

SLUG PESTS OF GRASS AND FORAGE SEED PRODUCTION SYSTEMS IN OREGON

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Introduction

Slugs are among the most important pests of grass and forage seed production in Oregon and have been estimated to cause \$60 million in damage to these crops annually (Salisbury, 2015). Although the gray field slug is the most damaging species, there are a number of other pest slugs that are largely overlooked or misidentified. Although multiple pest slug species can co-occur in the same field, one species often dominates.

Accurate identification of pest slug species is essential for successful management, as some control strategies work better with certain slug species than with others. For example, field slugs (*Deroceras* spp.) are more susceptible to metaldehyde baits than are roundback slugs (*Arion* spp.) (Wedgewood and Bailey, 1988). In fact, many of the overlooked pest slugs in seed crops in Oregon are *Arion* species. Because current control measures in the Willamette Valley focus heavily on the use of molluscicidal baits, the importance of accurately identifying the pest species infesting a crop cannot be overstated. The goal of this report is to give an overview of the main slug pests of grass and forage seed crops and to provide an easy-to-use field identification key.

Basic Slug Morphology

A basic knowledge of the main body parts of slugs is required for accurate identification (Figure 1). Key features include the mantle, which is a saddle-shaped structure located behind the head. The position of the breathing pore on the mantle is an important diagnostic characteristic. This pore is typically either located in the

posterior (closer to the tail) or the anterior (closer to the head) part of the mantle (Figure 1).

The foot fringe is where the body meets the foot. There are two pairs of tentacles located at the anterior (head) end of the body, the upper ocular tentacles, which have eye spots, and the lower peduncular tentacles. Mucus is produced by both the body and the foot, and its color and consistency (watery or sticky) can be important for distinguishing different species.

References

- Hoffman, G.D. and S. Rao. 2013. Association of slugs with the fungal pathogen *Epichloe typhina* (Ascomycotina: Clavicipitaceae): Potential role in stroma fertilisation and disease spread. *Annals Appl. Bio.* 162:324–334.
- Rowson, B., J. Turner, R. Anderson, and B. Symondson. 2014. *Slugs of Britain and Ireland. Identification, Understanding and Control.* Telford, U.K.: FSC Publication.
- Salisbury, S. 2015. The cost of slugs to the grass seed industry in the Willamette Valley. Presented to the House Agriculture and Natural Resources Committee chairman at the Oregon capitol, Salem, May 2015.
- Wedgewood, M.A. and S.E. Bailey. 1988. The inhibitory effects of the molluscicide metaldehyde on feeding, locomotion and faecal elimination of three pest species of terrestrial slug. *Annals Appl. Bio.* 112:439–457.

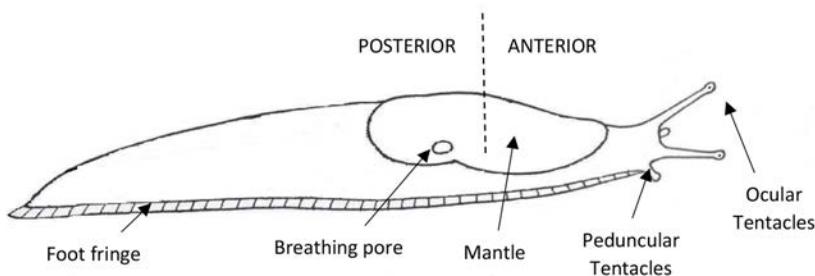


Figure 1. Main slug body parts used in species identification. The broken line illustrates the approximate midpoint of the mantle. If the breathing pore is to the left of this line (toward the tail), it is termed posterior; if it is to the right (toward the head), it is termed anterior. In this figure, the breathing pore is in the posterior part of the mantle.

Welter-Schultes, F.W. 2012. *European Non-marine Molluscs, a Guide for Species Identification: Bestimmungsbuch für Europäische Land- und Süßwassermollusken.* Gottingen, Germany: Planet Poster Editions.

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Field Identification Key

1. Breathing pore located posterior to the midpoint of the mantle (as in Figure 1)..... go to 2
Breathing pore located anterior to or at the midpoint of the mantle..... go to 3
2. Slug brown; body mucus watery and colorless..... **Marsh slug**
Slug cream or gray, often with darker flecks; body mucus sticky,
becoming milky colored when slug is handled..... **Gray field slug**
3. Foot fringe with thin, vertical lines **Dusky slug**
Foot fringe without thin, vertical lines go to 4
4. Grayish-white slug; foot mucus colorless..... **White-soled slug**
Yellowish-brown slug; foot mucus yellow or orange **Hedgehog slug**

To view photographs of these slug species, visit the OSU Slug Portal website at <https://agsci.oregonstate.edu/slug-portal>.

Brief Species Descriptions

Gray field slug (*Deroceras reticulatum*)

A small to medium-sized slug, up to 2 inches (50 mm) long when extended. Specimens in the Willamette Valley tend to be gray or cream colored, with dark flecking throughout the body. Easily identified because its mucus typically changes from colorless to milky when it is handled. The most abundant and damaging slug species in grass and forage seed crops in Oregon. Unlike some pest slugs (e.g., the dusky slug), this species often is dispersed throughout crop fields (Rowson et al., 2014).

Marsh slug (*Deroceras laeve*)

A small, fast-moving slug, up to 1 inch (25 mm) in length when extended. Mucus is clear and watery. In the Willamette Valley, specimens tend to be pale chestnut to deep brown in color. The marsh slug is amphibious and can survive flooding events that kill other slug species. It may intentionally enter the water and survive for days completely submerged. Eggs also hatch under water (Welter-Schultes, 2012). Given this behavior, this species likely thrives in the wetter parts of grass and forage seed production fields.

Dusky slug (*Arion subfuscus*)

A medium-sized slug, up to 2.75 inches (70 mm) long when crawling and typically brownish yellow in color. Body mucus is yellow or orange. The foot fringe has thin, black, vertical lines. The dusky slug lives primarily at the edge of fields, and it has a preference for dense vegetation. However, it has been observed moving into crops, where it likely facilitates fertilization of the fungus *Epichloë typhina*, which causes choke disease in orchardgrass (Hoffman and Rao, 2013).

White-soled slug (*Arion circumscriptus*)

Also known as the brown-banded slug, this small to medium-sized species is up to 1.5 inches (40 mm) long when extended. The body tends to be grayish white, mucus is colorless, and the sole of the foot is white or light gray. Over the past 15 years, this slug has become more common in Oregon. Based on collections, it is the second most abundant slug species in grass and forage seed crops and is more prevalent in the northern part of the Willamette Valley. Like the gray field slug, it often is found dispersed throughout the field.

Hedgehog slug (*Arion intermedius*)

A small slug, up to 0.75 inch (20 mm) in length when crawling. Sole mucus is yellow to orange. Body color varies, but specimens in the Willamette Valley tend to be gray or brownish yellow. Although not visible to the naked eye, the prickles on this slug's body when at rest gives it its name. This species has only recently been found associated with grass and forage seed fields, and it seems to be confined to field edges.