

**Dispersal biology of *Orobanche ramosa*  
in South Australia**

***Master of Science***

***Thesis***

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December 2009

# Table of Contents

Abstract .....	ii
Declaration .....	iv
Acknowledgments.....	v
Dedication .....	vi
Chapter 1. Introduction .....	1
Chapter 2. Sheep as seed dispersal vectors for <i>Orobanche ramosa</i> .....	14
Chapter 3. Natural wind dispersal of <i>Orobanche ramosa</i> .....	45
Chapter 4. Wind tunnel investigation of <i>Orobanche ramosa</i> dispersal by wind.....	60
Chapter 5. Discussion .....	87
Appendix 1. Details of sheep body weight and wool testing.....	92
Appendix 2. Trial of seed trap design .....	94
Bibliography.....	100

## 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

3 December 2009

## Acknowledgments

Jenny Watling – For your academic advice and for being more positive and patient than I would have been with a student like me.

John Virtue – For your academic support and friendly enthusiasm, help with experimental design, and practical assistance with wind tunnel.

John Matthews – For your problem-solving skills, practical advice and assistance with field experiments.

Darryl Miegel – For your tireless practical support in the field, including sharing the driving on the trips to and from Mannum, for pondering weather conditions with me and for the many patient explanations of farming systems and agronomic matters.

Dorothee Hayton – For great support in the field and tireless work in the lab, counting seeds and performing germination tests for me, and most of all for the friendly ear and smiling face.

John Leys – For building the amazing wind tunnel and bringing it all the way from NSW, and for making the most daunting week of my whole Masters actually fun!

Stephan Heidenreich – For explaining the physics of wind movement to me in a manner that I could actually almost grasp! And for your expert operation of the wind tunnel.

Janine Jones of Biometrics SA – For assistance with the statistical analysis for the wind tunnel chapter.

Phil Warren and members of the Broomrape Eradication Program – For financial support and introducing me to the world of convocations.

The CRC for Australian Weed Management – For financial support for the project and conferences.

The Grains Research Development Corporation – For financial support.

The University of Adelaide, Science Faculty – For financial support.

Jeff and Kevin Bond – For cheerfully offering your freezer to be filled with sheep poo, and for chats over the back of the ute.

Phil Dabinet – For allowing the use of your land for the project.

Jill Woodhouse – For jumping at the chance to spend a Saturday collecting sheep poo with me.

Susan Gehrig, Janet Newell, Nicole Grant, and Vanessa Glennon – For your valued friendship and support along the post-grad journey (and a shared love of stationery).

The DEH girls – For your inspirational quotes on dark days, for friendship, chocolate, wine, pizza, and bling.

My family – For unconditional love and support. You'll now get to see me in the funny hat!

Brad Ginman – For your encouragement to finish what I started, for always being on my team, and for keeping the home fires burning.

## **Dedication**

For Mum and Dad