Dispersal biology of *Orobanche ramosa* in South Australia

*Master of Science*

*Thesis*

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Abstract

Orobanche ramosa L. is an annual, parasitic weed present in the western Murray-Mallee region of South Australia. A quarantine zone was established to encompass all known infestations, and has been adjusted over time as new infestations have been discovered. The movement of fodder, machinery, grain and straw, horticultural crops, livestock, and soil is controlled by strict quarantine procedures, to prevent further spread across the landscape.

O. ramosa presents a unique situation for weed managers: plants are obligate parasites, relying entirely on broadleaved hosts for their water and nutrition; and seeds are tiny (0.3 mm), produced in large numbers (up to 100 000 seeds per plant), and are long-lived, persisting in the soil seed bank for up to 13 years.

The dispersal vectors for O. ramosa in South Australia are the focus of this Master’s thesis.

Two dispersal vectors were chosen for investigation: sheep and wind. Sheep were examined as possible vector for seeds, both via the gut (internal transport, or endozoochory) and via adhesion on the external surface of the animal (external transport, or epizoochory).

Internal transport via sheep was investigated with a classic gut-passage experiment, which showed a peak in excretion of weed seeds at day 2, reducing to zero seeds excreted at day 8, and a half-life of 2 days.

Two phases of external transport on sheep was studied: attachment and retention. Attachment was confirmed by finding seeds on the body wool and feet of sheep that had been kept for 7 days on soil with an O. ramosa seedbank. Seed retention was confirmed by placing seeds onto the body and still finding them in wool samples after 7 days.

Wind was the other dispersal vector investigated for O. ramosa. A survey of natural wind dispersal was conducted, which confirmed wind as a vector and allowed trap design to be tested. Then a portable field-based wind tunnel was used to investigate the effects of ground cover (bare ground and cereal stubble) and wind speed (low, medium and high) on wind dispersal of O. ramosa seeds. For the stubble treatments, more seeds were trapped within the tunnel, and on bare ground more seeds were
trapped exiting the tunnel. Importantly, the data showed that low wind speeds readily move *O. ramosa* seeds, and that the seeds are capable of aerodynamic lift in the wind profile.

Results are discussed in the context of dispersal biology, quarantine procedures, and future work that would further refine knowledge of likely dispersal vectors for *O. ramosa*. 
Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Emma Ginman and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Emma Ginman

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Dedication

For Mum and Dad