

# Manipulating nutrition to improve fruit quality and shelf life



This project studies the influence of nutrient and water use efficiency on cherry trees through fertigation to facilitate the consistent production of high quality fruit with longer shelf life. The project will investigate the effect of water stress and surplus water on nitrogen (N) uptake, the effect of N delivered by fertigation treatments on tree and fruit nutrition, and N storage and seasonal transport within the tree. Fruit nutrition and quality data has been collected for the 2011/12 season and is currently being analysed.

## Sweet cherry nutrition

### Background

Fertiliser management is key for optimum balance between vegetative and reproductive growth which supports fruit set and growth. Deciduous fruit trees accumulate and store nutrients at the end of the growing season for remobilisation the following spring, supporting the first growth of the season.

N is one of the key macro nutrients and is needed most where plant growth is actively occurring, especially in those processes involving cell division. Studies have shown that there are several effects of N deficiency in cherries, starting with fewer flower buds being produced and resulting in smaller fruits which are more highly coloured and mature earlier. In addition, applications of N in late spring and summer are too late for the cell division phase of fruit growth and tend only to stimulate additional vegetative growth.

Detrimental effects of excessive N levels include a delay in fruit maturity and decreased red colouration on the fruit, and either increase or decrease of cherry firmness indirectly due to either increasing cherry size or delayed maturity.

### Desired outcomes from fertigation research

Precision farming through fertigation can facilitate efficient utilization of resources and improve returns per unit area and time to growers. Fertigation delivers both water and essential nutrients such as N, directly to the active root zone of growing crops through micro irrigation systems, thereby minimising water and nutrient loss and improving productivity. Whilst fertigation is commonly practised by cherry growers in Australia, research and management guidelines for optimal supply of tree nutrient requirements are limited.

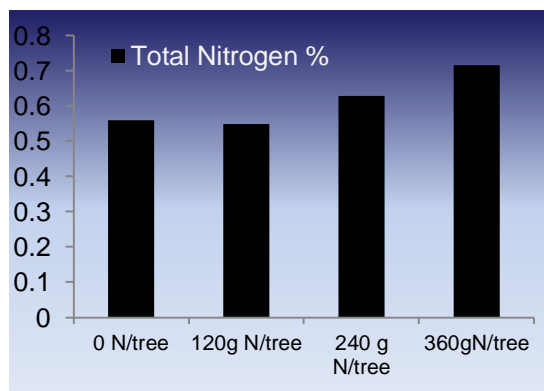
Through this research, this project aims to develop fertigation guidelines for growers to optimise whole tree nutrition and fertiliser management in order to increase orchard productivity and sustainability.

### Methods

This project will use precision fertigation and irrigation methods to deliver N at varying rates across a range of irrigation scenarios (from stress to surplus water) to investigate the influence of N on cherry fruit quality and shelf life over three seasons. The fruit is picked at the same time as commercial fruit, and fruit quality features including size, firmness, colour, stem pull force, brix, and acids are assessed at the TIA Newtown laboratories immediately after harvest and at 25 and 50 days post harvest.

### Results

With one season's nutrition data collected, there is strong evidence for N transport in cherry trees to fruit under varying N treatments. But what does this mean for fruit quality and shelf life? Fruit quality data is currently being analysed and will be reported in the near future.



**Figure 1:** Percentage total nitrogen content of cherry fruit after fertigation in the 2011/12 season

### Summary of Key Messages

- Strong evidence of N uptake by tree and transport into fruit at varying rates of applied N
- Analysis currently being completed on the influence of N content on fruit quality & shelf life

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