

The Importance of Irrigation to Growers



In depth interviews with 110 irrigators across the South East of England have shown that:

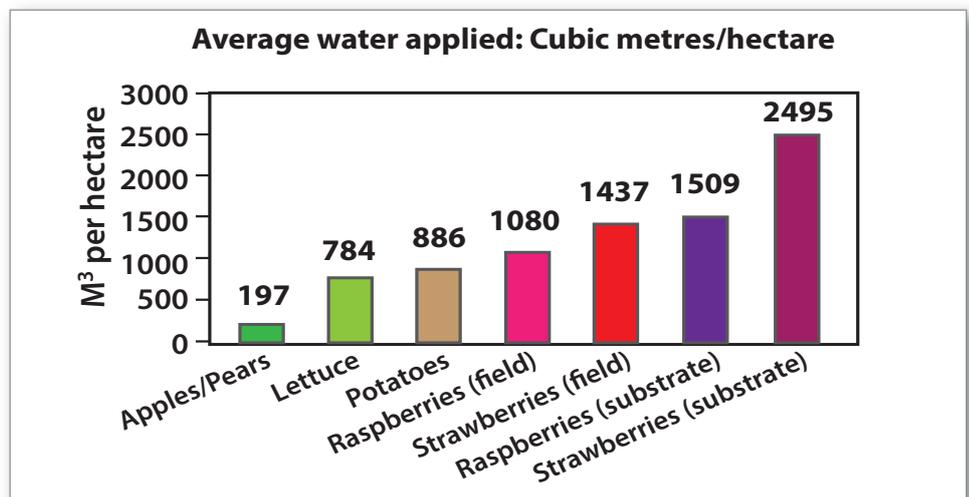
- Over 70% of growers regard irrigation as 'Crucially Important' to their business
- There is typically a 2 to 4 fold difference in water use efficiency between growers
- There is strong correlation between optimising irrigation water use and financial returns

apples

Irrigation Water Use in Apples

Irrigated tree fruit uses considerably less water per hectare than other main irrigated crops. On average, apple and pear growers used 197 cubic metres of water per hectare compared with around 800 to 900 cubic metres for lettuce and potatoes, and between 1100 and 1400 cubic metres for field raspberries and strawberries. This is partly

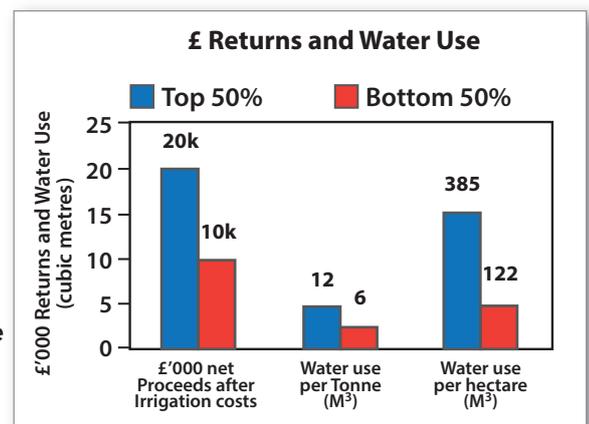
because fruit trees have extensive, deep root systems which are able to access rainfall and ground water reserves. However, the low water use also reflects the fact that one of the main drivers for using irrigation in the tree fruit sector is to ensure that the crop produced meets retailer fruit size, uniformity and quality requirements.



Apple Water Use Efficiency and Financial Returns

On average, apple irrigators used 6 cubic metres of irrigation water per tonne of crop produced. However, there was nearly a 4 fold difference in water productivity between growers, ranging on average from 3 to 11 cubic metres of water per tonne.

