Reducing the impact of late season rainfall

Fruit water uptake

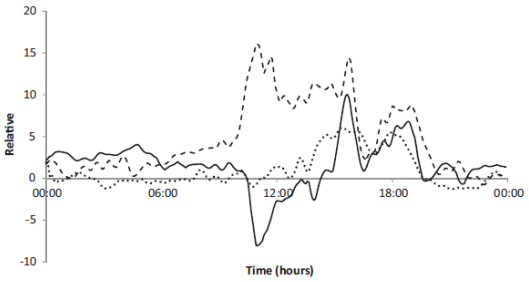
Reducing the impact of late season rainfall is not an easy task. The frequency and intensity of late season rainfall is unpredictable, but ongoing research aims to generate important results that will be directly applicable to orchard practice. Several techniques have been validated in the management of fruit cracking and this project (2013 – 2016) hopes to provide further information with which to improve fruit integrity, and consequently fruit quality. The research aims of the project are to reduce crop damage and the impact of late season rainfall by:

1. Reducing the impact of rapid water uptake to fruit following rainfall
2. Building fruit resilience through orchard practices before rainfall

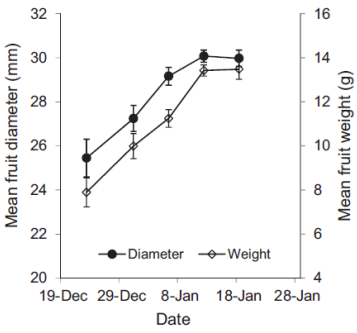
Reducing the impact of rapid water uptake to fruit following rainfall

Water uptake patterns change following a rainfall event due to changes in atmospheric conditions. Much research to date has focused on whole tree water uptake, but the added component of fruit within a tree system is not as well understood.

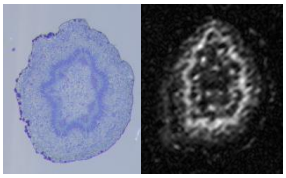
It is already known that internally supplied water can result in increased side cracking but not known is the daily fluctuations in water uptake or the functionality of the fruit stem (pedicel) over the duration of fruit development. Understanding water uptake in fruit and functionality of the pedicel will help develop options for managing water uptake.



Sap flow in and out of fruit on three different days experiencing different weather (positive = into fruit, negative = out of fruit)



Mean (n = 30) fruit diameter and weight during the five weeks prior to harvest



Microscopic and NMR images showing functional stem components.

In this project heat girdling to disable stem phloem was completed during later stages of fruit development at two sites and sap flow, diurnal fruit diameter changes and stem morphology data were collected. Fruit at all stages of growth experienced fluctuating diameter changes, with fruit at Stage II of growth experiencing the greatest amplitude, despite a negligible net growth. Nuclear magnetic resonance imagery (NMRI) and microscopic imagery found that stems remained functional (able to carry water in the xylem and the phloem) throughout the entire growing period. This is particularly important when considering water pathways with the potential for manipulation in order to reduce rapid influx following rainfall. This result implies that rainfall during the ripening period has the potential to cause cracking. Fruit develop a strong demand for water as maturity increases, and this is not negated by any loss of function of the stem.

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