Deterring birds from vineyards

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Introduction

Birds can cause significant damage to crops, including vineyards. Using unmanned aerial vehicles (UAVs, more commonly known as drones) is one of the emerging approaches to tackle this problem. Typically, these drones are designed to closely resemble natural predators. However, birds will habituate to scaring methods without the presence of a real threat. Therefore, we used a different approach in our research by trying to make the birds learn that the drone is a new predator in their community rather than an existing natural predator.

Methods

Bird behaviour research shows that birds learn about novel threats by seeing them at the same time as hearing alarm responses from other birds. To capitalise on this way of learning, the prototype drone is equipped with a horn tweeter and a crow taxidermy (Figure 53). The crow taxidermy is hanging upside down from the undercarriage of the drone, giving the impression that the drone has just caught the crow. The coinciding distress call coming from the horn tweeter signals to onlooking birds that the crow taxidermy is in real danger; an experience that should trigger social learning.

The drone was tested in four New South Wales vineyards in 2018 and successfully deterred birds from the immediate area (Wang et al. 2019). This year, the drone was compared with two common bird scaring methods i.e. netting and reflective objects (Figure 54) in three vineyards located in the Hunter Valley, Young and Orange, NSW. Each treatment was applied to an individual block within the vineyard; each block was approximately 0.2 hectares. The three blocks were as close to each other as possible with a sufficient buffer area to isolate the effects of different methods. The blocks contained the same grape varieties and had evidence of pest bird activity before testing started.

The treatments were deployed two weeks before harvest. Netting and reflective objects were manually installed and they were left unattended for seven days as per usage instructions. The drone was flown manually between sunrise and sunset during the seven days with a minimum frequency of one flight every hour. If bird activity was observed, the drone was flown more frequently to target the birds. Each flight lasted at least three minutes.

Figure 53. The unmanned aerial vehicle equipped with a horn tweeter (top left) and a crow taxidermy (bottom).

To determine the effectiveness of the treatments, the damage to the vines was assessed before and after the interventions and compared within and between treatments. Three bunches were randomly selected and tagged from each vine within each block and the bird damage in these bunches was visually estimated.

Results

In the Hunter Valley vineyard, the drone performed slightly better than netting and significantly better than reflective objects, whereas in Orange the netting outperformed the drone by a small margin, and the reflective objects almost had no effect. However, the results from Young showed that the reflective objects performed slightly better than the drone, but netting was the most effective deterrent. It is possible the drone outperformed the reflective objects in the Hunter Valley and Orange but not in Young because the primary pest bird species in Young was Silvereyes. Their smaller body size was difficult for the drone to target. Results might improve if the drone was flown more frequently, especially as previous research suggests silvereye activity decreases significantly in the 15-minutes following the drone flight (Wang et al. 2019).

Conclusion

Incorporating bird behaviour theory and drone technology is a viable solution to the pest bird problem in vineyards. The results indicated the drone was more effective than reflective objects when used with large-bodied birds. The effectiveness of the drone against small-bodied birds may improve if the drone was flown more frequently and/or if taxidermy mounts and vocalisations were more closely related to the target species used (e.g. a silvereye rather than a crow). In addition to such adjustments, future research will focus on developing autonomous technologies, so that more frequent flights and more precise targeting become possible.

Figure 54. The reflective bird scaring objects used in the experiments.

Reference

Wang Z, Griffin AS, Lucas A and Wong KC. 2019. Psychological warfare in the vineyard: using drones and bird psychology to control bird damage to wine grapes. *Crop Protection*, 120: 163–170.

Acknowledgement

This work was funded by the Wine Australia Regional Program, University of Sydney and Agent Oriented Software.