

Multispectral imagery and weed biocontrol: A useful pairing?

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Summary High resolution multispectral imagery is playing an increasingly important role in assessing agricultural crop health and vigour. In recent studies, such imagery has been trialled to assess the impact of weed biocontrol agents on their target plants. However, acquisition of this imagery can be limiting, due to flight costs. This study explored the use of unmanned aerial vehicles (UAVs) as a cost-effective, user-friendly tool in acquiring imagery to not only detect an invasive weed target, but also to monitor the dispersal and impact of a released biocontrol agent. *Cylindropuntia* spp. are Cactaceae of Mexican and southern USA origin. They have become weeds of arid and semi-arid regions of mainland Australia, with eight species currently recorded as naturalised. A biocontrol program was initiated in Australia in 1925 for the control of *C. imbricata*, through the introduction of a cochineal, *Dactylopius tomentosus*. More recently, different biotypes of *D. tomentosus* (which

have specific impacts on the different *Cylindropuntia* spp.) have been imported, tested and approved for release. Two *Cylindropuntia* species, *C. fulgida* var. *mamillata* (boxing glove cactus) and *C. pallida* (Hudson pear), which have had *D. tomentosus* biotypes released against them were considered in this study. For *C. fulgida* var. *mamillata*, a UAV (equipped with a 12MP sensor) was used to acquire aerial imagery (RGB) of a long-term monitoring site to visualise cochineal crawler dispersal over time, as well as the overall impact of the cochineal on the weed. For *C. pallida*, UAVs fitted with multi-spectral sensors were used to assist in mapping the species in areas of its invaded range, as well as assessing the impact of the *D. tomentosus* biotype on target weed vigour. The results of these studies will be discussed, in particular reference to UAVs and their future use in monitoring and evaluation.