



Department of
Primary Industries

Hort
Innovation



Australian Government
Department of Agriculture

Remote Sensing - the Sky is the Limit

Multi-scale monitoring tools for managing Australian tree
crops – Phase 2 (olive)

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AARSC
Applied Agricultural
Remote Sensing Centre



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



AUSTRALIAN OLIVE
ASSOCIATION

Multi-scale monitoring tools for managing Australian tree crops – Phase 1



Multi-scale monitoring tools for managing Australian tree crops - Phase 2 (olive)

- NSW DPI coordinate olive component
- Evaluate remote sensing technology
Andrew Robson (AARSC UNE)
- Dry matter estimation and time of harvest, fruit maps
Kerry Walsh (CQU)
- Australian tree crop rapid response map
Craig Shephard (QLD DES)

Evaluate remote sensing technology



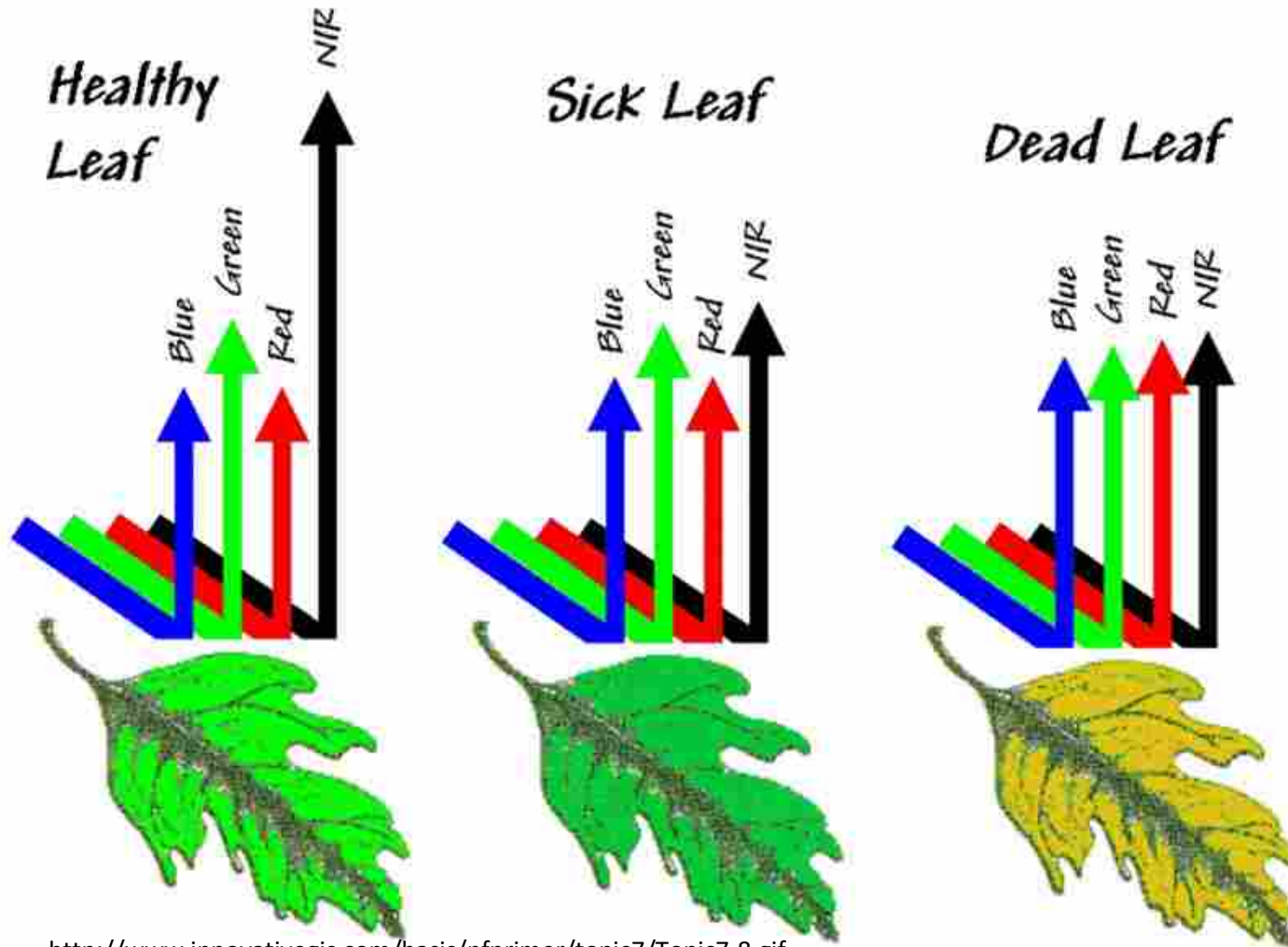
Satellite



Airborne Sensors



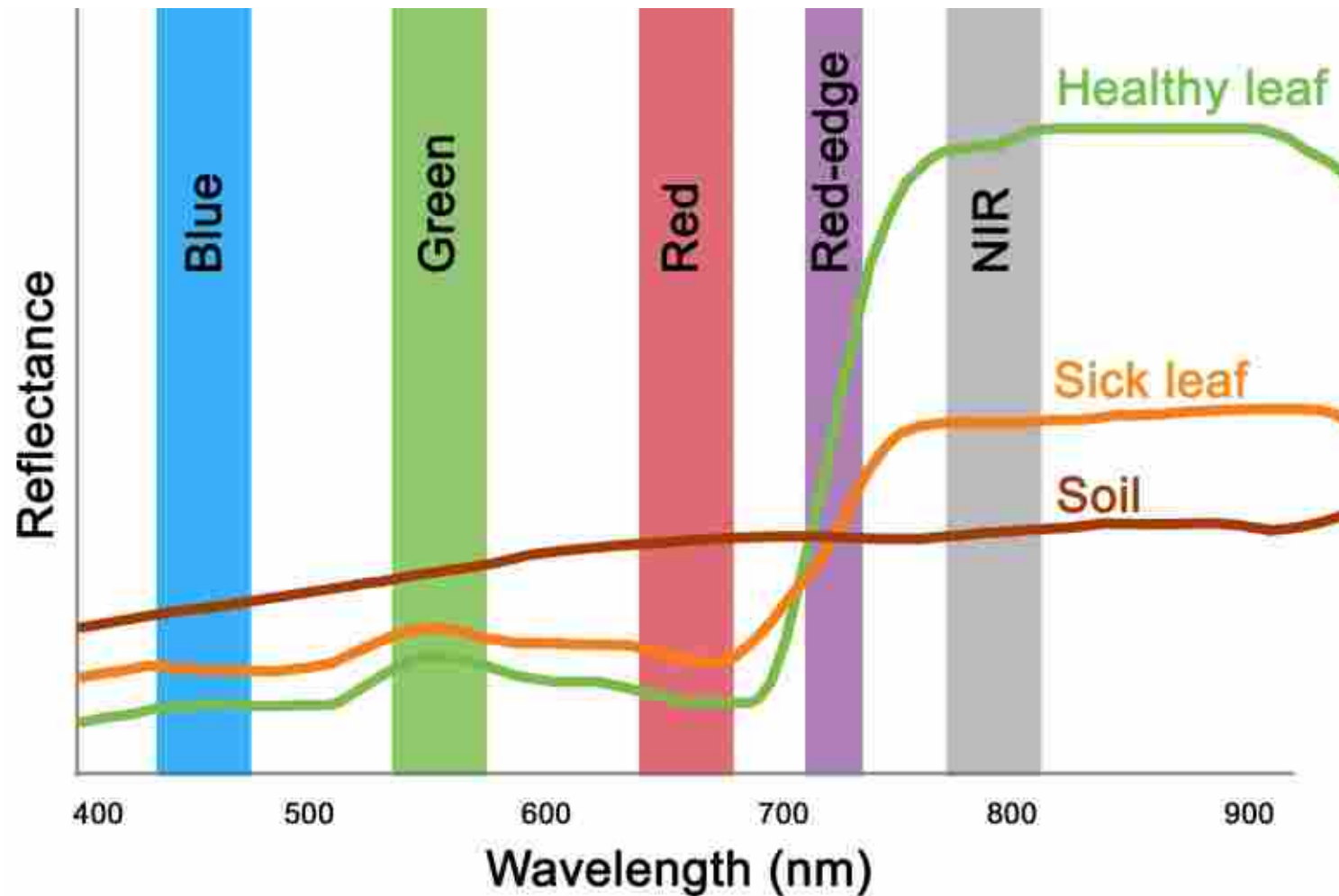
Understand what sensors measure



<http://www.innovativegis.com/basis/pfprimer/topic7/Topic7-8.gif>

Normalized Difference Vegetation Index (NDVI): is a good indicator of plant/ tree vigour (size and health). However, other vegetation indices may be better correlated to the parameters of interest.

