



Airborne and Ground-Based Platforms for Data Collection in Small Vineyards: Examples from the UK and Switzerland

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This paper presents an overview of some of the low-cost ground and airborne platforms and technologies now becoming available for data collection in small area vineyards. Low-cost UAV or UAS platforms and cameras are now widely available as the means to collect both vertical and oblique aerial still photography and airborne videography in vineyards. Examples of small aerial platforms include the AR Parrot Drone, the DJI Phantom (1 and 2), and 3D Robotics IRIS+. Both fixed-wing and rotary wings platforms offer numerous advantages for aerial image acquisition including the freedom to obtain high resolution imagery at any time required. Imagery captured can be stored on mobile devices such as an Apple iPad and shared, written directly to a memory stick or card, or saved to the Cloud. The imagery can either be visually interpreted or subjected to semi-automated analysis using digital image processing (DIP) software to extract information about vine status or the vineyard environment. At the ground-level, a radio-controlled 'rugged' model 4x4 vehicle can also be used as a mobile platform to carry a number of sensors (e.g. a Go-Pro camera) around a vineyard, thereby facilitating quick and easy field data collection from both within the vine canopy and rows. For the small vineyard owner/manager with limited financial resources, this technology has a number of distinct advantages to aid in vineyard management practices: it is relatively cheap to purchase; requires a short learning-curve to use and to master; can make use of autonomous ground control units for repetitive coverage enabling reliable monitoring; and information can easily be analysed and integrated within a GIS with minimal expertise. In addition, these platforms make widespread use of familiar and everyday, off-the-shelf technologies such as WiFi, Go-Pro cameras, Cloud computing, and smartphones or tablets as the control interface, all with a large and well established end-user support base. Whilst there are still some limitations which constrain their use, including battery power and flight time, data connectivity, and payload capacity, such platforms nevertheless offer quick, low-cost, easy, and repeatable ways to capture valuable contextual data for small vineyards, complementing other sources of data used in Precision Viticulture (PV) and vineyard management. As these technologies continue to evolve very quickly, and more lightweight sensors become available for the smaller ground and airborne platforms, this will offer even more possibilities for a wider range of information to be acquired to aid in the monitoring, mapping, and management of small vineyards. The paper is illustrated with some examples from the UK and Switzerland.