

Healthy Rivers, Healthy Communities
Presenting current research in the Goulburn Broken Catchment

Matching water application to water use to maximize production and quality of Pink Lady apple in the Goulburn Valley

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Abstract:

This collaborative project, funded by the Centre for Water and Landscape Management, forms linkages and expands the scope of currently funded projects of the Department of Primary Industries (DPI), Tatura in the GBCMA. The project will test the hypothesis that tree water use is a function of canopy cover by measuring apple transpiration using sap flow technology and relating this to canopy interception of photosynthetically active radiation (PAR). The project will also assess sap flow as a tool to measure water stress for irrigation scheduling.

The project commenced in July 2004, with an experimental site established in the Mt Major Orchard, Dookie Estate. Five irrigation treatments have been implemented in Pink Lady/M26 rootstock trained on central leader trellis. Control treatment irrigation is applied to meet estimated crop evapotranspiration (ETc). Two treatments are applied less than ETc (67% and 47% ETc) and two applied greater than ETc (137% and 177% ETc). Sap flow sensors were installed prior to bud burst to continuously measure tree transpiration. Weekly measures of canopy PAR interception and leaf conductance are currently being made. Diurnal changes in trunk diameter in combination with weekly stem water potential will provide data to estimate the onset of water stress. Preliminary data from this field experiment will be presented and discussed.

Key Findings:

- Apple tree transpiration rate increases with leaf area development after bud burst and with evaporative demand.

Implications:

- More appropriate crop coefficients based on simple estimates of canopy cover for apples.
- An approximate 20% increase in water use efficiency (yield per unit of applied irrigation) in micro-irrigated apples.

Additional benefits of this collaborative project are:

- Reallocation of water to new vineyard developments or the environment.
- Reduced leakage and associated environmental impacts.
- Improved capability to use RDI.
- Minimal yield loss during droughts.
- Demonstrable best-practice water management credentials for the industry.

Summary:

- A field experiment has been established in an apple orchard to test hypothesis that tree water use is a function of canopy PAR interception.

Further Reading:

- Goodwin, I. and O'Connell, M. (2004) Crop water requirements of fruit trees. Irrigation Australia 2004 - Conference & Exhibition, Adelaide, South Australia 11–13 May 2004. CD Rom.
- Goodwin (2004) Peach tree water use. Doctoral thesis, The University of Melbourne, Victoria.