

# Feasibility and sustainability of subsurface drip irrigation in pasture production

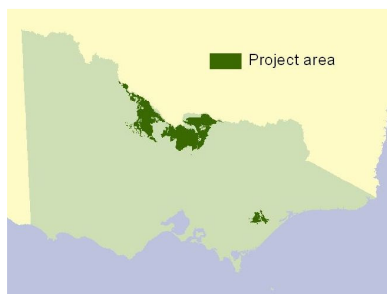
A Sustainable Irrigation Program R&D Project

2006/07

## Background: why this project is important

The Victorian dairy industry uses a significant amount of irrigation water to irrigate pasture. Dairy farmers are reassessing their irrigation practices due to changes in water supply and policy, declining terms of trade and environmental concern. Subsurface drip (SSD) irrigation has potential for use in pasture production on dairy farms. Wood and Finger (2006) showed that sprinkler and SSD can significantly reduce overall water use whilst increasing pasture production, with environmental benefits in terms of reduced surface runoff and deep drainage losses. SSD has advantages over sprinkler irrigation by reducing evaporation loss, with lower operating pressure/energy requirements, and flexibility of design. This allows the tailoring of the SSD system to fit existing vegetation, paddock shapes and layouts, providing another option for areas not suited to border-check or large scale sprinkler irrigation. Another advantage of SSD is that staged installation to match farm cash flow is possible.

Although technically promising, SSD has not been widely adopted due to its cost and lack of knowledge about its performance under grazed conditions. Uncertainty arises in levels of water savings, production benefits and suitable designs for a range of soils. The regional environmental benefits of the adoption of subsurface drip irrigation by the dairy industry, including impacts on regional water balances and water quality, must also be understood. This project will investigate the potential benefits of subsurface drip irrigation, identify situations where its adoption should be encouraged, and ensure that the adoption of the technology is based on sound design and management guidelines.



## Project Objectives

- To assess the practical and economic feasibility of subsurface drip irrigation on dairy farms.
- To evaluate the economic, environmental and social consequences of subsurface drip irrigation on dairy farms at farm and catchment scales.
- To produce information about subsurface drip irrigation on dairy farms for irrigators, irrigation service providers, and irrigation extension and policy programs.



## Approach

The project will gather data from farm based experiments that are investigating the impact of subsurface drip irrigation system design, irrigation scheduling and grazing management on:

- ◆ Pasture production and composition,
- ◆ Water use, water balances, solute movement and water quality
- ◆ Soil structural indicators and
- ◆ Performance and longevity of the SSD system.

The data will be used in farm and catchment scale analysis and modelling.

# Subsurface drip irrigation of pasture

A Sustainable Irrigation Program R&D Project

## The experiment

The experiment is being conducted on two commercial dairy farms, looking at the performance of SSD on a “medium” soil (Byrneside, 2 ha) and a “light” soil (Bunbartha, 1 ha). There are four replicates of six treatments, each a combination of tape spacing and irrigation frequency:

<b>Spacing</b>	0.6 m	1.0 m	1.4 m
<b>Irrigation frequency</b>	Every day (E-R 6 mm)		Every 4 days (E-R 24 mm)

The drip tape is installed at a depth of 0.2 m at both sites. The irrigation infrastructure was installed between August and October 2006, with a perennial ryegrass/white clover pasture sown after the drip tape was installed. Grazing occurs at the same time for all treatments, scheduled to fit around the less frequent irrigation regime, so that no grazing occurs for 48 hours from commencement of a 24 mm irrigation event. Nitrogen will be applied using fertigation after each grazing event, managed similarly across treatments. Additional focussed experiments will be conducted within the main experiment to investigate water quality, pasture striping, water application method and grazing pressure aspects in more detail.

## Measurements

Data will be collected from October 2006 through to June 2009, which covers three irrigation seasons and two winter periods. The measurements include:

- water balance (applied water, rainfall, runoff, estimated evapotranspiration, drainage and change in soil water storage)
- pasture measurements (dry matter removal, botanical composition and pasture water stress)
- soil properties
- water quality
- grazing impact, and
- irrigation performance.

## Results, implications and benefits

At the end of the project dairy farmers, scientists and catchment managers will have a better understanding of the role for subsurface drip irrigation on dairy farms and how the technology fits within the suite of available efficient irrigation technologies. Realistic estimates of likely production benefits, water savings and potential environmental benefits (in terms of water and water quality management) will help guide private investment with appropriate support from resource management agencies.

## Contact

Lucy Finger (Principal Investigator & Project Manager)  
Primary Industries Research Victoria,  
DPI Tatura Centre, 255 Ferguson Road, Tatura, VIC, 3616.  
Phone : (03) 5833 5324  
Email: [lucy.finger@dpi.vic.gov.au](mailto:lucy.finger@dpi.vic.gov.au)

Published by: Department of Primary Industries  
Primary Industries Research Victoria  
Tatura, Victoria, Australia  
December, 2006

© The State of Victoria, 2006  
This publication is copyright. No part may be reproduced by any process except in accordance with the provisions of the *Copyright Act 1968*.

### Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

For more information about DPI visit the website at [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) or call the Customer Service Centre on 136 186.