New Project

TF 210

Deriving irrigation set points to improve water use efficiency, fruit quality and sustainability of irrigated high-intensity apple and sweet cherry orchards

Project Number:	TF 210
Project Title:	Deriving irrigation set points to improve water use efficiency, fruit quality and sustainability of irrigated high-intensity apple and sweet cherry orchards
Project Leader:	Dr Mark A. Else
Contractor:	East Malling Research
Industry Representative:	Mr Tim Biddlecombe – FAST Mr Mark Holden
Start Date:	01 April 2013
End Date:	31 March 2016
Project Cost:	£96,294

Project Summary:

Recent droughts, particularly affecting the southeast and east regions have highlighted the need for growers to use water more efficiently. Increases in agricultural water demand in the 2050s in England and Wales range from 25% to 180% of current demand. The challenge is to put in place measures that improve irrigation water use efficiency, especially in areas of water vulnerability. Irrigation of high-intensity orchards is needed to optimise productivity and quality but improved guidelines must be developed as the impacts of climate change alter evaporative demand and summer water availability. Changes in legislation mean that from 2013, drip irrigators will no longer be exempt from abstraction licencing and will have to demonstrate an efficient use of irrigation water. A new water-saving irrigation test regime (ITR) has been developed for high-intensity pear production in TF 198. Water savings of over 50% have been achieved, compared to commercial controls, and yields and quality of marketable fruit have been maintained.

The Tree Fruit Panel has identified a need to develop targeted irrigation strategies to optimise water use efficiency, yields and fruit quality for other high-intensity tree fruit crops. Scientifically-derived irrigation guidelines will be developed that match demand with supply for 'Gala/M.9', 'Braeburn'/M.9, 'Merchant'/Gisela 5 and 'Kordia'/Gisela 5. Soil matric midday stem water potentials that slow extension growth without reducing fruit size or quality will also be identified. The effects of irrigation scheduling on shoot extension, fruit yields and quality will be determined and

compared to unscheduled commercial and non-irrigated controls. The proposed research will provide guidelines to optimise water (and fertiliser) use efficiency in high-intensity apple and sweet cherry orchards on a range of different soil types. The project will also help to secure the continued involvement of the team of scientists in RECP with expert knowledge of tree fruit physiology

Aims & Objectives:

(i) Project aim(s):

1) To optimise water use efficiency in high-intensity tree fruit growing systems at EMR
2) To improve profitability and sustainability of irrigated apple and sweet cherry production

(ii) Project objective(s):

1) To develop irrigation set points based on soil matric potentials for 'Gala/M.9' and 'Braeburn'/M.9, and 'Merchant'/Gisela 5 and 'Kordia'/Gisela 5
2) To schedule irrigation to improve irrigation water use efficiency in high intensity apple and sweet cherry orchards
3) To determine the effects of the irrigation regimes on components of fruit quality
4) To devise water-saving irrigation strategies for high-intensity orchards
5) To communicate the results to the industry

The successful completion of all objectives is essential to achieve the overall project aim

The project team's experiences in TF 198, TF/SF 45 (CSA 4116/HL0109L), SF 107, SF 118, SF 83, SF 136 and Defra WU0115 will help to ensure that all objectives are met in full

Benefits to industry

- Irrigation guidelines to optimise water use efficiency in high-intensity apple and sweet cherry orchards on a range of soil type used for tree fruit growing
- Increased awareness of the effects of scheduled, unscheduled and no irrigation on canopy growth and fruit quality
- Reduced water usage by up to 40% (compliance with legislation, maintenance/expansion of current production despite increasingly limited and expensive water supplies)
- Improved sustainability (more efficient use of water, lower production costs)

- Reduced environmental impact (lower abstraction rates, reduced nutrient leaching)
- Improved fruit flavour (less dilution of essential flavour compounds)
- Greater resource use efficiency to enable sustainable intensification despite limited freshwater supplies

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