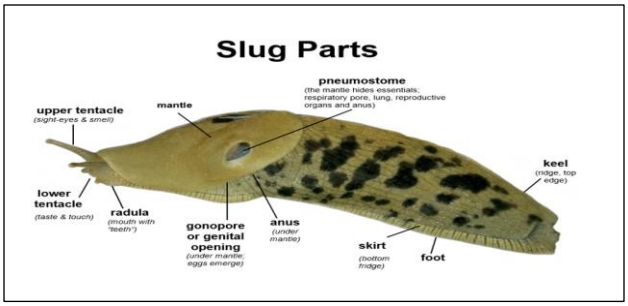
Slug Management FS-5 (Draft Copy)



Introduction

Controlling slugs in agricultural crops is difficult because slug reproduce quite quickly. To control slugs, producers must:

1) Understand Slug Biology, their Habitat, and their Environment
2) Scout for Slugs and Know their Slug Density
3) Manage or Reduce Slug Food and Shelter
4) Increase Slug Predators
5) Utilize Repellants, Alternative Feeds, and Toxicants (Baits) effectively
6) Combine a combination of management strategies to keep slug numbers at an economical level that does not excessively damage agricultural crops.

No one strategy has proven to be consistently successful at controlling slug populations. This fact sheet will summarize various slug management practices.

Farm Management Practices that Enhance Slug Numbers

1) Dense thick tall vegetation (fence rows, buffers, water ways, filter strips): food & shelter
2) Planting cover crops early resulting in thick dense vegetation: food and shelter
3) No-till or minimal soil disturbance: food and shelter
4) Leaving unharvested seed on the soil surface (shattering, poor grain cleaning): food
5) Broadcasting cover crop seed on the soil surface: food source
6) Poor chaff spreaders: Provides both food and shelter from residue and grain.
7) Mild winter, cold wet spring: Allows slug numbers to expand rapidly, slow crop growth
8) Open trench or open seed slot at planting: Easy food source, reduced plant growth
9) Slow Plant Growth: More time for slugs to eat lush growth before it lignifies or grows too tall.
10) Legumes and clovers are a preferred food source; alfalfa, red clover, sweet clover, winter peas, soybeans (Exception: Slugs do not like Crimson Clover!)
11) Grasses: wheat, corn, oats, cereal rye, annual (perennial) ryegrass, bluegrass, sorghum, Sorghum Sudan, Sudan, millets.
12) Brassicas: rape or canola
13) Weeds: dandelion, giant ragweed, purslane, lambsquarter, plantain,
14) Lack of predators: No predators to reduce slug numbers and keep populations stable
15) Hunting: Reduces predator populations (fox)
16) Lack of dens trees or dead trees: No place for owls, hawks, and falcons and other birds to make nests or perches to reduce slug numbers.

Vole habitat is anywhere with permanent herbaceous cover. From Purdue University

Cultural Practices to Control Slugs

Several cultural practices may be needed to control slug numbers. Drilling soybean crops versus planting crops in 15 to 30 inches rows is more effective because there are more soybeans to possibly compensate for reduce yields from slug feeding. Generally, this strategy works better when slug numbers are low.

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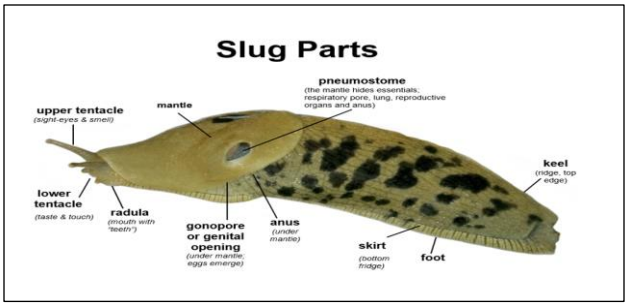

Cold wet springs do not allow grain crops to grow quickly. If plants grow fast enough, they may outgrow slug damage or reduce the amount of damage that slugs cause. Faster growth just means that there is more food for everyone (humans and slugs). Row cleaners and sweepers may move crop residue away from the emerging plant. Zone tillage warms the soil and improves crop growth. Both row cleaners/sweeps and zone tillage allow the soil to dry out and allow the emerging crop to grow faster and possibly outgrow slug damage.

Slugs (and voles) love matted residue. Rotary hoeing fluffs the residue and dries out the soil where slugs live. Running the rotary hole at night is also an option. Rotary hoes do the following:

1) Rotary hoes move residues and dries out slug habitat

2) Rotary hoe in fall if major slug population reduces residue matts and disrupts slug habitat.

3) Rotary hoe in spring before planting crop to reduce residue matts and disrupt slug habitat.

Rotary hoe in Fall of Spring may reduce slug populations.

chaff and grain residue thin reduces the slug environment. Draper headers do a better job of spreading residue. Harvest corn plants higher and try to keep the stalks standing to reduce slug environment. This practice also allows the soil to dry out faster and keeps the stalks attached to the soil so that crop residue does not wash away or clump during a rain event.

Mowing (<8 inches) or grazing reduces the tall thick vegetation and allows predators to find the slugs. Mowing around field edges or borders, filter strips, grass waterways, or buffers also reduces slug habitat and migration. In land enrolled in the Conservation Reserve Program (CRP), mow and terminate vegetation by early fall before returning to crop production. 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.

