



# Managing Rat Lungworm Vectors In Edible Cropping Systems

## 1) Emphasis on Controlling the Hosts and Parasite

### Preventative Controls

Environmental (Cultural) Controls	Deterrents**	Natural Predators**
Manage water Reduce shade Monitor catchment tanks Monitor compost piles Eliminate feeding/breeding areas for rats Remove debris around farm Timely knock down of rotting material	Copper bands Fiber Glass Screen Lime Copper Hydroxide  **Should not be your <u>only</u> line of defense	Toad Predacious beetles Predatory snail  ** Use caution as they can potentially become a host

## 2) Implement an Attract and Kill Approach

Attract	Kill (Suppression Techniques)	
Physical Controls	Chemical Controls**	Non Chemical Suppression Techniques
Beer Traps (yeast attractant) Wood Boards Plastic sheeting / weed mat traps Fruit traps Bait stations for rats, slugs, and snails	Commercially available <b>rat</b> baits and blocks Commercially available <b>slug and snail</b> food baits**  ** See Table 1, commercial baits attract and suppress	Salt (dessicant) Hand picking** + Slug Jug (15% salt) Caffeine Beer (drowning) DIY, yeast, sugar, and flour solutions

## 3) Inspect Before Harvesting

Look for visual cues of pest damage prior to harvesting such as slime trails, feces, etc. and avoid harvesting products at risk.

## 4) Always Wash Before You Eat

Washing produce prior to eating is always a good practice. Just like washing your hands, washing can physically dislodge particles, and pathogens from fresh produce. Separate leaf sheath and discard produce of concern.

## NOTES

Handpicking: Use gloves and a designated tool for picking up slugs and snails

Bait systems attract targeted pest and also contain a toxicant to suppress the pest

Some bait formulations lose efficacy when they get wet

Rat baits require the use of bait stations to protect non target species and improve efficacy of the product

Some baits are toxic to non target animals, always read and follow the label



College of Tropical Agriculture  
and Human Resources  
University of Hawai'i at Mānoa



Department of Agriculture  
STATE OF HAWAII

Table 1: List of Approved Chemical Products for Slug and Snails in Select Vegetable Cropping Systems

Category	PRODUCT NAME	Lettuce	Cabbage	EPA REG NUMBER	Chemical 1
AG	DURHAM METALDEHYDE GRANULES 3.5	X	X	5481-91	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	DURHAM METALDEHYDE GRANULES 7.5	X	X	5481-103	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	DEADLINE M-PS MINI PELLETS	X	X	5481-507	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	DEADLINE BULLETS	X	X	5481-507	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	DEADLINE GT	X	X	6836-350-5481	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	IRONFIST SLUG AND SNAIL BAIT	X	X	67702-32-87865	Sodium ferric ethylenediaminetetraacetate (139114)
AG	METAREX 4% SNAIL AND SLUG BAIT	X	X	7173-257	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	AXCELA	X	X	6836-350	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	ORCAL SLUG-FEST ALL WEATHER FORMULA	X	X	71096-4	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	OR-CAL SLUG & SNAIL BAIT	X	X	71096-7	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	SLUGGER 4.0 SLUG & SNAIL BAIT	X	X	71096-13	2,4,6,8-Tetramethyl-1,3,5,7-tetroxocane (53001)
AG	OR-CAL BIO-SUL SLUG & SNAIL BAIT	X	X	71096-16	Sulfur (77501)
AG	FERROXX SLUG AND SNAIL BAIT	X	X	67702-33	Sodium ferric ethylenediaminetetraacetate (139114)
AG	FERROXX AQ	X	X	67702-49	Phosphoric acid, iron(3+) salt (1:1) (34903)
OMRI	SLUGGO SLUG AND SNAIL BAIT	X	X	67702-3-70051	Phosphoric acid, iron(3+) salt (1:1) (34903)
OMRI	BUG-N-SLUGGO	X	X	67702-24-70051	Phosphoric acid, iron(3+) salt (1:1) (34903)
OMRI	LEAF LIFE SLUGGO SNAIL AND SLUG BAIT	X	X	67702-3-34704	Phosphoric acid, iron(3+) salt (1:1) (34903)
OMRI	DESECT DIATOMACEOUS EARTH INSECTICIDE	X	X	<a href="#">7655-1</a>	Silicon dioxide

Read and follow directions on the manufacturer's label. Check if products are approved for intended use and follow rates of application. The label is the law. Mention of a trademark or proprietary name does not constitute an endorsement, guarantee, or warranty by the University of Hawai'i Cooperative Extension, College of Tropical Agriculture and Human Resources, or Hawai'i. Department of Agriculture or its employees and does not imply recommendation to the exclusion of other suitable products.

## REFERENCES

- 1) Barratti, J., D. Chan, I. Sandaradura, R. Malik, D. Spielman, R. Lee, D. Marriott, J. Harkness, J. Ellis, and D. Stark. *Angiostrongylus cantonensis*: a review of its distribution, molecular biology and clinical significance as a human pathogen
- 2) Cowie, R. H. (2013a). Biology, systematics, life cycle, and distribution of *Angiostrongylus cantonensis*, the cause of rat lungworm disease. *Hawai'i Journal of Medicine and Public Health* 72, 6–9.
- 3) Cowie, R. H. (2013b). Pathways for transmission of angiostrongyliasis and the risk of disease associated with them. *Hawai'i Journal of Medicine and Public Health* 72,
- 4) Hata, Trent Y., Arnold H. Hara and Benjamin K.-S. Hu (1997). Molluscicides and mechanical barriers against slugs, (*Stylommatophora*: *Veronicellidae*) *Vaginula plebeia* Fischer and *Veronicella cubensis* (Pfeiffer). *Crop Protection*, V.16. no. 6. pg. 501-506.
- 5) Hollingsworth, R. G., Howe, K. and Jarvi, S. I. (2013). Control measures for slug and snail hosts of *Angiostrongylus cantonensis*, with special reference to the semi-slug *Parmarion martensi*. *Hawai'i Journal of Medicine and Public Health* 72, 75–80.