Drone spraying for vineyards

Marty Smith, Absolute Viticulture

Marty Smith (Absolute Viticulture)

- Owns a 6 ha vineyard at Cranbrook.
- Manages 6 other vineyards totaling approx. 100 ha ranging from Pipers Brook to Coal, Derwent and Huon Valleys
- Provides vineyard management consulting and mechanised harvest services to a range of vineyards

Fergus McEwan Foulds, SkyApply (drone contractor)

Fergus McEwan Foulds (SkyApply)

- Commercial drone operator providing mapping, spraying and spreading services
- Spraying of gorse and other environmental weeds in difficult terrain
- Broadacre crop and vineyard spraying and spreading
- Uses XAg P100 (50 kg lift capacity for spraying and spreading) capable of 22 l/min output at 50 km/h flight speed
- Uses DJI Mavic 3 Multispectral for mapping and imagery

Agtech applications

- Marty uses soil moisture monitoring probes in his own vineyard
- Yield mapping is done in conjunction with harvest
- Vineyard spraying was first done in spring 2024
- Motivation for drone spraying was to avoid ground rig soil compaction due to wet soil conditions in early spring

Steps to success

- Chemical companies had to be approached for approval and rate recommendations for aerial application of certain fungicides
- While route planning is done automatically by the drone software, it takes some time and experience to determine the most efficient plan in particular environments (e.g. steep slopes)
- A number of factors determine the efficiency and efficacy of the spraying job – flying height, speed, swath width, application rate and droplet size. All can be changed and in new operating environments it can take some time to arrive at the best result.

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Steps to success continued

- Vineyard spraying operations have so far focused on early stages of bud growth - the limits of canopy cover have not been tested for drone spraying.
- The use of a contractor was preferred because of the equipment investment and background knowledge and experience required.
- An accurate map of the spray site is required in advance of the spraying operation. This is a separate operation that requires data processing before uploading the map to the spray drone.

Outcomes

- In the specific example of drone spraying on Marty's vineyard, the drone sprayed at a rate of 6 ha/h whereas a ground rig would have operated at 1 ha/h. Set up and clean down time for the drone was about the same as for a ground rig.
- Using a drone avoids direction of operation constraints that are imposed on a ground rig by virtue of trellis direction and positioning. This allows that drone to fly a path that accommodates factors such as wind direction.
- There are significant timeliness advantages in being able to start fungicide application early in the spring without the risk of soil (and potential vine root) damage.
- The faster work rate allows spraying to take advantage of smaller time windows of ideal weather conditions.
- Using a contractor allows vineyard staff to be allocated to other tasks.

Costs

- Taking into account pre-spray mapping, the cost of drone spraying is about the same per hectare as ground rig spraying.
- For permanent environments like vineyards, mapping of the site would normally be an initial set up task and not be required again next season.
- It is very difficult to attribute a cost benefit to the ability to spray earlier in the season or to improve timeliness by spraying in ideal weather windows, other than to recognise that doing the right task at the right time is one of the key factors determining success in any cropping operation.

Positives

- Timeliness – spraying early in the season without soil damage and spraying when the task needs doing
- Lack of soil damage
- Release labour for other tasks in the vineyard
- Flexibility in route planning

Negatives

- The relatively short flight time that is dictated by the combination of chemical tank capacity and battery capacity.
- Achieving the best combination of these two factors, and decisions about payload vs battery power comes with experience.

Conclusion

- **Timeliness, both within the season and within the day, are key benefits of drone spraying.**
- **While the drone software will design an optimised flight path, achieving the most efficient and effective route is influenced by factors such as terrain and environmental conditions on the day.**
- **Direct costs of drone spraying are similar to ground rig spraying, but with a number of other advantages such as releasing staff for other purposes.**

This project was delivered by the Tasmanian Agricultural Productivity Group (TAPG) and supported through funding from the Strategic Industry partnership Program (SIPP).