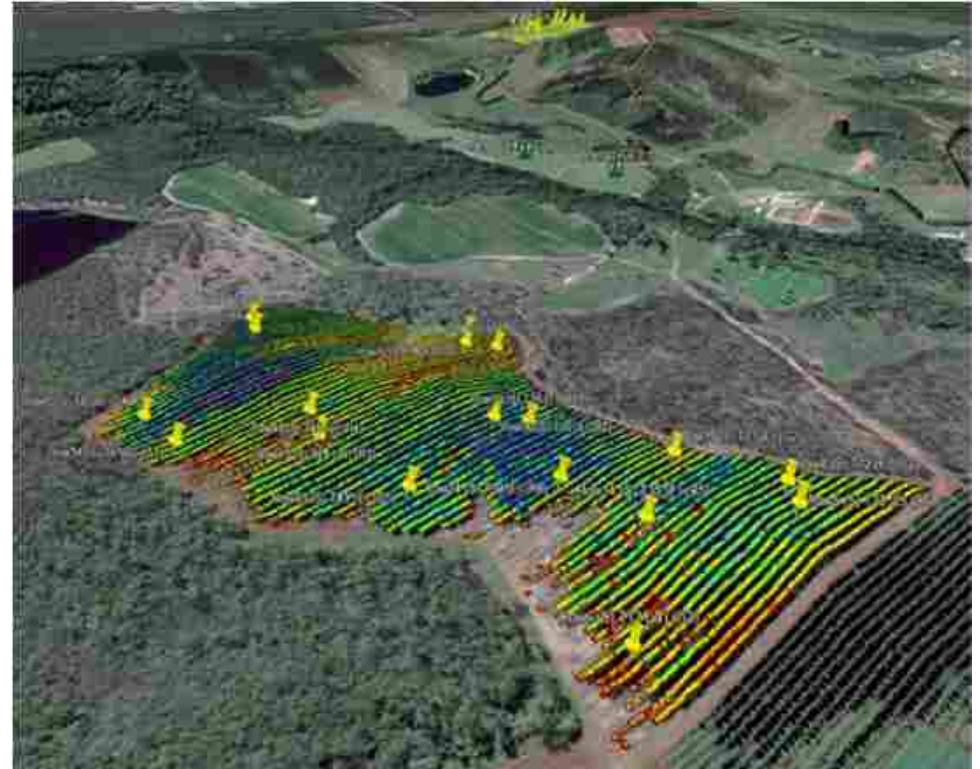
Understand what sensors measure



Spatial resolution

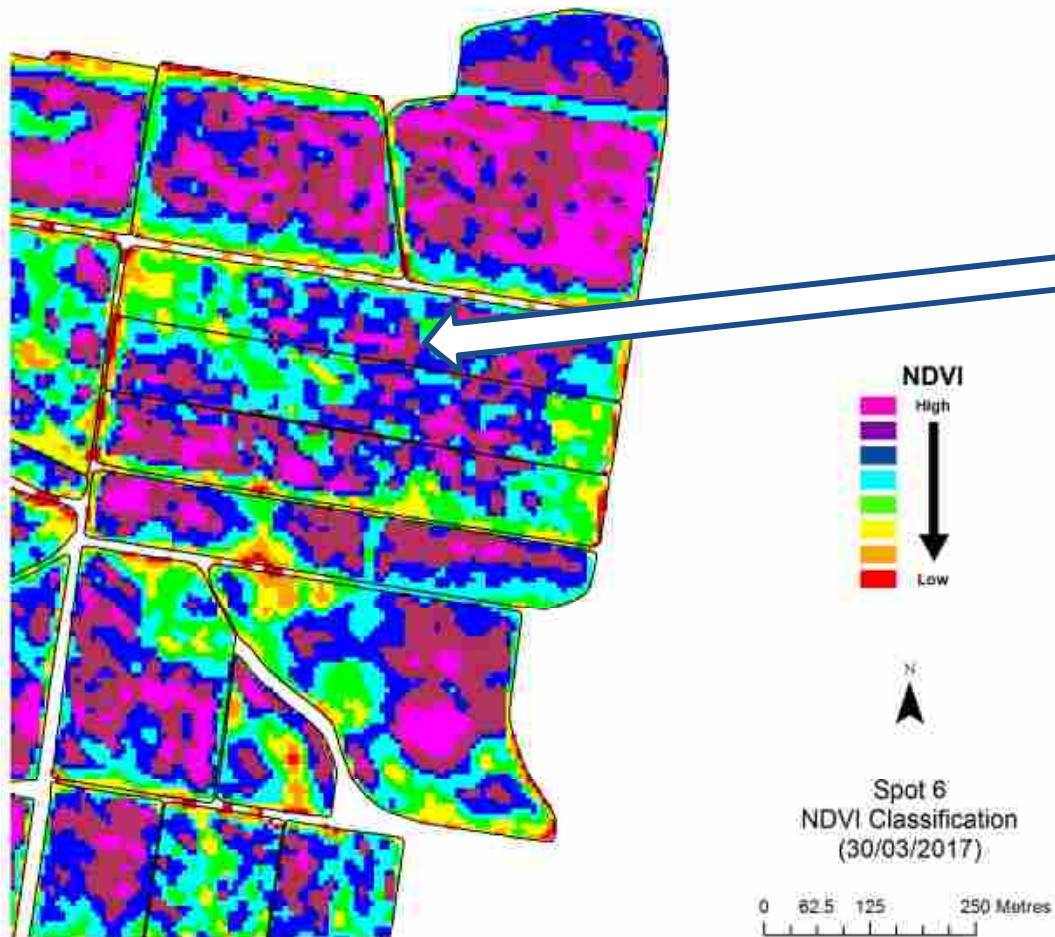


High resolution like (2 cm) can disguise the spatial variability occurring across a crop

