Biology and ecology of the introduced snail *Microxeromagna armillata* in south eastern Australia

Angela L. Lush

B.Ag.Sc. Hons (University of Adelaide)

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School of Agriculture, Food and Wine

University of Adelaide

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Frontispiece: Active *Microxeromagna armillata* adult (top) and inactive adult and juvenile *M. armillata* (bottom) in leaf litter of a citrus orchard.

Dedicated in loving memory to my dad,

Laurence Cowley Lush

3-4-1927 to 29-5-2006

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Abstract

Microxeromagna armillata (Lowe, 1852) is a snail introduced snail to Australia which has established populations in the Riverland and Sunraysia citrus growing regions. Citrus exported from these regions to the USA has been rejected due to contamination with *M. armillata*, causing significant economic losses. The life history, phenology and activity of *Microxeromagna armillata* has not been studied in Australia: this forms the basis of this thesis.

Microxeromagna armillata employs an iteroparous egg laying strategy in semi-field conditions and lays approximately 500 eggs per year. Field populations can reach high densities (~4000 snails/m^2), particularly during the winter months when juvenile recruitment occurs. Snails reach sexual maturity at ~ 6mm in shell diameter and can grow to this size from a juvenile stage (2mm) within six weeks. *Microxeromagna armillata* can reproduce successfully by self-fertilisation, and juveniles are able to aestivate with little reduction in subsequent fecundity. These traits make control of this pest a significant challenge. Leaf litter is the preferred habitat of *M. armillata*, but snails do move in the tree canopy. Cues for snail activity in the leaf litter and canopy appear to differ, as does the size of active snails in these areas. *Microxeromagna armillata* activity was low in the tree canopy during harvest compared to post harvest, intimating that fruit contamination is either occurring infrequently or post-harvest. Copper trunk bands were shown to minimise snail movement into the canopy and may be an important preventative measure.

These findings have changed the recommendations for *M. armillata* management in citrus groves of south eastern Australia.

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 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.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

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