- The Top 50% of apple growers in terms of financial returns achieved net proceeds after irrigation costs of £20,000 per hectare on average compared with £10,000 per hectare for other growers
- On average, the Top 50% of growers used twice as much water per tonne than other growers, and also applied three times more water per hectare. Their achieved average yields of 31 tonnes per hectare were 55% higher than other growers. This may reflect other factors such as tree density, but it also suggests that for tree fruit growers, optimising irrigation timing and duration is more important than water use efficiency per se, in maximising returns
- The importance of irrigation in helping growers to optimise fruit size and quality is also reflected in the fact that on average the Top 50% of growers achieved crop selling prices that were 34% higher than other producers



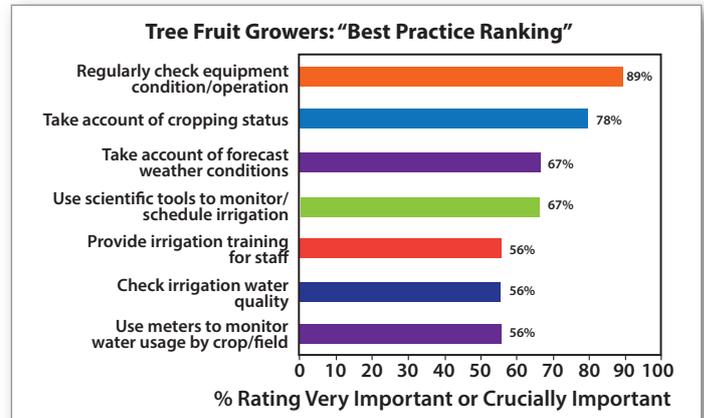
Irrigation Best Practice: Grower Perspectives

For tree fruit growers, the importance of irrigation scheduling and timing to optimise fruit size and quality is reflected in the fact that over three quarters of growers ranked 'taking account of cropping status' as 'very important' or 'crucially important'. Likewise, two thirds rated 'taking account of weather conditions' and 'using scientific tools to monitor soil moisture content and schedule irrigation' as similarly important. Amongst leading growers there was extensive use of soil probes, local weather stations and specialist advice to optimise scheduling. However, growers also mentioned the need for better integration of these different scheduling technologies and

systems, as well as more crop specific advice and 'hands on' support.

The need to regularly check irrigation equipment condition and operation was also ranked as 'very' or 'crucially important' by the large majority of growers. Many growers mentioned the importance of using the latest application systems and undertaking regular monitoring and servicing to avoid costly equipment malfunction. Similarly, for the

majority of growers, providing up-to-date training for irrigation staff is a key requirement in ensuring optimal scheduling and operational performance.



Optimising Water Use in Apples – Latest Research Findings

The recent shift towards more intensive fruit tree orchards, implies that the sector is becoming increasingly reliant on irrigation to deliver the fruit size and quality demanded by retailers and consumers. However, research funded by AHDB and carried out in intensive Gala/M.9 and Braeburn/M.9 orchards at EMR has shown that irrigation may not always be necessary in years when sufficient rainfall occurs at regular intervals throughout the cropping season. Nevertheless, to ensure consistency of yields of Grade I fruit in successive cropping seasons, drip irrigation is essential to avoid soil moisture deficits that limit fruit expansion.

A key output of our research has been the identification of the range of soil water availabilities over which Grade 1 yields, fruit quality and storage potential are optimised. Sensors that

measure changes in soil moisture availability at different rooting depths have been used in experiments to trigger irrigation automatically, so that soil water availability is optimised, whilst leaching of water and nutrients is minimised. This information can now be accessed remotely using an App developed for smartphones which provides alerts to tree fruit growers of the need to irrigate.

The automated precision irrigation system can also be used to apply deficit irrigation during specific crop development stages, in an attempt to improve aspects of fruit quality, without reducing fruit size. The challenge now is to incorporate environmental metrics and weather probability forecasting into a grower-facing irrigation decision support system. This will enable soil water availability to be

optimised during specific cropping stages in changeable weather by making the most effective use of rainfall.

Summary

Irrigation is complex and time consuming. Maximising returns requires optimisation of many variables, in particular soil moisture monitoring, irrigation frequency and duration. In the tree fruit sector, optimal scheduling is critical in ensuring fruit size and quality. As one tree fruit grower put it:

"The main purpose of irrigation in tree fruit is to meet supermarket requirements for produce uniformity. My irrigation system paid for itself within one year."

This factsheet highlights the specific irrigation performance of apple growers participating in the WATERR Project 'Irrigation Business Review' interviews and covers 15 irrigated crops over the period 2011 to 2013.

The WATERR project is part-funded by the European Regional Development Fund as part of the South East ERDF Competitiveness Programme 2007-2013. It is being led by East Malling Research and is supported by their partners, the Environment Agency and Kent County Council