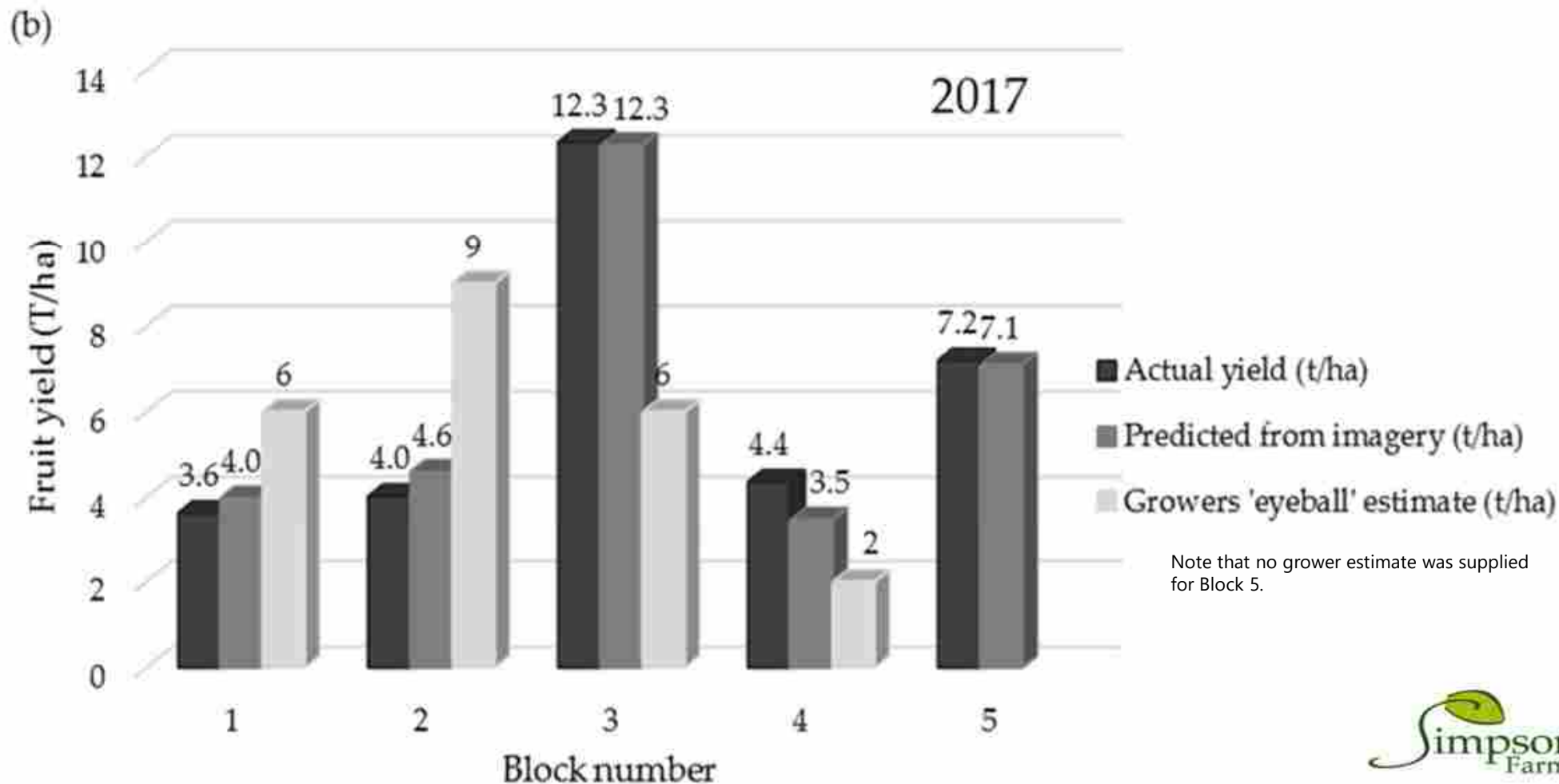


Crop vigour 'zones' support growers in the implementation of Precision Agriculture practices

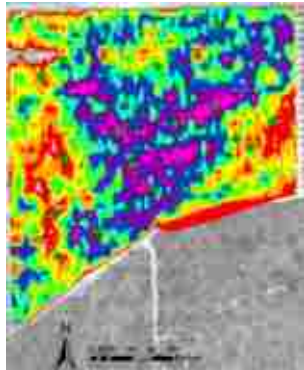
Consider how the data will be used



Actual vs predicted yield - avocado



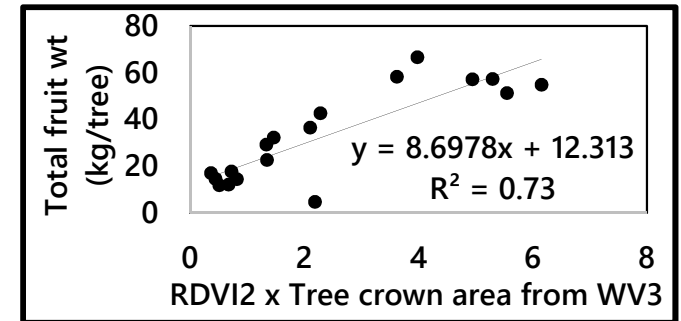
Predicting yield – Mango



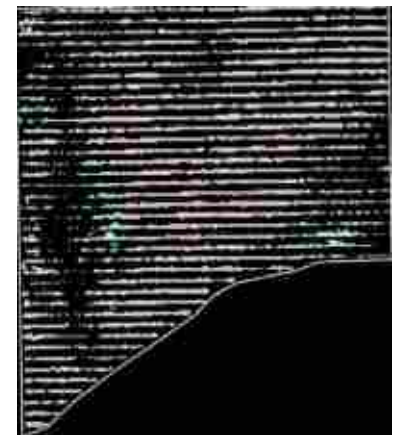
NDVI image showing variation in tree vigour across a mango orchard. The higher the NDVI the more healthy the tree.



