Using remotely piloted aircraft for vineyard management

Amy Steiger, GIS Manager for the Cardno South Coast office

Remotely piloted aircraft systems (RPAS), also known as an unmanned aerial vehicle (UAV), unmanned aircraft system (UAS) or drones, are revolutionising critical data capture, offering aerial mapping solutions that are fast, accurate, and inexpensive. They can be a crucial business tool to provide cost-effective and accurate data for vineyard management.

This technology is particularly applicable to winemakers and grape growers, collecting valuable information that can be compared year after year, which helps with decision making about crop management. Key applications include identifying variations in plant health or plant stress, smarter planning for irrigation, fertiliser and pesticide delivery, as well as being able to track plant density and distribution.

There are two platform types for remotely piloted aircraft: fixed wing or multi-rotor aircraft. They each have their own advantages and limitations and the results required will determine the best platform for the job at hand. A multi-rotor UAV only needs a small area for take-off and landing, can hover and usually has the ability to capture video footage. Fixed wing UAVs are often lighter, can cover large areas quickly and are ideal for aerial mapping.

Cardno is global company, certified in Australia by the Civil Aviation Safety Authority (CASA) to provide aerial surveying services for commercial projects. Operations are also offered in New Zealand and the United States. Our pilots are surveyors and spatial analysts who undertake field capture and data interpretation. Fresh advances in aerial technologies allow unique multi-sensor flight packages that greatly increase efficiency; completing what used to take days in the field with a single flight mission.

The primary platform our pilots use is the Sensefly eBee, which is a fixed wing aircraft. The eBee can be completely autonomous and is designed as an aerial mapping tool, providing high quality and detailed outputs. Additional environmental

Figure 1. Drone type EBEE RTK ready for take off.

sensors such as thermal, near infrared (NIR), red edge and multi-spectral can be integrated into this single, fixed wing platform for optimum utility.

Capturing data with a multi-spectral or near infrared camera gives insight into crop health beyond what is visible to the eye, such as vine development and stress analysis. These different sensors can help to identify diverse factors influencing the growth potential of vineyards and can help to tailor actions to optimise overall productivity and yield .

Acquiring information from a plane or satellite is often referred to as remote sensing. Remote sensing can provide insights for harvesting, planning and site/crop management such as:

- the early stages of growth
- identifying targeted soil sample locations
- recommended vine spacing
- evaluating plant health and potential crop yields.

The key benefits from using RPAS for vineyard management include:

- Rapid deployment – reduced time and cost to collect valuable field datasets, ability to capture current information and cover large areas quickly that may be remote or rugged.
- Efficiency of cost – increased efficiency through streamlined inspections, planning for irrigation, fertiliser distribution and pest control.
- New visibility – ability to obtain a bird's eye view to help understand key trends and relationships, and monitor changes through time.

Cardno has been a certified operator in Australia since September 2014 focusing primarily on surveying, but more recently expanding into aerial photo interpretation and remote sensing. We take a holistic approach to RPAS through integrating GIS, remote sensing and surveys to provide clients with a complete and precise aerial mapping service. We are able to provide detailed interpretation of the results to assist growers and winemakers improve crop quality and yield.

The demand for remote sensing services is growing rapidly as more clients seek the ease and relative safety of remote observation. RPAS allow service providers to pursue advanced efficiencies and streamline operations to lower costs and reinforce client satisfaction.

About the author: Amy Steiger is the GIS Manager for the Cardno South Coast office and has been a UAV pilot since 2014. Amy has worked as a consultant in spatial sciences, environmental and scientific consulting for almost 10 years.

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About Cardno: Cardno is a professional infrastructure and environmental services company, with specialist expertise in developing and improving physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company, listed on the Australian Securities Exchange [ASX: CDD]. www.cardno.com.