

**Slimy Friends and Foes: Understanding Slugs and Snails**  
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Slugs and snails are common in almost any ecosystem and particularly in nurseries where ideal habitats are a given. As a general rule, slugs and snails are almost always considered as unwanted pests. Most slug and snail problems as horticultural pests are caused by invasive species. There are few educational resources available describing the great diversity of snails, many of which are beneficial and suffer unnecessary controls. Beneficial snails contribute to the organic fraction of the soil cycle while some species are predators of other snails. Many of the products currently used for slug and snail control kill non-target arthropods and lead to an increase in mite populations and therefore, increased pesticide usage. Additional research is needed to identify more effective, affordable, and environmentally sound control of harmful slugs and snails. This poster presents an overview of slugs and snails, identifying harmful and beneficial species and providing web sites where color images of each can be viewed.

## **INTRODUCTION**

Slugs and snails are Gastropods (class Gastropoda). Slugs and snails are typically met with the same negative reception as snakes – often expressed with the sentiment of “the only good snake is a dead snake”. There are approximately 40,000 gastropod species inhabiting terrestrial, freshwater, and marine environments across the globe. Eastern North America has over 500 species of terrestrial snails and slugs (Hubricht, 1985). Morphologically, the great difference between slugs and snails is fairly simple; slugs lack the calcium carbonate shell common to snails. The shell provides increased protection from the environment; as most snails can seal themselves in their shell with a thin mucus layer at the opening (aperture). The shell can also make it difficult for a predator to reach a snail because of the structures (lamellae) in the aperture. A slug's lack of a shell increases its mobility and access to food. Most snails (henceforth referring to slugs and snails) eat detritus (decaying organic material) and fungus. Some of a snail's more important functions are to aid in the decay of organic material and act as a calcium source for the soil and other animals. The remainder of snails can be classified as herbivorous, omnivorous, and even carnivorous. To the ecosystem, a snail's function is invaluable. To the horticulturist and home gardener, a snail's function may also include the destruction of plants.

**Pest Habits.** A snail that destroys plants falls into the minority. The most common effect that a snail has on a plant is to eat holes into its leaves. Snails have teeth arranged in rows that rasp through a leaf. Snails such as *Helix aspersa* Fig. 1 (invasive spp.) are major pests of citrus crops. *Zonitoides arboreus* Fig. 2 is a major pest of plant roots. Slugs do most of their damage to leaves. Plant damage normally occurs after dark when moisture levels are higher and temperatures are lower. During the day, snails usually hide in a moist dark place unless there is ample shade and high levels of moisture. These animals move across a mucus layer secreted through what is called a foot (the ventral side of the animal), which leaves a trail that is often considered unattractive. Some of the snails commonly encountered as pests include *Limax maximus* Fig. 3, *Helix* spp., *Cepaea* spp., and *Zonitoides arboreus*.



Figure 1



Figure 2

**Pest Control.** Generally speaking, information on snails is not readily available. In fact, only a few scientists study snails. Information of specific snail habits and especially identification is difficult to obtain. Once a snail problem is identified, one must decide on control measures. Herein lies a big problem. There are very few control options for snails (chemical, cultural, biological, or organic). One of the most common methods of snail control is the use of a chemical such as metaldehyde, which paralyzes the snail and allows for exposure to environmental conditions such as heat and lack of moisture leading to dehydration and death. Metaldehyde is generally applied in pellet form as bait. Recently, caffeine was reported as a possible control method for snail pests common in orchid production (Hollingsworth et al., 2002). Other reports indicate that the use of copper screening placed around trees, table legs, or beds protruding from the ground around an area might provide control. When a snail comes in contact with the copper, there is an electrical discharge that is uncomfortable to it, thus acting as a deterrent (Canyon Communications, 2002). Biological control can involve anything from molluscicidal nematodes (Ester et al., 2003) to predatory snails like the omnivorous *Rumina decollata* Fig. 4. Several home remedies are commonly used in attempts to control snails (i.e. salt, beer, broken egg shells, ashes, diatomaceous earth, etc.) as well as other reports of organic controls (Singh and Singh, 2000; Speiser, 1999). Unfortunately, controls currently are mediocre at best and there is little being done to provide a remedy for this problem.



