



Athena IR Tech Trans-IR Solution field device

Digital maps as a foundation for AgTech adoption – part 2

Digital viticulture in the Canberra District

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In October 2024 the Viticulture Society of the Canberra District (VSCD) held an 'AgTech Innovation in Viticulture' demonstration event at Four Winds vineyard in Murrumbateman. The event was funded through the Australian Government Department of Agriculture, Fisheries and Forestry as part of its Support for Regional Trade Events program.

As outlined in Part 1 of this article, published in the December 2024 issue of *Grapegrower & Winemaker*, this event followed on from the VSCD's 'Digital Viticulture in the Canberra District' project that showcased how vineyard mapping can facilitate targeted Agtech adoption. This is a summary of the AgTech presentations from the day.

Facilitated by Hans Loder, digital viticulture expert and director of viticultural consultancy Vitifelix Pty Ltd, presenters included Mammoth

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Geospatial, FarmLab, Athena IR-Tech, EarthSQL and Goanna Ag. These vendors demonstrated new technology options that can be integrated with vineyard mapping to inform farm management.

Mammoth Geospatial's John Bryant demonstrated how vineyard managers

can leverage QGIS, a powerful free and open-source Geographic Information System, to enhance and apply precision viticulture practices. This cost-effective solution enables growers to visualise their vineyard, overlaying multiple data sources including drone imagery, soil maps and yield to perform sophisticated spatial analysis. QGIS' flexibility makes it an ideal platform for precision viticulture, allowing growers to build valuable year-on-year spatial datasets which can be interrogated beyond being just a 'pretty picture', without the ongoing software costs. Mammoth Geospatial specialises in helping growers maximise the benefits of open-source GIS technology.

Oli Madgett from FarmLab outlined his work with Meat & Livestock Australia, AgriFutures, Treasury Wine Estates and the Clean Energy Regulator to scale soil carbon baselining and decarbonise supply chains. He demonstrated under vine and inter-row cover crop trials which had shown the importance of mapping, sampling and monitoring these areas independently of each

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Goanna Ag GoWISD smoke detection unit

other. Mapping farms for carbon and biodiversity is emerging as an essential part of farm management and property valuation; vineyards need additional care when sampling and analysis due to the presence of vine and mid-row with zoning these critical to achieving representative results.

Che Wightwick from EarthSQL demonstrated the Scion database which offers growers the opportunity to consolidate their vineyard data into a secure, single point of truth location for their business. This provides data ownership and facilitates interoperability between systems, hardware and also sharing between individuals to avoid business silos. Data stored can range from observations collected via traditional scouting with clipboard, pen and paper, to continuous streams provided by agtech tools, weather stations and IoT devices. Scion provides web-based dashboards and reports that allow for easy-to-use insights and change detection over time (temporal analysis), potentially to the vine level.

Dave Gerner, regional innovation manager from Wine Australia, presented on their AgTech Innovation resources and current National Vineyard Register Project which aims to create a national dataset of vineyards and the associated tools and insights to support better decision making for wine producers.

Jay Holata from Athena IR-Tech demonstrated the Transp-IR solution optimises water use efficiency by monitoring vine transpiration in the canopy in real-time with infrared sensors and then using a variety-specific algorithm to inform the grower of whether they should irrigate the vines. Data is transmitted to the cloud via 4G, with each device geotagged based on GPS coordinates to create a geospatial time series of canopy and ambient temperature, vapour pressure deficit, humidity and solar radiation. This information is consolidated into a Crop Water Index over an easy-to-read interface and can also be exported for numerous offline use cases.

Jock Fergusson from Goanna Ag demonstrated the GoWISD solution which is the result of a decade long collaborative research project between Latrobe University and Wine Australia. This detects smoke and collects data for smoke dose and potency to determine cumulative fruit exposure and severity. This uses a simple to read real-time dashboard that can be viewed on either laptop, PC or device to report probability of smoke taint to fruit. The GoWISD solution can be relied upon to deliver insight on whether smoke exposure will result in taint, providing stakeholders confidence that fruit can be used for winemaking.