Sample locations of 18 trees overlaid on to a false colour satellite image



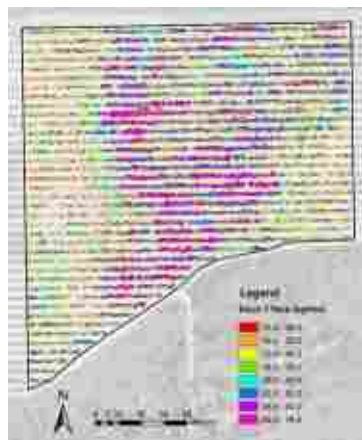
Relationship between mango yield per tree versus measured TCA x RDVI2 (*a measure of canopy reflectance*)



Extraction of canopy spectral data



Extraction of tree crown area (TCA)



Derived yield map (Kg/ tree)



Prediction of total block Yield (Kg/ tree) or fruit Number.

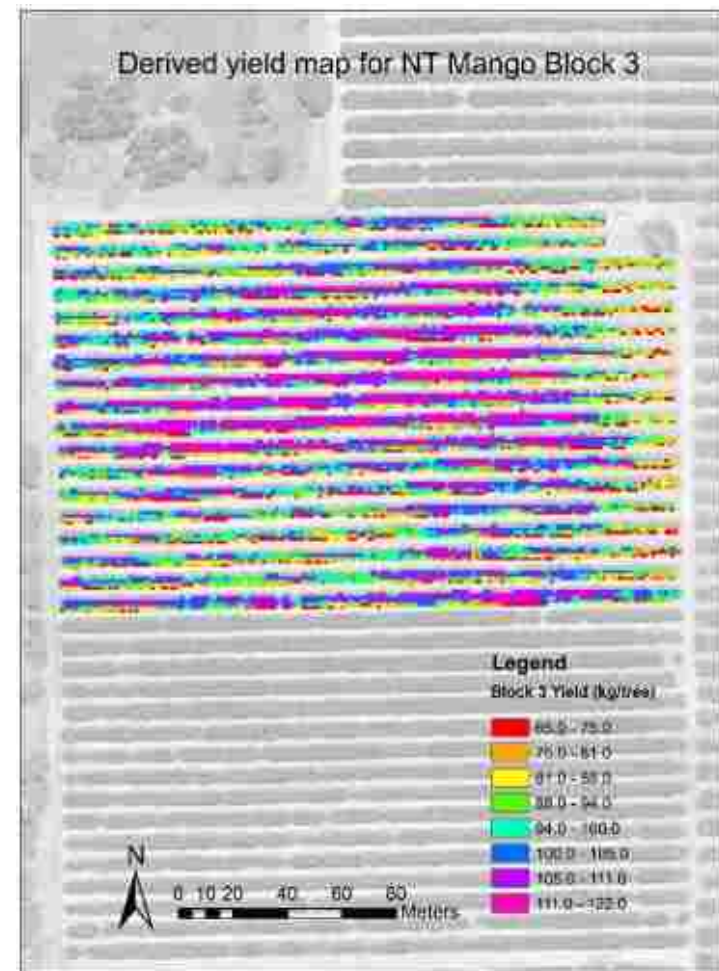
Improving predictions

2017 NT Block 3

145,831 kg fruits from 1142 trees in Block 3

Predicted yield (VI only)= 128,731 (88%)

Predicted yield (TCA)= 146,926 (101%)



