

Introduction

Introduced Mediterranean snails are arguably one of the most important invertebrate pest threats facing the Australian grains industry. Their greater pest status in Australian broadacre crops than elsewhere globally limits the availability of overseas experience for local growers to draw on, but also positions Australian growers as leaders in innovation for pest snail management.

Snails cause widespread feeding damage, particularly to young crops. Even more significantly, their potential to contaminate the grain harvest leads to substantial pre- and post-farmgate losses for affected growers, as well as significant risks to trade for the industry.

The costs of snails to the grains industry are not well quantified, but together with slugs are likely to exceed \$170 million annually. These costs are incurred from crop losses, field management costs, harvest and post-harvest cleaning costs, grain rejection or value penalties at delivery, and opportunity costs which are difficult to capture. Opportunity costs may arise from growers' avoiding growing certain crops to avoid snails, or grain being diverted to alternative markets.

Research on the impact of snails in the grains industry has occurred since the 1980s, and GRDC has a history of investment in novel approaches to mollusc control, some of which are ongoing. Twenty-five years ago, the grains industry developed a truly integrated management program for snails, which still underpins best practice snail management.

Mollusc management consists of an integrated, year-round approach comprising cultural, mechanical, and chemical (baiting) methods undertaken in autumn, around the harvest operation, and between cropping seasons. Together these methods help mitigate snail populations but, even when performed exceptionally well, snails continue to pose problems.

With evolving farming practices, modern farms provide a generally favourable habitat for snails, with retained stubble increasing the availability of refuges, moisture, and carbon. Some of the earlier snail management practices (e.g., tillage, burning) are now less compatible with conservation farming, with snails also benefitting from reduced disturbance of the system. Meanwhile, invasive snails have continued their quiet spread between paddocks, farms, and districts, through movement of infested feed, vehicles, and equipment.

Together, these factors have contributed to an increased pest status of snails in existing and new geographic regions, which has been concurrent with tightening of grain delivery standards for snail contamination. Conical snails have emerged as a particular problem due to their small size, often high populations, preference for hiding in shelters, and the difficulty separating them from grain at harvest. Effective snail management has become more important than ever before for enhancing grower profitability.

Collective research efforts have led to the development and adoption of improved integrated control programmes for snails and some very promising approaches for further research, but no single 'silver bullet'. The impact of snails will continue to be problematic without an integrated 'systems' approach.

Ongoing research and development of novel monitoring and field control methods is required to better manage the risks of snails in our farming systems. This is likely to require multidisciplinary problem-solving approaches in the supply chain (field, harvest, postharvest), including AI based monitoring, engineering, robotics, biological control, movement interception, and agronomic strategies. But at the heart of successful management must be an ever-more comprehensive understanding of pest snail biology and ecology, to better know these enemies and their vulnerabilities.

GRDC has and will continue to investigate the most effective integrated snail management tactics for the grains industry.

Improved management of snails and slugs remains a priority to improve growers' profitability and ensure Australia's market access is maintained.

This revised and updated booklet *Nail the snails: A practical guide to integrated snail control for Australian grain growers*, is designed to guide and support growers and advisers in tackling snails. It draws heavily on the original research but homes in on the most relevant management strategies and key actions to consider throughout the crop management cycle.

Revisions to the manual include new and updated information on bait timing and application, harvest and postharvest practices, incorporation of newer research information available nationally, and a streamlined updatable format.

This guide provides a national resource to help growers make informed snail management decisions. The key message is that correct timing of controls, as well as patience and persistence, underpin successful snail control. The core management points are:

- 1. Practise farm biosecurity to prevent snails spreading**
- 2. Reduce snail survival over summer**
- 3. Bait snails before they breed**
- 4. Minimise snail contamination at harvest**
- 5. Clean infested grain after harvest**
- 6. Encourage biocontrol of conical snails**

Dr Leigh Nelson

GRDC Manager - Pests

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Image: Kym Perry