

Root Zone Drainage under Almonds

The project, *Assessing the Potential for Root Zone Drainage in Almonds* was undertaken to identify and evaluate methodologies for measuring Root Zone Drainage (RZD) volumes that are generated under irrigated almond plantations.

The Department of Primary industries (DPI) was engaged by the Mallee Catchment Management Authority (CMA) to undertake this project with funding provided by the Australian government's National Action plan for Salinity and Water Quality.

Why is this work important?

RZD is a critical input to salinity modelling that underpins the basin salinity management strategy, and hence the protection of the River Murray. Recent studies have identified opportunities to improve the confidence in salinity impact assessments by firming up root zone drainage assumptions utilising information available at a local plantings scale.

Additionally, with drought and low water allocations it is imperative for growers not to waste water by irrigating at the right time and for the right length of time.



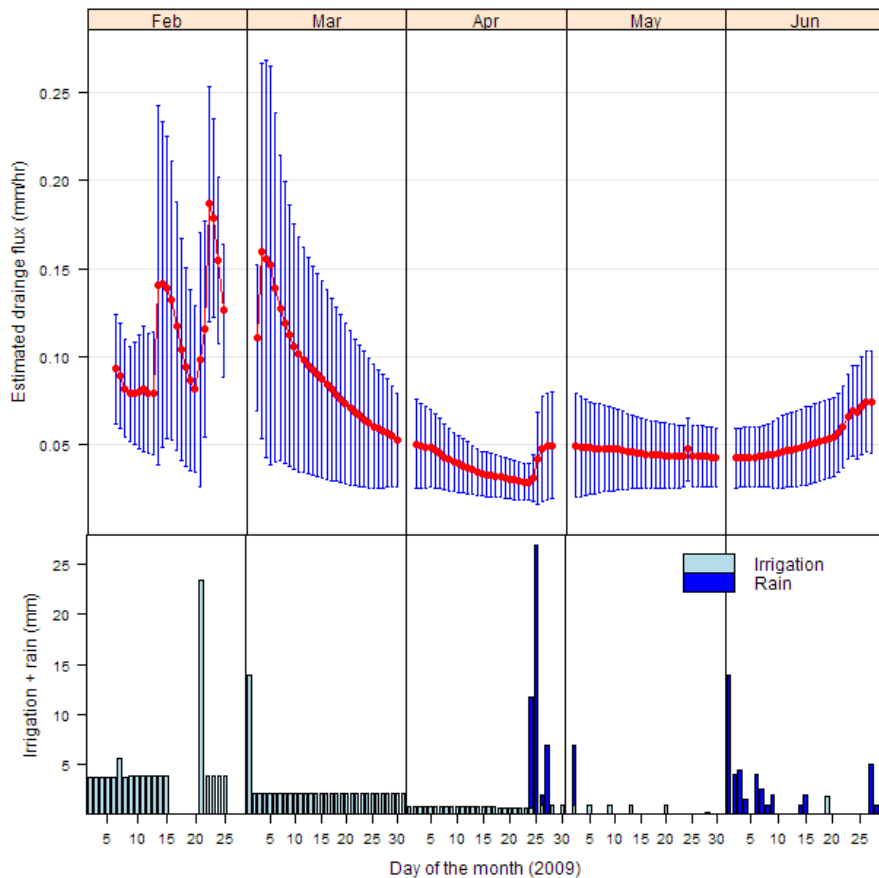
Above: Almonds being irrigated by modern dripper irrigation systems. Photo: Mallee CMA.

Method

A study site was established within a commercial almond plantation being irrigated by drippers at Lake Powell near Robinvale, Victoria. The site comprised 12 plots of almonds with soil moisture monitoring probes (capacitance probes) installed at regular distances from the emitters, capable of monitoring soil moisture content to a depth of 120 cm at 10 cm intervals.

At a glance

- Root zone drainage (RZD) is the amount of water draining past the root zone of crops.
- Excessive amounts of RZD wastes water and causes environmental impacts through salinity.
- RZD is difficult to measure.



Left: Figure 1. Mean daily drainage flux + and - half a standard deviation between 90 and 120 cm for 12 capacitance probes as derived by the estimated gradient method (top) and daily irrigation and rainfall (bottom) at Lake Powell, Victoria 2009.

Soil moisture monitoring data, irrigation applications and weather data were recorded to the 5 months to June 2009. Together with baseline data on soils, this enabled three methods of estimating RZD to be evaluated including the measured gradient method based on Darcy's Law, the modified water balance method and the wetting front detection method that detected the relative change in soil moisture.

Results

The wetting front detection method provided a qualitative assessment of RZD and when compared to the modified water balance method gave consistent results and reasonable agreement in detecting potential drainage events. As both methods are independent being

derived from different data sets they provide greater certainty when used in combination.

The estimated gradient method provided a quantitative method estimate of RZD (figure 1) which was higher when compared to the estimates of RZD produced by the modified water balance method. Of note is the high variability between plots with two plots recording very little drainage while another plot just 60 metres away recording relatively large drainage volumes. A number of uncertainties were identified with the estimated gradient method including the extent of the wetted zone around the drip emitter and soil variability between the soil moisture monitoring probes.

Future Work

Future work could investigate the uncertainties surrounding the estimated gradient method. Soil variability could be more accurately defined by laboratory analysis of soils on each plot and the extent of the 3 dimensional wetted zones around emitters could be investigated with additional capacitance probes.

Acknowledgements

The Mallee CMA and the DPI project team would like to thank Select Harvest for providing the research site.

Further information

The information for this bulletin has been taken from: Assessing the potential for Root Zone Drainage in Almonds – Final Project Report 2008-09. A copy of this report can be downloaded from the Mallee CMA web site: www.malleecma.vic.gov.au

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