New Fruit monitoring quality technology

For the whole Horticulture value chain

Initiative: “Horticulture Innovation Funds”

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Industry quality monitoring concerns

- Need to identify optimal harvest date
- Current method (Firmness and Soluble Solids) not sufficient to determine correct physiological stage

CURRENT SOLUTIONS

- DA-Meter, identifies physiological stage but difficult to manage the data
- New Fluorescence technology
Identification of stone fruit maturity classes using I_{AD} (DA meter)

- Harvest at best maturity to suit specific markets
- Cultivar specific
- Correlate I_{AD} value with fruit ethylene production
  - Ethylene production related to fruit maturity (ripeness)
- Can be conducted in the field or pack house
- New ethylene sampling protocol in Australian Stonefruit Grower – August 2016

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• DA-Meter new software for data management:
  – Allows import of data from micro memory card
  – Allows separation by block, cultivar, training system, etc
  – Allows creation of graphs for the current season (maturity development)
  – Allows creation of graphs between seasons (comparison in predictive mode)
  – Still in beta testing
  – Should be ready around December
  – YouTube explanatory videos placed on HIN website
Selecting the data to plot
Seasonal plot
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• Three Chlorophyll Fluorescence Technology based sensors:
  – hand-held sensor to be used in conjunction with a smartphone app, that will enable pre-harvest maturity monitoring and enable harvest prediction based on spectral data and other parameters (such as GPS localisation)
  – Sensor to monitor conditions of fruit in real time during cold storage, especially during long term period required by pome fruit
  – Sensor designed for the graders and packing lines (at prototype stage)

• Data from the three sensors can be shared across the value chain, so that it will be possible to follow fruit quality from tree to consumer

• YouTube explanatory videos placed on HIN website
Hand Held sensor

- High correlation with flesh firmness, soluble solids concentration and maturity.
- Workable on smartphone APP
- Allows to make own calibration to further improve quality
- Allows for cultivar specificity
- Tested on peach, nectarine and apple
- Correlates with $I_{AD}$ values (ethylene development)
High correlation with Flesh Firmness and Brix

R^2 Prediction: 0.822
RMSE Prediction: 0.790 kg

R^2 Calibration: 0.983
RMSE Calibration: 0.273 kg

R^2 Prediction: 0.632
RMSE Prediction: 1.471 degree Brix

R^2 Calibration: 0.981
RMSE Calibration: 0.378 degree Brix
Cold storage sensor

- Based on image capture of chlorophyll fluorescence
- Allows for long-term monitoring
- Tested on apple
- Requires further testing on other fruit type and image resolution
New technologies to monitor fruit quality

Improve orchard monitoring during fruit development

Important to understand and predict optimal harvest (no ethylene = no harvest)

Identification of market of choice based on fruit quality at packing

Improved monitoring during postharvest

Provide a solution for fruit quality management along the whole value chain

More monitoring = more understanding = better planning = improved whole farm logistics = HIGHER PROFITABILITY

Both technologies have the same base concept and utilisation protocols

Thank you

QUESTIONS?

- ACN Orchards Bunbartha:
  - field testing on stone and pome fruit for the hand held instrument
- Rubens Technology Ltd:
  - Sensors Development; software/APP development; testing and proofing of predicting correlation accuracy and robustness
- Agriculture Victoria Research:
  - sensors testing; scientific provider for predicting correlation accuracy and robustness
- Biosecurity Agricultural Services
  - YouTube videos and HIN webpage management
- Horticulture Innovation Funds
Effect of orchard factors on maturity development

August Flame peach $I_{AD}$ field development 2015-17

August Flame peach $I_{AD}$ field development 2015-17

Autumn Bright nectarine $I_{AD}$ field development 2015-17

T204 peach $I_{AD}$ field development

DA value

26/11/16, 6/12/16, 16/12/16, 26/12/16, 5/01/17, 15/01/17, 25/01/17, 4/02/17, 14/02/17, 24/02/17, 6/03/17, 16/03/17

26/11/16, 16/12/16, 5/01/17, 25/01/17, 14/02/17, 6/03/17

23... 27... 31... 8... 12... 16... 20... 24... 28...