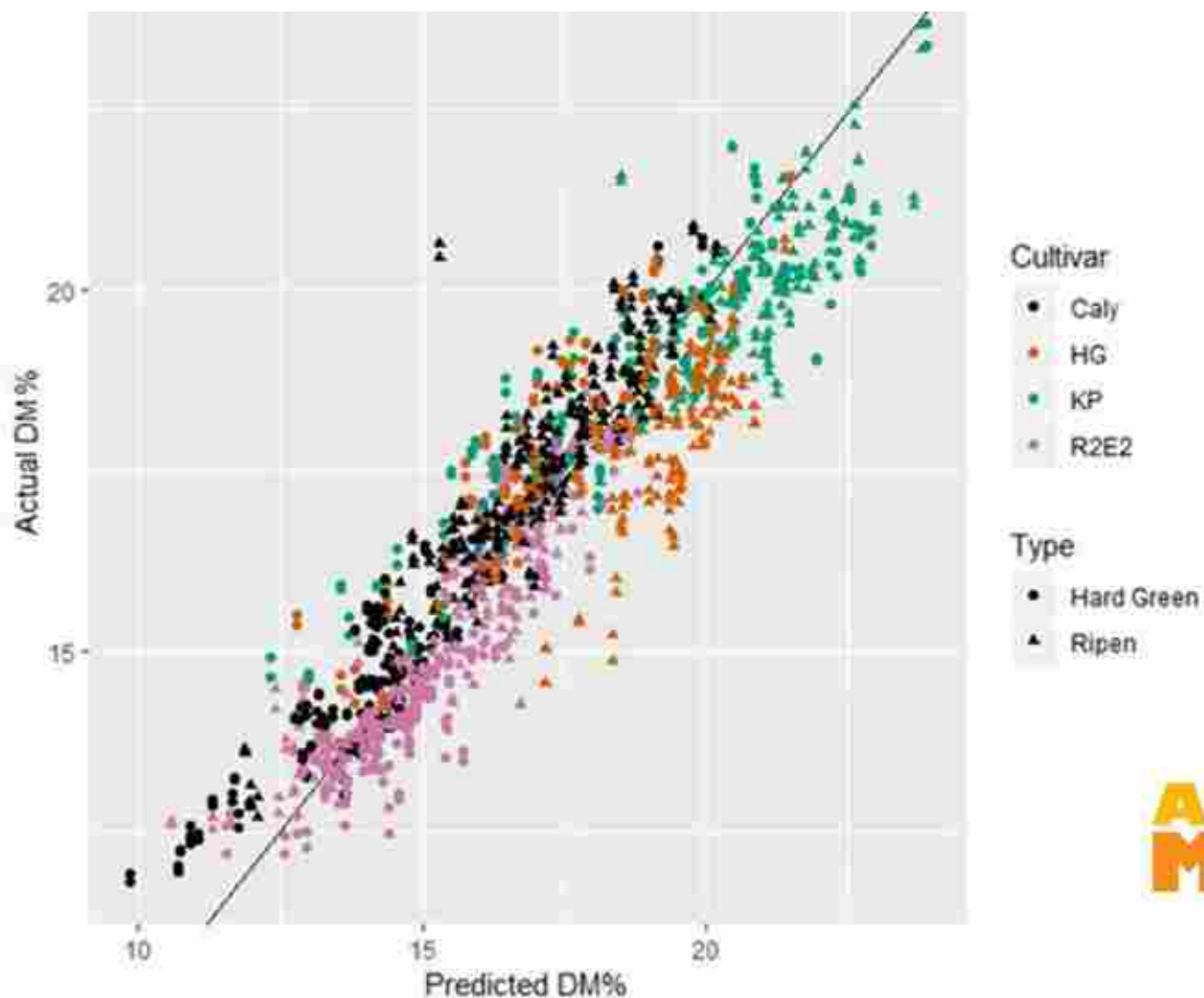
Dry matter estimation and time of harvest and harvest fruit maps

