

Slug Scouting FS-2

Introduction

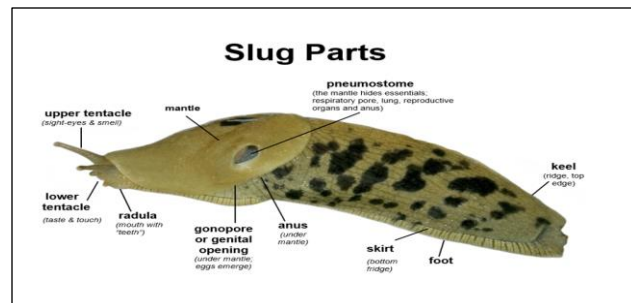
Slug damage to agricultural grain crops have become a major problem, especially in no-till and cover cropped fields. With greater food sources and adequate shelter, slug numbers may increase dramatically over time. Understanding slug biology is the first step to controlling slug damage. The second step is to conduct slug scouting and understanding what factors attract slug to agricultural fields. Managing the slug's food and shelter are critical steps to controlling slug populations.

Agricultural Slug Damage

Slugs may damage virtually all agricultural crops. They are a common pest in corn, soybeans, wheat, alfalfa, hay fields, small grains, and canola and cover crop fields. Slugs have over 27,000 teeth and can eat 2.0-2.5X their daily weight per day. About 20% of no-till acres may lose yield from slug damage. So slug feeding is a major agricultural pest in no-till and cover cropping systems.

Slugs cause a variety of damage to plants. They feed on both decaying and fresh plant tissue. Slugs can hollow out seeds, scar roots and tubers, feed on the emerging radicle, kill the growing point of plants (for corn below ground, for soybeans below the cotyledon) and shred holes in emerging leaves. Slugs like lush growth and feed on newly emerging leaves that are high in nitrogen and low in carbon. They do not like to consume lignified stems or mature plants. Most stand losses are attributed to poor seed slot closure, and slugs feeding on plant tissue may damage the plant's growing point.

Slugs damage that kills or terminates the growing point on plants result in plant death. Slug feeding on new leaves often skeletonize the leaf and then is prone to desiccation. Slugs often follow the unclosed planting slot during wet planting conditions which increases plant death. Damage to 2nd and 3rd year plants is less



noticeable unless extensive winter or early slug feeding occurs. The biggest losses occur in the spring and fall to new germinating plant seedlings. Most fall slug damage comes from adult slug feeding.

Corn slug damage is most severe from emergence to 4 leaf stage. Later, slugs may feed on corn brace roots, but damage is small and is not economically significant (Purdue University). Slugs like tender young corn seedlings, new roots and shoots. Damage above the growing point is less significant than damage below the growing point. Most plants can outgrow slug damage unless cool wet conditions prevail and the slugs outgrow the plants. **Slugs require cool, moist, dark conditions and young lush vegetation to survive.** Entire corn rows may disappear after planting due to retarded corn plant growth. Slugs use rasping grating “teeth mouth parts” to shred tender leaves, stripping and shredding leaves between the veins, which may result in desiccation. Most weeds and any young plants are prime slug food.

Slugs prevent soybean establishment and may greatly lower soybean yields by reducing stands. Slug feeding and/or damage below the cotyledon and growing point often results in soybean death. Often this damage occurs before a producer even notices that slugs have damaged the field. Slugs are nocturnal but feed in early mornings and at dusk under cloudy, overcast, cool moist days. Slugs leave slimy trails on plants and the soil they inhabit. Slug damaged holes may be seen on underground plant parts, seedlings, cotyledons, and the first plant leaves. Soybean plants clipped below the cotyledon will die while slug seedling damage above the cotyledon generally results in almost no yield loss. Slug girdling effects on soybean yield may vary if it stunts the plant. Slug damage on soybeans is greater and faster than on corn. Producers may not see the soybean yield loss until it is too late.

Slugs often live and hide in corn residue no-till planted to

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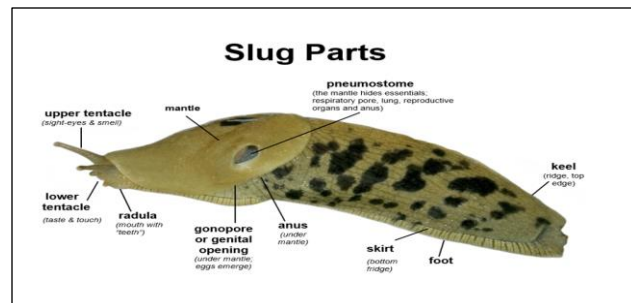
soybeans. A population of 10 slugs per square foot may consume 215 pounds of forage per acre per day (Kentucky University Extension). Slugs tend to feast on newly emerging soybean plants when conditions are cool and wet (slows soybean plant growth) following unclosed slots. Avoid planting soybeans when the slot will not close. To avoid this problem, either plant or drill soybeans when soil conditions are drier, make sure the slot is closed, and plant soybeans deeper so that when soybean emerge, they have an established root and have a chance to outgrow slug damage. Soybeans planted deeper (2 inches) have a more vigorous root system and may outgrow potential slug damage.

