## The Importance of Irrigation to Growers

In depth interviews with 110 irrigators across the South East of England have shown that:
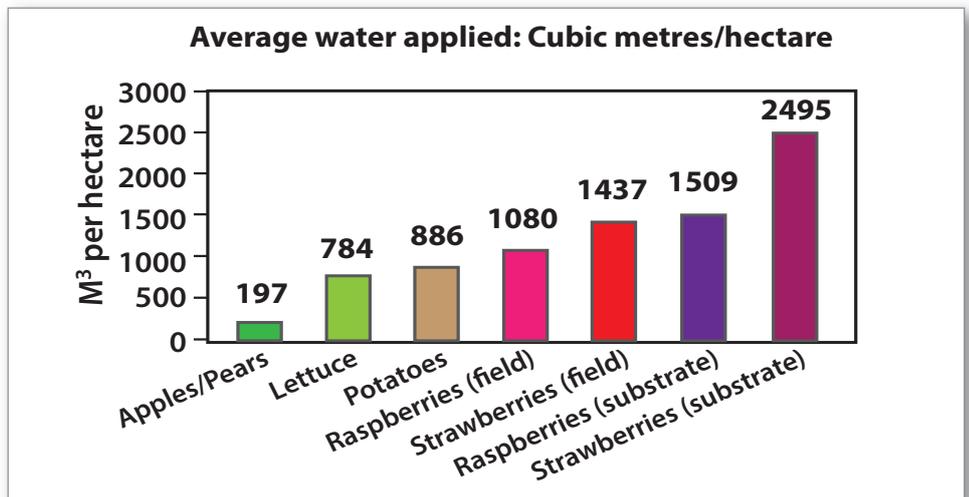
- Over 70% of growers regard irrigation as 'Crucially Important' to their business

- 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

## pears

### Irrigation Water Use in Pears

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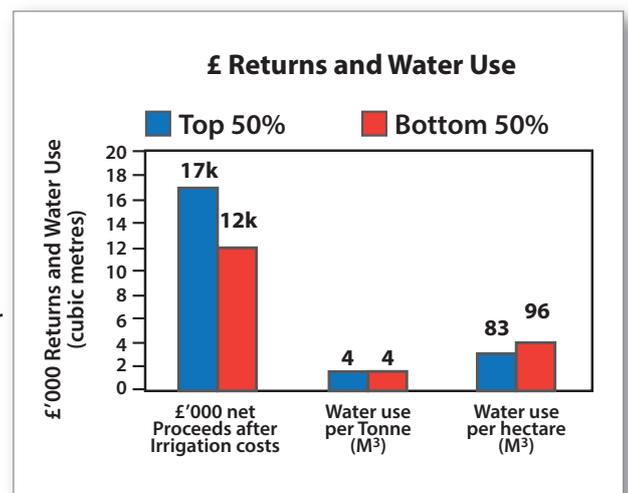nd strawberries. This is partly because fruit trees have extensive, deep root systems which are able to access rainfall and ground water reserves. However, the low water use also reflects the fact that one of the main drivers for using irrigation in the tree fruit sector is to ensure that the crop produced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

**Average water applied: Cubic metres/hectare**



| Crop | M³ per hectare |
|---|---|
| Apples/Pears | 197 |
| Lettuce | 784 |
| Potatoes | 886 |
| Raspberries (field) | 1080 |
| Strawberries (field) | 1437 |
| Raspberries (substrate) | 1509 |
| Strawberries (substrate) | 2495 |

## Pear Water Use Efficiency and Financial Returns

On average, pear producers used 4 cubic metres of irrigation water per tonne produced, with usage ranging from 1 to 7 cubic metres per tonne.

- The Top 50% of producers in terms of financial returns achieved net proceeds after irrigation costs of £17,000 per hectare on average, compared with £12,000 per hectare for other growers

- On average, there was little difference in yields between the Top and Bottom 50% of growers, with overall average yields of 23 and 22 tonnes respectively. Likewise, both groups used similar amounts of water per tonne and per hectare

- However, the importance of irrigation scheduling and timing in helping growers to optimise fruit size and quality is reflected in the fact that on average the Top 50 % of growers achieved crop selling prices that were 34% higher than other producers

**£ Returns and Water Use**



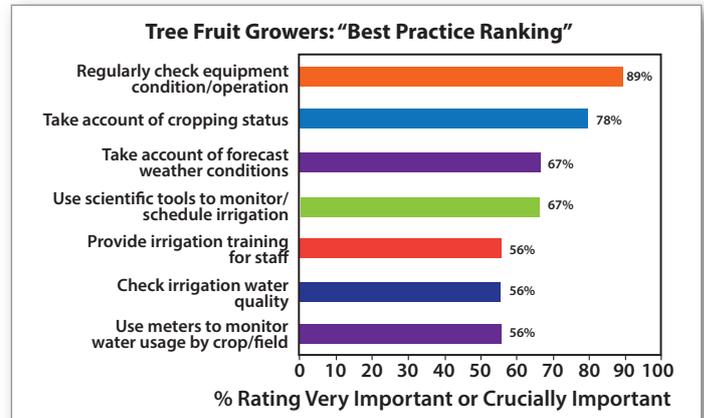| | Top 50% | Bottom 50% |
|---|---|---|
| £'000 net Proceeds after Irrigation costs | 17k | 12k |
| Water use per Tonne (M³) | 4 | 4 |
| Water use per hectare (M³) | 83 | 96 |

## 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.

**Tree Fruit Growers: "Best Practice Ranking"**

| Category | % |
|---|---|
| Regularly check equipment condition/operation | 89% |
| Take account of cropping status | 78% |
| Take account of forecast weather conditions | 67% |
| Use scientific tools to monitor/schedule irrigation | 67% |
| Provide irrigation training for staff | 56% |
| Check irrigation water quality | 56% |
| Use meters to monitor water usage by crop/field | 56% |

**% Rating Very Important or Crucially Important**

## Optimising Water Use in Pears – Latest Research Findings

Many pear growers use irrigation to maintain soil moisture around field capacity throughout much of the cropping season, since mild or severe soil moisture deficits can limit rates of fruit expansion, and pear is more susceptible than apple. However, this approach can lead to significant leaching of water and fertilisers and any rain that falls within the cropping season is not utilised effectively.

Research funded by the AHDB in the East Malling Concept Pear Orchard at EMR aimed to identify the range of soil water availabilities over which fruit size and quality attributes were optimised. The extent of soil drying that limited fruit expansion was identified and used to develop and test an Irrigation Test Regime (ITR). Water savings of up to 70% were achieved compared to commercial control values, and fruit size, quality attributes and storage potential were unaffected. Importantly, there were no effects on return bloom in subsequent years. Soil moisture probes, dataloggers with telemetry and an App for smartphones are now being used to deploy and test the ITR in commercial trials funded by a major retailer and a leading tree fruit Producer Organisation. So far, water savings of 50% have been achieved, without detriment to fruit size, quality, storage potential or return bloom.

Work in 2016 will focus on the application of Regulated Deficit Irrigation to try to improve aspects of fruit quality in commercial pear production. 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 pear growers participating in the WATERR Project 'Irrigation Business Review' interviews and covers 9 irrigated crops over the period 2011 to 2013.*

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