Several of the day's vendors are participants in the federal government's On Farm Connectivity Program (OFCP) which offers primary producers a 50% rebate on eligible AgTech.

Expert panel discussion

An expert panel made up of Dave Gerner, John Bryant, Oli Madgett and Che Wightwick then discussed the

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value proposition of detailed vineyard mapping and practical approaches to AgTech adoption as part of a Q&A. They agreed that accurate baseline digital maps provide a foundation that creates value, enables analysis and provides both immediate benefits and others that are realised over time. Digital mapping can guide the selection of AgTech as challenges are identified, with devices positioned in what can be determined as representative locations. But as Dave Gerner explained, “anything that helps you make a decision is really valuable – but you really want to know the decision you are trying to make it for”.

Importantly, the panel emphasised the following:

- That emerging technologies, like drones, are affordable and accessible now compared to five or so years ago, and that this is where a lot of new technology is heading. Importantly, many technologies now also enable you to generate data and use it in freely accessible platforms.
- Automation is a tipping point that requires accuracy. Longer term, a use for a digital map of the vineyard, that is to the row and vine level, will be AgTech automation – autonomous vehicles, but also those that provide spatial observations.
- Data being collected now will in 5-10 years’ time provide the base line data that AI/machine learning technologies require to provide representative outputs.
- Maps require a common nomenclature to facilitate their storage. This is important as it relates to data base structure – standardised

and in order – with Wine Australia’s “Collabriculture” initiative having put these building blocks in place.

- Using data for land valuation – such as data that relates to soil – is a near future need for accurate farm maps.
- Key analytics that can be drawn from digital mapping and AgTech to increase the value and relationship of data being collected can include:
 - Weather/temperature and rainfall from one or more representative observation site/s. Furthermore, wind direction can help understand factors of canopy roll, sporulation events, catabatic airflow, smoke movement, etc.
 - Soil moisture, Identifying variability in soils through EM38 mapping or via measure of vegetation index, to identify representative soil monitoring locations and extrapolating areas of influence.
 - Canopy and ambient temperature, relative humidity, vapour pressure deficit and solar radiation interpreted as a Vine Crop Water Index overlaid onto an optimal plant water status zone for each major phenological stage.
 - Canopy growth – NDVI score per vine, row, sub – block and block area. At the row level, it can be about change detection in case of irrigation blockages/blowouts or, at the vine level, monitoring for decline due to disease or other factors. Sub block zones tend to remain stable, and a block average can be useful in terms of looking at seasonal differences.
 - Yield mapping – while access to a

harvester fitted with a yield monitor may not be possible, it can be useful to map out vigour zones, with a close relationship to yield as well given as generally more shoots = more bunches!

- Canopy size/density mapping can assist in determining canopy size, relating this to spray volume and a move towards variable rate spray applications. Alternately, it may simply provide a basis for prioritising areas to designate as likely disease hot spots.

A list of best practice analytics as determined through the PTUP opportunity is to be developed post-project, with other outcomes being the realisation that vineyard data needs to be managed. As such the VSCD is looking to trial an Earth SQL Scion database platform based on the Wine Australia Collabriculture common data model, to manage mapping and regional AgTech data. Further is the opportunity for Mammoth Geospatial to deliver a QGIS vineyard GeoPackage template that can be easily populated by growers when they capture their own vineyard maps.

The VSCD aims to replicate this event in future years, possibly to coincide with the Murrumbateman Field Day and the NSW DPI AgTech Alley initiative, solidifying its role in advancing agritech adoption. The event’s outcomes point to the critical role of data-driven tools in supporting the broader agricultural sector’s long-term sustainability through adoption of precision tools, AgTech, adaptation and innovation.

*For further information and a link to the expert panel discussion video, go to the VSCD website: Canberragrapes.net.au **CW***