



Managing Slugs, Snails, and Flatworms in the Home Garden to Reduce the Risk of Rat Lungworm Infection



Cynthia Nazario-Leary, PhD

Extension Agent in Urban Horticulture, Department of Tropical Plant & Soil Sciences

Effective management of slugs, snails, and flatworms utilizes a combination of methods, including elimination of desired hiding places, plant selection, barriers and traps, and baiting. None of these should be considered stand alone practices.

Know your slugs from your snails

All slugs, snails, and flatworms (predators of slugs and snails) can be hosts of the Rat Lungworm parasite. The Semi-Slug (*Parmarion martensi*) can be more heavily infected with the parasite.



Semi-slug eggs and young. Eggs are about 2.5 mm in diameter.



Adult semi-slug with residual "shell". Adults are about 5 cm long.

Semi-slugs can climb on structures, e.g. exterior house walls, drain pipes, and water tanks, as well as on fruit trees, e.g. banana, papaya, and avocado. They are found under plastic and in piles of compost, fallen palm leaves, and in other types of rotting organic matter.

Manage your growing environment

- Reduce number of places where slugs/snails can hide during the day. Check under boards, cardboard, stones, weed cloth, in dense ground covers, sheltered areas, soil crevices, and around trunks and weedy areas.
- Check and observe mulched areas for slugs/snails. Mulches can provide plenty of hiding spaces.
- Remove fallen and rotting fruit so that it does not become free food for slugs and snails.
- Don't leave pet dishes outside over night — slugs/snails are attracted to pet food and the rat lungworm parasite they carry can also sicken pets.
- Practice good watering techniques — slugs/snails prefer a moist environment and feed at night. Water early in morning to allow water to evaporate, and use drip irrigation with water directed toward individual plants.

Choose Plants and Planting Areas with Care

- Grow vegetable gardens and plants slugs and snails like to eat as far away as possible from places where they can hide.
- In areas with visible slug and snail activity, plant non-edible plants or select plants they do not prefer.
- Slugs and snails tend to not eat plants that are woody, highly scented, and/or have stiff leaves. These pests may still use these plants to hide in and ALL plants should be checked for presence of slugs and snails.

Snails and Slugs like to eat...

- Succulent foliage
- Seedlings
- Basil
- Beans
- Broccoli
- Cabbage
- Dahlia
- Lettuce
- Marigolds
- Most leafy greens
- Ripening fruit, e.g. strawberry, tomatoes



Physically Remove Snails and Slugs

- Handpicking and trapping can be very effective at reducing slugs and snails if done thoroughly and on a regular basis.
- Draw out snails and slugs by watering area in the late afternoon.
- After dark, search for them using a flashlight.
- For both handpicking and trapping, place collected snails/slugs in a container of saline solution, 7 parts water to 1 part salt. Make sure container has a lid.
- Let sit in saline solution for minimum of 48 hours to kill both slug/snail and parasite. Dispose in plastic bag in trash. DO NOT crush or add to compost.

SAFETY PRECAUTIONS

Slugs and snails can potentially be carriers of the rat lungworm parasite so care should be taken when removing them. It is important to never touch slugs, snails, or flatworms with your bare hands. Always pick up these pests by using tongs, chopsticks or even a plastic bag. We encourage you to wear gloves when removing slugs, snails, and flatworms.

REFERENCES

- Hata, T.Y., A.H. Hara, B.K.-S. Hu. 1997. Molluscicides and mechanical barriers against slugs, *Vaginula plebia* Fischer and *Veronicella cubensis* (Pfeiffer); *Crop Protection* Vol. 16, No. 6: 501-506.
- Hara, A.H., Cabral, S.K., Niino-DuPonte, R.Y., Aoki, K.L., Zarders, J. 2013. Slugs: Best management practices. University of Hawai'i at Mānoa, CTAHR, Komohana Research & Extension Center, Hilo, HI.
- Hollingsworth, R. G., Howe, K., & 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 & Public Health*, 72(6 Suppl 2), 75-80.
- Flint, M. L. and Wilen, C.A. 2009. Snails and Slugs, Integrated Pest Management for Home Gardeners and Landscape Professionals. University of California, Agriculture and Natural Resources, Oakland, CA. Publication 7427.

