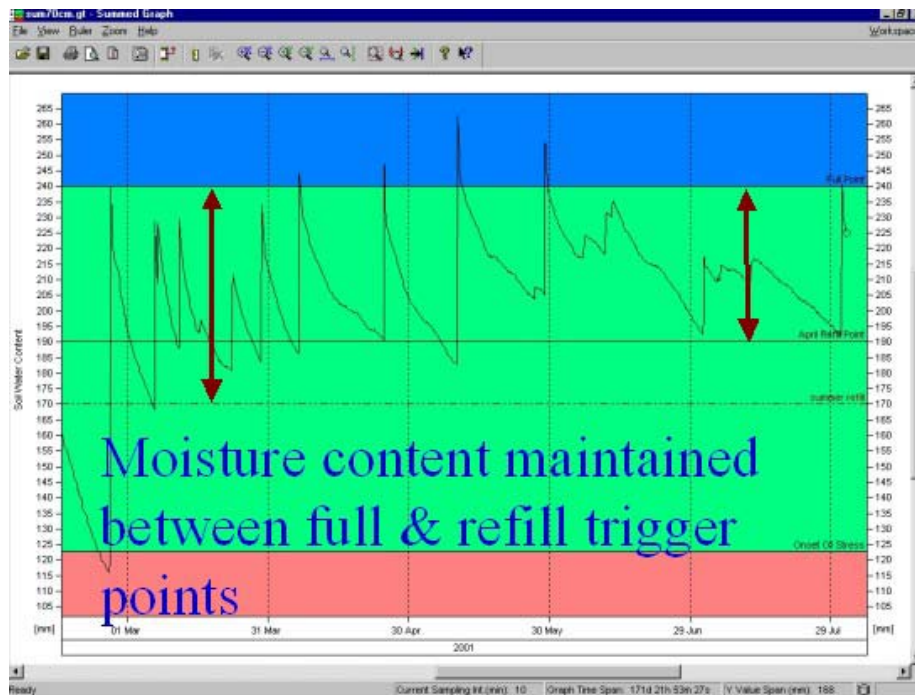


Figure 2 shows a site where the soil moisture is successfully maintained between the full and refill points for the duration of the irrigation period. The data was carefully monitored on a regular basis, and the upper and lower thresholds and other trigger points were adjusted as required. Figure 2 shows how to maximise wastewater application without leaching into the water table.

Figure 2



What Was Achieved

The Best Management Practice Template recognizes the inter-dependence of the many different factors being measured on the success of the woodlot and the importance of taking a holistic approach. Furthering the success of this template, is BRL Hardy's move to employ Sentek to undertake a water balance modeling exercise to determine the true capacity of the woodlot for wastewater disposal and to identify and if present, quantify any drainage below the root zone that may occur.

Key Results

BRL Hardy has demonstrated to both themselves and the EPA that the woodlot is being managed in a sustainable manner, in terms of drainage to groundwater. The adoption of Sentek's soil moisture monitoring technology will enable better irrigation scheduling and utilization of the site and may delay the need to expand the woodlot as the winery's capacity is expanded in response to ongoing market success. The

improvement in irrigation efficiency will help maintain tree health and vigour so that uptake of water and nutrients by the woodlot plantation is optimal and more predictable.

For further information on wastewater management please contact Sentek Sensor Technologies via their web site www.sentek.com.au, email Sentek's Marketing Coordinator, Adrian Manera, amanera@sentek.com.au or freecall 1-800-SENTEK (1-800-736-835).