Figure 3



Figure 4

**Beneficial Snails.** Before snails were considered pest problems, they were shipped to the United States with good intentions. Some snails such as *Helix aspersa*, that we now consider pests, were brought into the U.S. as a food commodity. *H. aspersa* is the most common snail used in meals or hors d'oeuvres as escargot. Heliciculture (snail farming) is a multi-million dollar a year global business. Most slugs seen in urban areas were introduced plant pests from Europe (Burch, 1995). Most native slugs stay in the woods feeding on decaying plant material and fungus (Burch, 1995). This decomposition activity of gastropods helps to build soil. With the great diversity of gastropods, most snails seen in or around the garden are not pests at all. Many snails seen in these settings are actually after fungus or algae growing on a plant, the plant container, mulch, or the growing substrate. More often than not, when a home gardener or commercial grower turns over a pile of leaves or stirs up growing medium, snails seen are the beneficial ones. Beneficial snails (i.e. *Mesodon thyrooidus*, Fig. 5), as mentioned before, usually eat detritus or fungus. In 1939 leaves of lilac (*Syringa vulgaris*) in Durham, North Carolina, were found infected by the powdery mildew (*Microsphaera alni*), with peculiar markings noted on some of the plants. When examined at night, the markings were identified as feeding tracks of *M. thyrooidus*. Snails placed in jars were found to consume numerous larger fungi as well as slime molds and a lichen. All of the species of fungi offered were eaten in preference to lettuce or other chlorophyll-containing food (Pilsbry, 1939). There are also snails (*Euglandina rosea* Fig. 6) that prefer to eat other snails. *E. rosea* tracks other snails by the scent of their mucus trail. Many *E. rosea* have probably died from the lack of proper identification for these members of the native environment when they should have been left alone to eat the harmful species. However, *E. rosea* has become a major pest in other countries and in Hawaii, by severely reducing the populations of their native snail fauna, while remaining a very valuable part of the southeastern U.S. ecosystem. Two of the largest families of Terrestrial gastropods in the U.S., Polygyridae (*Mesodon* spp., *Triodopsis* spp., *Inflectarius* spp., etc.) and Zonitidae (*Ventridens* spp., *Mesomphix* spp., *Glyphyalinia* spp., etc.) contain very few pest species. Zonitidae has at least one species that is a major pest, which is *Z. arboreus*.



Fig. 5 *Mesodon thyrooidus*,



Fig. 6 *Euglandina rosea*

## Summary

Little information exists relative to the impact of beneficial and pest snails in horticultural crops. The few snail taxonomists are generally those in the field of biological sciences. Additionally, snail control methods and product research is a great need. Many of the chemical controls used contain carbaryl (Sevin™) which kills many non-target arthropods and causes an increase in mite populations and, therefore, increased pesticide usage. Another major chemical control is metaldehyde products, but due to the non-target and vertebrate toxicity levels of metaldehyde, it is under much scrutiny. More research is needed to validate the effectiveness of many currently recommended controls (i.e. diatomaceous earth, beer baits, etc.). Without being listed on the product package, a product cannot be legally used for snail control. Also, recent work with caffeine needs to be further evaluated to determine efficacy and economical use to the horticulture industry. Biological controls must be investigated carefully to determine ecosystem impacts. Integrated pest management strategies incorporating chemical, biological, and cultural practices may lead to more effective controls with minimal environmental impact.

## LITERATURE CITED

- Burch, J.B.** 1995. Class Gastropoda/Subclass Pulmonata. (Last accessed August 2003). <http://animaldiversity.ummz.umich.edu/mollusca/gastropoda/geophila.html>
- Canyon Communications/Gowan Company.** 2002. Move fast to manage mollusks. *Ornamental Outlook* 11(2):36-38.
- Ester, A. K. van Rozen, and L.P.G. Molendijk.** 2003. Field experiments using the rhabditid nematode *Phasmarhabditis hermaphrodita* or salt as control measures against slugs in green asparagus. *Crop Protection* 22:689-695.
- Hollingsworth, R.G., J.W. Armstrong, and E. Campbell.** 2002. Caffeine as a repellent for slugs and snails. *Nature* 417:915-916.
- Hubricht, L.** 1985. The distributions of the native land mollusks of the Eastern United States. *Fieldiana. Zoology*, no. 24, viii, 191 p.
- Pilsbry, H.A.** 1939. Land Mollusca of North America (north of Mexico). Monograph (Academy of Natural Sciences of Philadelphia), no. 3. v.1 pt.2: 710.
- Singh, K. and D.K. Singh.** 2000. Toxicity to the snail *Limnaea acuminata* of plant-derived molluscicides in combination with synergists. *Pest Manag. Sci.* 56:889-898.
- Speiser, B.** 1999. Molluscicidal and slug-repellent properties of anaerobically digested organic matter. *Ann. Appl. Biol.* 135:449-455.