Set Traps

- Traps include wooden board, cardboard, folded plastic tarp, beer, and melon rind traps.
- Traps will only attract slugs and snails within a few feet of trap. Install several traps around garden area.
- Beer traps need to be replenished every few days to keep the level deep enough for them to drown. They should have deep, vertical sides to keep slugs and snails from crawling out and a cover to reduce evaporation.
- Place traps in early evening and scrape off slugs and snails the following morning. Dispose of properly in container of saline solution.



Erect Barriers

- Barriers can repel slugs and snails but do not kill. They should be used in addition to other control measures to reduce number of slugs/snails in the garden.
- Copper bands/tape can repel slugs/snails. They should be at least 2 inches wide and must be kept shiny and clean. If burying copper bands they need to be at least 4 inches tall. Bury a portion of band a few inches below the soil to prevent slugs from crawling beneath the barrier.
- Barriers of desiccating or other abrasives (diatomaceous earth, egg shells, etc.) heaped in a band 1 inch high and 3 inches wide will deter but lose effectiveness after becoming damp and need to be replenished often.



For more information please contact your nearest UH Cooperative Extension office:

Honolulu Extension Office
1955 East-West Rd. Ag Sci III,
Rm. 217, Honolulu, HI 96822
tel: (808)956-7290
uchidar@ctahr.hawaii.edu

Kauai Extension Office
State Office Bldg., 3060 Eiwa
St., Rm. 210, Lihue, HI 96766
tel: (808)274-3471
Lihue@ctahr.hawaii.edu

**Komohana Research and
Extension Center**
875 Komohana St., Hilo, HI
96720
tel: (808)969-8201
komohana@ctahr.hawaii.edu

Kahului Extension Office
310 Kaahumanu Ave., Bldg.
214, Kahului, HI 96732
tel: (808)244-3242 x222
kahului@ctahr.hawaii.edu

Molokai Extension Office
P.O. Box 394
Hoolehua, HI 96729
tel: (808)567-6929
molokai@ctahr.hawaii.edu

Bait

- Baiting is most effective when placed late afternoon or evening.
- Irrigate or apply water BEFORE applying bait to encourage snail and slug activity.
- Place bait in moist and protected locations and in known snail and slug crossings.
- Do not pile bait in mounds or clumps, especially more hazardous bait, since it makes more attractive to pets and children.

Iron Phosphate and Sodium Ferric EDTA

- Causes snails and slugs to stop feeding. Dies 3 to 6 days later. Evidence of death may not be readily visible.
- Safe to use around pets, children, fish, birds, beneficial insects, and other wildlife.
- Can be used around gardens, ornamentals, and fruit trees.
- Check product for Organic certification.
- Can remain active for up to 2 weeks, even with repeat wettings.



Metaldehyde

- Dehydrates snails and slugs. Kills within 1 to 3 days.
- Poisonous to pets, do not use where children and pets could encounter them.
- Avoid getting bait on plants and do not apply to food crops after the edible portion has formed.



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.

PESTICIDE PRECAUTIONS

Read and follow directions on the manufacturer's label. Check if products are approved for crops and follow rates of application. THE LABEL IS THE LAW! If you have questions about pesticides or repellents, please contact your local Hawai'i Department of Agriculture (HDOA) Pesticides Branch. Contact information can be found at

https://hdoa.hawaii.gov/pi/files/2013/01/Pesticide-Branch-Contacts_General-10-16.pdf

University of Hawai'i Cooperative Extension at <http://go.hawaii.edu/jhS>

Other helpful sites:

National Pesticide Information Center (NPIC), <http://npic.orst.edu/>

Organic Materials Review Institute (OMRI), <https://www.omri.org/>

COOPERATIVE EXTENSION UNIVERSITY OF HAWAII AT MANOA COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES 1955 EAST-WEST ROAD, AGRICULTURAL SCIENCES 306, HONOLULU, HAWAII 96822 The UH-CTAHR Cooperative Extension and the U.S. Department of Agriculture cooperate in presenting to the people of Hawai'i programs and services without regard to race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status. The