

SF23000

Smart Sensing Technologies for Precision Crop Load Management in Australian Summerfruit Orchards

Smart sensing technologies are currently being evaluated (Project SF23000 - Precision Summerfruit Orchards) in measuring fruit and tree parameters. The primary objective of this assessment is to determine technologies that enhance outturn, production and labour efficiency.

OVERVIEW

The level of uniformity in tree size, fruit number, fruit diameter and fruit colour is being investigated within blocks of commercial Summerfruit crops (peach, nectarine, apricot and plum) in key growing regions (Sunraysia, Murray Valley, Goulburn Valley) of Australia. Pre-harvest and harvest scans of orchards using precision sensing technologies, enable real-time data collection on production uniformity, canopy characteristics, and provide agronomic insights for improved orchard management.

A survey was conducted on state-of-the-art commercially available smart technologies that use contact, proximal and remote approaches to measure canopy metrics and fruit and flower parameters.

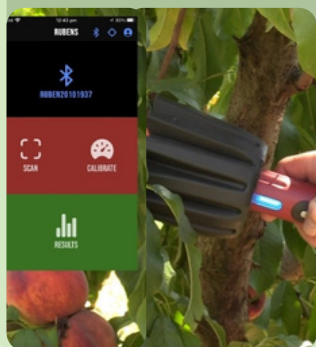
The sensing technology being evaluated in project SF23000 includes mobile ground-based Cartographer (Green Atlas), drone (Outfield Technologies Orchard Management Platform) and smartphone APPs (Aerobotics, Hectre, Croptracker, DataLogger paired with Bluetooth digital calipers).

TECHNOLOGY



RUBENS SENSOR AND APP

For measuring fruit sweetness, firmness and maturity



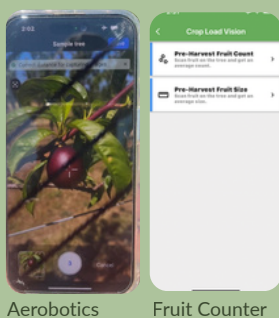
OUTFIELD TECHNOLOGIES PLATFORM

Utilising drone for aerial sensing of tree size and fruit number



FRUIT COUNTING APPS

Using smartphone to scan



Aerobotics

Fruit Counter



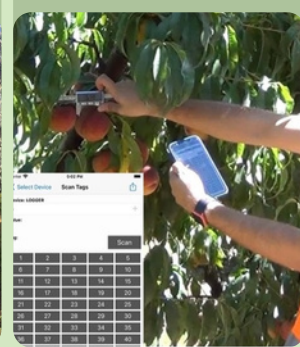
GREEN ATLAS CARTOGRAPHER

Using sensors to scan blossom load



DIGITAL BLUETOOTH CALLIPERS

With DataLogger app for fruit size



TECH COMPARISONS AND ASSESSMENTS

The following tables show sensing technology for fruit and tree parameters in relation to detection and data capture for flowers, fruit number, fruit size, fruit colour, tree size and yield forecasting. The tables have been grouped into three categories: handheld, proximal and remote sensing. Each table provides a list products and their sensor type, what they measure, sample size, and an overall rating – a precision agriculture score (P-Ag Score). Technologies were evaluated according to: data type captured, sample size, accuracy and resolution, cost, skill requirements, data integration, compatibility with existing farm management decision support software, tech support.

HANDHELD SENSORS: DIRECT PHYSICAL CONTACT WITH FRUIT OR TREE

1

Sensor	Scale	Sample size	Parameter	P-Ag Score (1-10)	Product
Bluetooth calliper	Fruit, Tree	Small	Fruit size, Trunk size	3	iGaging OriginCal Syntek Maxigear Mitutoyo U-Wave
Bluetooth colourimeter	Fruit	Small	Fruit colour	5	Rubens Technologies
Bluetooth spectrometer	Fruit	Small	Fruit maturity Fruit sweetness	5	Rubens Technologies

PROXIMAL SENSORS: SENSE FRUIT OR TREE INFORMATION IN CLOSE RANGE

2

Sensor	Scale	Sample size	Parameter	P-Ag Score (1-10)	Product
<i>Handheld</i>					
Smartphone	Fruit, Tree	Medium	Fruit number, Fruit size, Fruit colour, Tree size, Yield forecast	5 – 7	Aerobotics Croptacker Hectre Agerpoint Petiole Pro™ FruitScout SoYield PixFruit
<i>Terrestrial (e.g., ATV, tractor)</i>					
Camera, LiDAR	Blossom, Fruit, Tree	High	Blossom load, Fruit number, Fruit size, Fruit colour, Tree size	6 – 10	Green Atlas Cartographer Revolute Systems RevScout Fruitometry Intelligent Fruit Vision Aurea TreeScout Vivid machines Orion FruitMaps Bitwise GreenView FruitCast

REMOTE SENSORS: SENSE FRUIT OR TREE INFORMATION AT A DISTANCE

3

Sensor	Scale	Sample size	Parameter	P-Ag Score (1-10)	Product
<i>Drone, aircraft</i>					
Camera	Fruit, Tree	High	Fruit number, Fruit size, Tree size	5 – 8	Outfield Technologies Sentra Aerobotics
<i>Satellite</i>					
Camera	Tree	High	Tree size	5	Ceres Imaging
Multispectral camera	Field	High	Yield forecast	3	Australian Tree Crop Map

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