Scouting

Slugs are nocturnal, so scouting after sundown is the best way to find slugs to assess population density. Use a flashlight and look for small juveniles which often are hard to see. In the Midwest, warmer days in April and early May is the best time to scout and look for slug eggs or slug adults. Monitor slugs till early June when neonates hatch. Monitor fall slug populations (September-October) to identify problem fields for next year (eggs, juveniles, adults). Look for slug feeding on younger plants combined with heavy feeding. The greatest plant damage potential comes from juveniles feeding in the spring. Adult slugs do most of the damage in the fall.

Guidelines (From Oregon State University)

- 1) Start fall scouting after harvest. If >5 slug/ft², consider control options.
- 2) Scout fields at least 30-45 days before planting. If >5 slug/ft², consider control options. Kill all vegetation 30 days before planting.
- 3) Scout for slugs one week before planting. If <2 slug/ft², generally slug damage control is not



economical. If >5 slug/ft², consider repellants, alternative feeds, toxicants (baits), and other control practices.

- 4) The best scouting time for slugs is to start in the fall (September) and then 30-45 days before spring planting starting in April.

To assess slug populations, utilize shingles, old boards, newspapers, or cardboard. Place these materials near the soil surface in at least five locations in early fall, spring, and early summer. Check for slugs after one week. Slugs prefer lower, moist areas with high soil organic matter. Place close to a food source like young growing plants. Slugs do not tolerate flooded or standing water. There are no real economic thresholds for slugs but a general guide is as follows:

- 1) 1-2 slugs Low
- 2) 2-3 slugs Medium
- 3) 4-5 slugs High (Oregon State University)

Slugs can be monitored with their favorite food, fermented products like beer. Pie plates are often buried slightly below the soil surface and filled with beer. The slugs generally drown in the beer. A 1987 Colorado State study found that slugs prefer: 1) Kingsbury Malt, 2) Michelob, and 3) Budweiser. Slugs appear to have expensive tastes! Generally any beer or fermented product will attract slugs.

Slug Cultural Practices to Reduce Slug Numbers

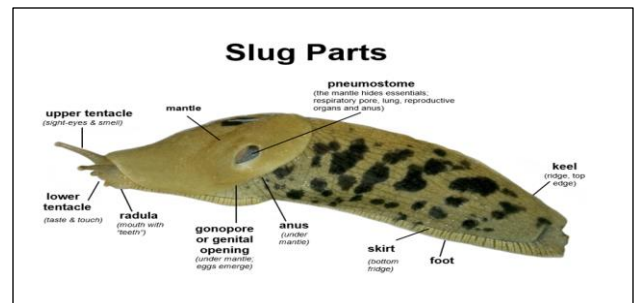
To control slugs, there are five major things to consider: food; shelter; predators; use repellants, trap crops, or toxicants (baits); or adapt new management practices that reduce slug numbers. Multiple strategies are

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generally needed to control or reduce slug numbers and slug density to an acceptable level.

The first step is to reduce food sources and shelter. If using cover crops, consider the following practices:

- **Modify Cover:** Avoid planting grasses and seeds that provide a food source. Avoid planting cover crops that are too tall or thick if you see high slug populations at harvest time.
- Slugs eat many different types of plants so terminating weeds in the fall before planting cover crops is a good way to reduce slug populations temporarily.
- Plant crimson clover as a non-food source for slugs. Crimson clover needs to be planted in early fall, so plant an early maturing grain crop in order to successfully grow crimson clover. In the Midwest, August-September planting dates are suggested. Crimson clover seed may be broadcast or aerially seeded (because slugs dislike crimson clover) while most other cover crop seeds that are potential food sources should be drilled.
- Selecting a cover crop mix that contains 50% species that winter kill may provide a less favorable slug habitat and still retain most of the conservation benefits. A good cover crop mixture: Drilled oats, crimson clover, radish (>50 percent winter kill). Note: Slugs are attracted to radish (Daikon, white tuber) because they are sweet however radish are high in sulfur which is a natural fumigant and tends to reduce slug populations (Ohio State University Extension).
- For cereal rye, reduce the rate by adding another cover crop species: cereal rye + oats, cereal rye + kale, **cereal rye + crimson clover**

may be the best mix. Avoid adding rape or canola to a fall cover crop mix because it is another preferred slug food source.