Infield burning temporarily reduces slug numbers but slugs may return once new vegetation starts growing again. Burning also leaves the soil susceptible to soil erosion and slugs prefer the lush green newly emerging plant vegetation that emerges after burning as a preferred food source. One of the most effective management practices has been to apply an early herbicide burn down 30-45 days before planting to reduce slug food and shelter. Planting green is an acceptable practice but to be effective, large beneficial predator insect populations are required to adequately control slug numbers.

As a last resort, vertical tillage, 3-4 inches deep will destroy slug habitat and bury residue when slug numbers are extremely high and generally will reduce slug numbers by 80%. Tilling 15-20 feet strips around a field to exclude slugs migrating from another area may succeed as long as slug numbers are low. If they slug numbers are high and they are hungry, slugs will migrate to the food. Slugs are reluctant to cross bare soil due to increased exposure to predators.

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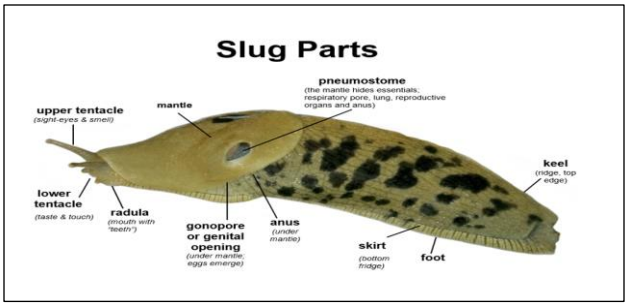

Effective Slug Control Practices

1) Kill vegetation 30-45 days before planting which reduces food and shelter.
2) Mow (graze) cover crop <8 inches: Reduces food and shelter
3) Prevent pest migration by mowing field borders, waterways, buffers, filter strips.
4) Plant grain crop deep (>2 inches) so slugs do not reach the seed as a food source
5) Spread chaff evenly in the fall which reduces food and shelter and dries out soil.
6) Rotary hoe in fall and spring to spread residue, dry the soil, and to reduce slug numbers.
7) Drill all grains crops and cover crops rather than broadcasting the seed: Reduces food.
8) Drill higher soybean population: Allows soybean yields to compensate if slug numbers are low.
9) Select fast emerging crop varieties that will outgrow slug feeding.
10) Plant non-food source cover crops: Crimson clover is a non-slug food source.
11) Plant a trap crop like cereal rye or winter pea to allow corn to outgrow slug damage.
12) Plant radish as a cover crop (natural fumigant that contains sulfur and irritates slug digestion).
13) Plant 50% cover crop mixtures that winter kill: reduces food source
14) Utilize a fully Integrated Pest Management (IPM) system to reduce excessive use of insecticides (especially neonicotinoids) that harm slug predators.
15) Scout and monitor fields in the fall and 30-45 days before spring planting. Use and monitor slug populations with boards, shingles, newspaper, or magazines place on soil surface.
16) Reduce or eliminate soybean neonicotinoids to increase beneficial predators (ground beetles, fireflies, rove beetles, centipedes, wolf and Daddy Long legs spiders) that prey on slugs.

Use shingles, wood or cardboard to monitor slug populations in the fall and spring. From Penn State University

17) Utilize perches and bird houses to enhance owl, hawk, & falcon predator numbers.
18) Restrict or avoid over hunting of fox which are beneficial slug predators.
19) Enhance the environment for other predators: shrews, crows, ravens, herons, blue jays, possum, skunks, raccoons, mink, snakes, salamanders, etc.
20) Till 15-20 feet around field borders to reduce slug migration. Vertical tillage 3-4 inches deep may reduce slug populations by 80% but often is not effective management practice by itself.
21) Using controlled drainage to raise the water table may decrease slug numbers because the slugs need to migrate towards the soil surface, especially if a deep freeze occurs during the winter.
22) Apply 10 gallons of liquid 28% N with 10 gallons of water per acre after sundown on three separate nights to reduce slug numbers. Scout after treatment to see if effective.
23) Slug repellants include lime, garlic, vinegar, copper sulfate, etc.
24) Capsaicin (hot pepper) as broadcast spray to emerging soybeans or apply 2 ounces cayenne pepper per acre in the seed row may reduce slug feeding.
25) Baits: Metaldehyde pellets (Deadline) or Iron Phosphate (Sluggo) to reduce slug numbers.

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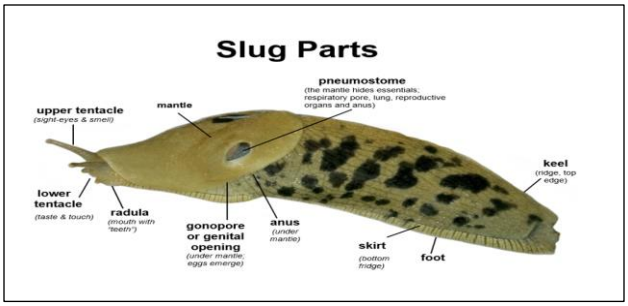

Summary

Once a slug population gets out of control, slugs may be difficult to manage. The first step is understanding slug biology. Second, scout for slugs and take steps to reduce or modify their food and shelter. Third, learn how to utilize and enhance natural predators to reduce slug populations and keep them at acceptable levels. Often this will require reducing the use of neonicotinoid insecticides which are deadly to beneficial slug insect predators. Fourth, when slug populations get out of control, understand how to utilize repellants, alternative feeds, and toxicants (baits) to control slug damage. Fifth, utilize all management practices outlined in this fact sheet to successfully control slugs. Normally an integrated approach utilizing multiple strategies will be needed to adequately minimize slug damage to economically acceptable levels.

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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