



RAT LUNGWORM (RLW) & RAINWATER CATCHMENT



PROTECT YOURSELF

- The most widely endorsed water treatment method is a series of sediment filters followed by an ultraviolet light disinfection system (Macomber 2010, CTAHR, UH Manoa), **but this may not be sufficient to keep out RLW larvae.**
- Sediment filters reduce debris to allow UV light to penetrate the water column for disinfection.
- Most sediment filters sold on Hawai'i Island have a "nominal filtration" rating (not an absolute size). Nominal rating is defined as $\geq 85\%$ and absolute rating is defined as $>99.9\%$ of particles of a given size will be retained by the filter as determined from a single-pass particle counting results. (Harrison 2000, Wes McGowan, 4th Edition)
- Filter ratings do not account for RLW larvae behavior such as swimming or burrowing.
- The Jarvi Lab pilot study shows that sediment filters tested can reduce the number of RLW larvae. (Howe et al. (2019) PLoS ONE 14 (4):e0209813)
- UV light damages bacteria and virus DNA resulting in an inability to grow, reproduce, and/or death (Kumar et al. 2004, Photochem & Photobio 80: 15-21). Multicellular organisms, like RLW larvae, can repair some DNA damage which may extend their life. (Leung et al. 2013, BMC Pharmacol & Toxicol 14:9)
- An ongoing Jarvi Lab pilot study evaluating the effects of UV light suggests doses comparable to a whole house UV system do not immediately kill RLW larvae. (unpublished)
- We continue our studies on this important problem and will make results publicly available.
- **Use potable water for consumption.**

This brochure was produced by the Hawai'i Island Rat Lungworm Working Group (Jarvi Lab), Daniel K. Inouye College of Pharmacy, University of Hawai'i at Hilo. Supported by funding from (1) Dr. and Mrs. Richard Robbins representing the Max and Yetta Karasik Family Foundation (2) National Institutes of Health (NIH), National Institute of General Medical Sciences (NIGMS), IDeA Networks of Biomedical Research Excellence (INBRE), (3) Hawai'i Catchment Co, Keaau, Hawai'i, (4) Kea'au Ace Hardware, and (5) the State of Hawai'i. The content is solely the responsibility of the authors and does not necessarily represent the official views of any funding source.

RESEARCH FACTS Howe et al. (2019) PLoS ONE 14 (4):e0209813.

- Live, infective stage (L3) RLW larvae generally emerge from drowned slugs and snails within 3-4 days.
- Infective stage (L3) RLW larvae can survive in water for at least 21 days.
- Most RLW larvae sink to the bottom of a 50 mL tube.

Pilot study: Sediment filter testing¹

Brand (model) ²	Material	Size	% larvae crossed filter
United Filters International (UP20R10P)	Wound polypropylene	20 µm	6 -7 %
Culligan (CW-F)	Wound polypropylene	10 µm	18-41 %
Matrikx Accucarb (32-250-10-GREEN)	Carbon block	5 µm	0 %
Culligan (P5)	Spun polypropylene	5 µm	0-2 %
Culligan (P1)	Spun polypropylene	1 µm	0- 7 %

¹Methods employed have a 20-36% margin of error.

²Brand names are mentioned for experimental results only and do not constitute an endorsement by the University of Hawai'i.

WORDS OF CAUTION

1. Do not expect all filters of a particular size, material, or brand to perform exactly the same in a household catchment system as our pilot test.
2. Do not assume any filter will provide 100% protection under variable conditions.
3. Do not assume all larvae are at the bottom of your catchment reservoir as conditions may vary.
4. Organic debris in a catchment system may affect filter performance and/or larvae viability or infectivity.
5. Higher water pressure may change filter performance.
6. It is unknown if the concentration of bleach recommended for water disinfection is effective in killing RLW larvae and bleach may expose consumers to toxic compounds when it reacts with organic matter (Nuckols et al. 2005, Environ Health Perspect 113: 863-870)

This information is designed to aid consumers in the prevention of waterborne illness. Consumers should be aware that routes of disease transmission can vary.

Further studies will become publicly available upon completion. For more

information about rat lungworm disease please visit our website:

<http://pharmacy.uhh.hawaii.edu/rat-lungworm-overview>