Fruit dry matter is important to fruit taste and harvest timing



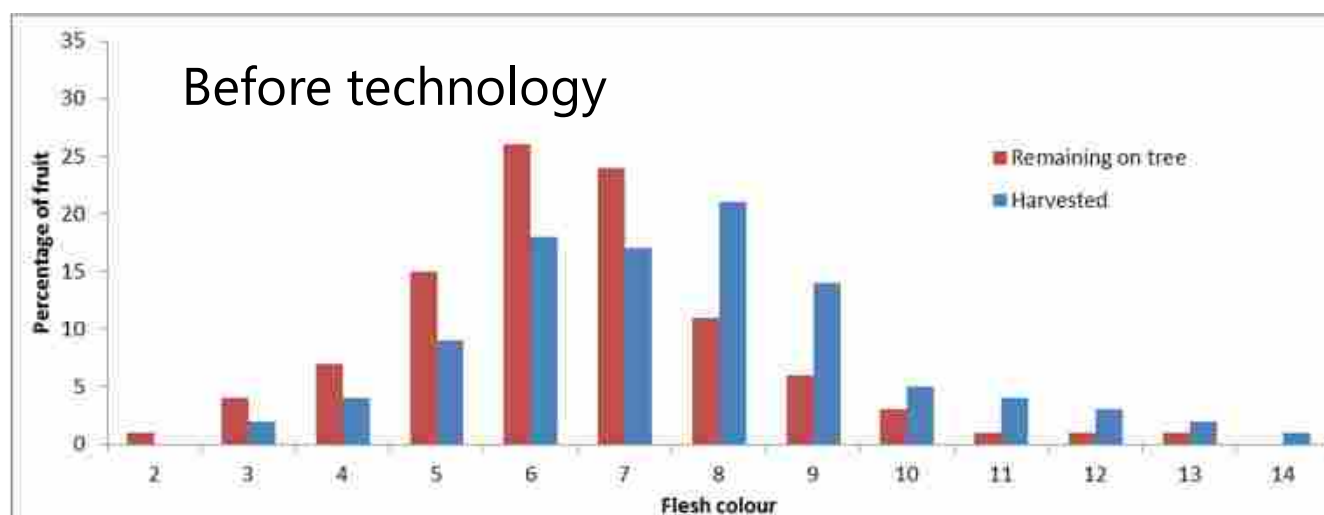
Felix Instruments Inc., USA

Actual dry matter vs NIR dry matter

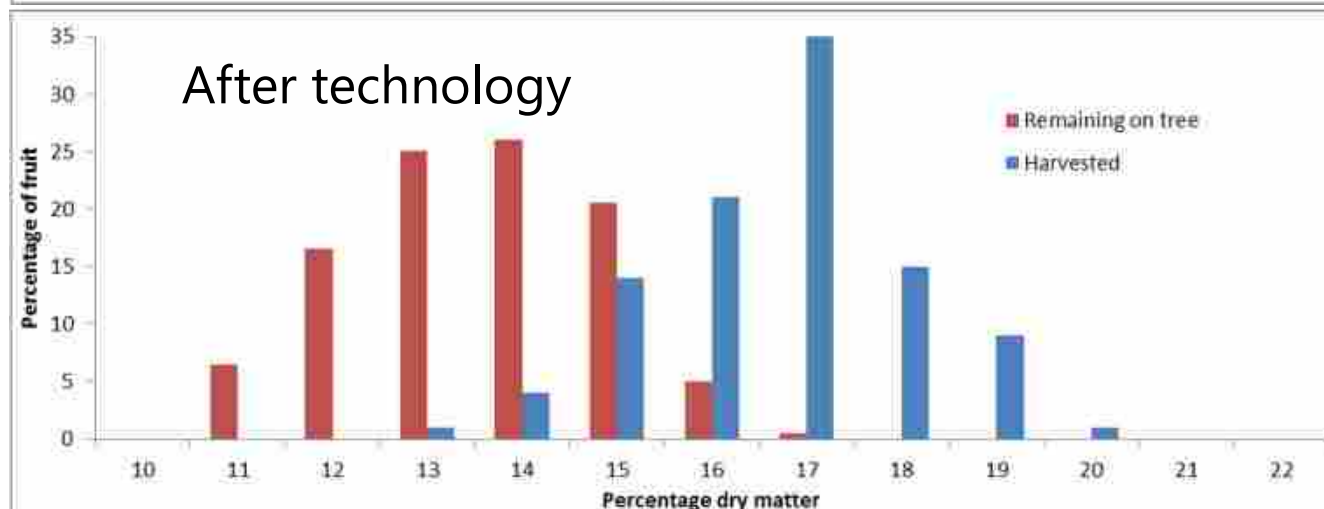


AUSTRALIAN[®]
MANGOES

Using the technology to train pickers



Little difference in maturity between fruit in bin and fruit left on tree.



Better separation, only the more mature fruit being harvested.

Postharvest consequence



Adding a decision support system



Australian tree crop rapid response map

Inputs

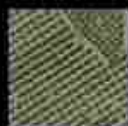
Industry and government data



Satellite imagery



Aerial photography



Citizen Science
'Land use Survey App'



Field observations



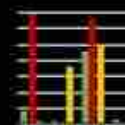
Expert knowledge &
Industry engagement



Applications



Rapid Response Map



Analysis and metrics



Biosecurity response and recovery
(e.g. Panama TR4 Disease)



Natural disaster management
(e.g. Tropical Cyclone Debbie)

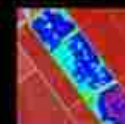


Image analysis
(e.g. yield, vigour, productivity)



Pest and Disease
(e.g. fruit fly, phytophthora)

