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Horticulture Impact Assessment Program

AP19003 – Advancing sustainable and technology driven apple orchard production systems – Case Study

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Hort Innovation

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AP19003 Advancing sustainable and technology driven apple orchard production systems

Kevin Sanders

Table 1 AP19003

Stakeholder	Kevin Sanders
Business	Sanders Apples
Location	Yarra Valley, Victoria

What was the project about?

Hort Innovation coordinated a production research program (AP19003) to investigate the physiological mechanisms and develop practical tools to support improved orchard design and crop load management. The overarching goal was to enable apple orchards to more consistently produce high-quality yields that meet market expectations, even under increasingly variable climate conditions.

Crop load management involves achieving the optimal ratio of fruit to tree resources. This includes balancing fruit numbers with factors such as tree size, age, and carbohydrate reserves, in order to maximise yield without compromising fruit quality.

The project also explored new technologies to support orchard productivity. One of the key technologies trialled was the Green Atlas Cartographer – a commercial mobile sensing platform capable of measuring in situ fruit and tree parameters. The Cartographer was used to establish orchard-specific crop load relationships by assessing fruit size, quantity, and light interception.

The aims of the investment were to support:

- investigating the dynamics of fruit position and light exposure on colour development, sunburn damage, fruit quality and floral initiation using the Sundial experimental orchard and technology such as LiDAR combined with solar position and light extinction models
- exploring the physiological mechanism (e.g. chemical signals) for observed impacts of high crop load on floral initiation and flower development, and the subsequent season(s) fruit size, assimilation, and translocation of carbohydrate to fruit
- developing a rapid orchard assessment tool using sensing technologies (e.g., proximal sensing of light interception, fruit number and fruit size) to determine crop load for optimum fruit size in apple orchards.

Kevin's involvement in the project

Kevin had been involved in the development of the Green Atlas Cartographer technology since 2013, before the technology was widely commercialised. As part of AP19003, he participated in a grower focus group that trialled the technology. He provided practical feedback and insights to optimise Cartographer's application in apple orchards.

What benefits have you seen because of the project?

Cartographer produced information on crop load, fruit size, and colour of apples on trees. This information is extremely valuable in crop load management practice of orchards. With the use of Cartographer, growers have access to information that were too difficult to obtain and analyse manually to help with optimising crop load specifically for each tree instead of taking an orchard wide approach. This in turns help improve the quality and yield of apples.

What were the challenges in adoption for the industry?

Growers tend to be conservative when adopting new technologies on orchards, especially high-tech solutions such as robotics. The benefits of adopting Cartographer need to be clearly demonstrated and is convincing for growers that the benefits would outweigh the costs of adoption, especially given the industry is struggling with low profitability.

Additionally, the capital investment required to adopt the Cartographer may be prohibitive for some growers. While the benefits are significant, the upfront costs can be a barrier, particularly for smaller or less profitable orchards.

How could Cartographer be further improved?

While producing crucial information on crop load of apples for the purpose of orchard management, there are still areas for improvement that Cartographer could make to further help growers. An example is to develop Cartographer's ability to count the number of flowers and apples that are beginning to grow on trees, rather than just formed apples. This would help growers to practise crop load management earlier in the production cycle to achieve better yield and quality for their apples.

Additionally, if the technology was developed further to include sorting capabilities and functions related to grading of apples, it could be used to streamline the quality grading process.