- Plant and drill grain crops at least 2" deep to increase plant growth. Make sure the planting slot is well covered.
- Use early herbicides to terminate cover crops 30 days before planting (Minimum 21-28 days) to reduce the slug's food source.
- Keep field borders mowed close especially around fence rows, waterways, buffers, road ditches, and edge of woods. Mowing cover less than <8 inches opens the landscape up to predators. Keep the cover crop vegetation low by either mowing or modifying the cover crop seeding mixture.
- For NRCS government contracts, discuss these practices with your local representative before implementing. Mowing may affect other resource concerns (wildlife, rabbits, and quail) and your government payment.
- In agricultural fields, slugs often migrate into newly harvested fields before or after harvest to forage for unharvested seed (wheat, corn, soybeans). These areas become a haven for slugs if they are not disturbed (no-till) especially if cover crops are sown. Thick growing, tall dense vegetation provides both food, shelter from predators, and insulation from low winter temperatures. Slugs prefer to hide under thick dense Mats of vegetation. Broadcasting cover crop seed (especially cereal rye seed) on the soil surface is an easy food source for slugs, drilling seed is better. Slugs also like to locate in areas with high residue like chaff, so make sure crop residue is evenly spread and distributed over the soil surface. High residue areas are a source of concentrated food and also provides shelter.

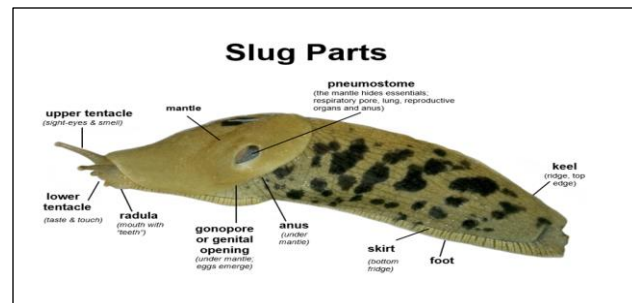


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- Slug damage in no-till fields and fields with cover crops generally exceeds slug damage in conventional fields. Tillage disrupts the slug eggs, juveniles, and adults and also buries the food source. Tillage has been shown to reduce slug populations by 80%, but under high slug densities, this practice alone may not control the slug population. Multiple strategies may be needed to reduce slug numbers to economically acceptable level.
- In the spring, slugs prefer to feed on whole soybeans and emerging soybean cotyledons. Drilling seed is better and planting seed >2 inches deep reduces slug damage because the plant may grow faster and outgrow slug damage. Drilling seed also increases the seeding rate, which may help compensate for reduce plant populations. Under wet spring soil planting conditions, slug will follow the soybean row and seed slots that are not fully closed, allowing slugs to feast on emerging soybean cotyledons.

Summary

This fact sheet covers scouting for slugs and reducing slug food and shelter. Controlling vegetation density by mowing, terminating vegetation 30 days before planting, and using 50% cover crop species that die out in the winter or are non-food sources are key practices that may reduce slug density on agricultural fields. Drilling cover crop seed versus broadcast spreading also reduces the seed as a food source. Spreading chaff evenly across the soil surface also reduces a concentrated food source and reduces shelter. The third fact sheet in this series will discuss using and promoting predators to reduce slug populations.



Fact sheets in this Series:

- 1) Slug Biology FS-1
- 2) Slug Scouting FS-2
- 3) Slug Predators FS-3
- 4) Slug Repellants & Baits FS-4
- 5) Slug Management Practices FS-5

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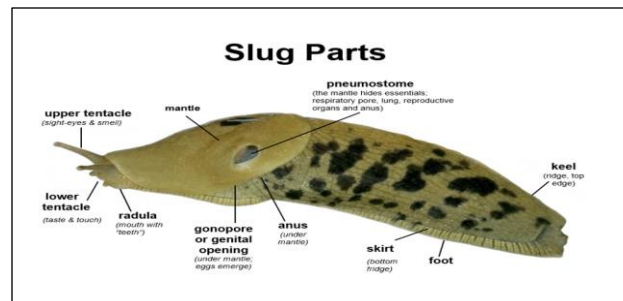
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