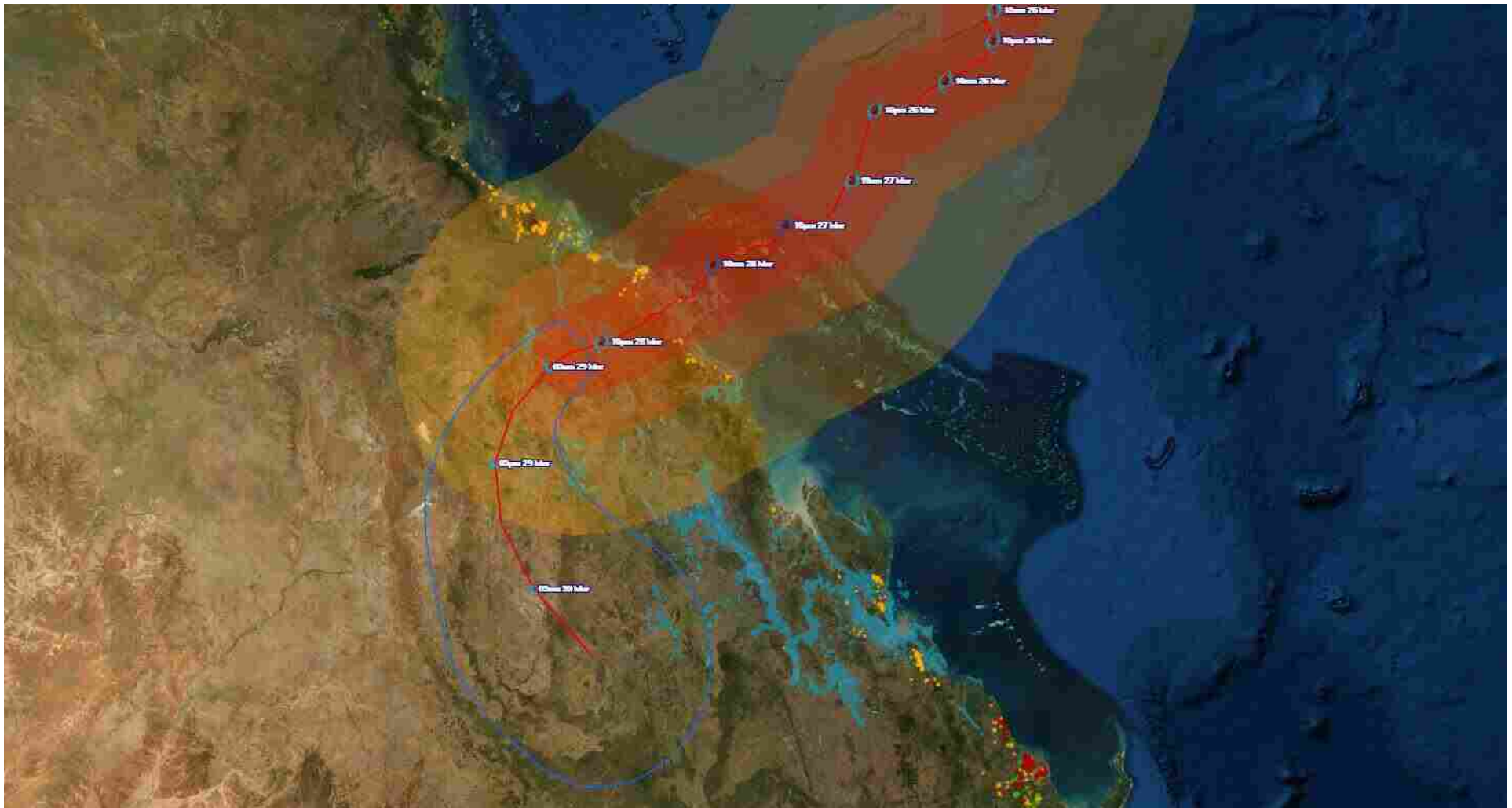


Baseline for additional data

Australian tree crop rapid response app



Australian tree crop rapid response web



Privacy of data

Only location and extent of groves will be mapped, NOT the enterprise / owner.

“Sources used to compile this information include remotely sensed data, state and national ancillary datasets, field observation and expert opinion. No personal or confidential information is collected as part of the land use mapping process nor contained within the land use datasets.”

How to help – Land use survey app



www.qld.gov.au/landusesurvey

HIA Survey

Point

Lat: -27.40334 Lon: 153.2201

Altitude (m):

Please select crop:

☐ Avocado

☐ Citrus

☐ Macadamia

☐ Mango

☐ Olive

☐ Other

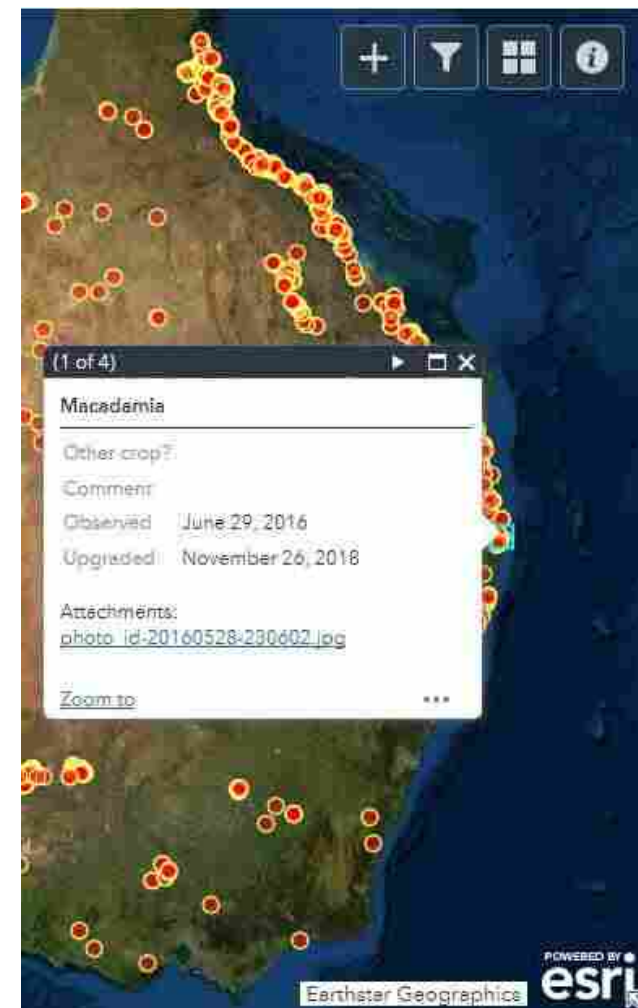
Comment:

Are you confident?

☐ Yes

☐ No

Image





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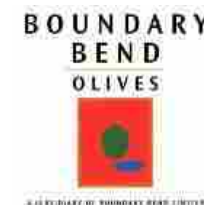
Professor Andrew Robson
Dr James Brinkhoff
Dr Angelica Suarez Cadavid



Professor Kerry Walsh



Craig Shephard
 @CraigShephard



Professor Stuart Finn



Australian Government
Department of Agriculture

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