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THE GARDEN SLUG AND ITS CONTROL

by

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The grey garden slug, so well known to the flower and vegetable gardener of the Willamette Valley, has now become a very serious pest of the legumes. It has proven especially destructive to Ladino clover, Crimson clover, Hairy vetch, and winter peas. It has also been found attacking rye grass, barley, and related crops. Weather conditions for the past few years in the Willamette Valley have been especially favorable to the growth and reproduction of the slug. The slug thrives especially well in cool moist summers and mild winters. This lowly animal has marvelous powers of adaptation, a great variety of tastes, and an insatiable appetite. Not only are plants attacked, but decaying animal matter, rotting plant tissue, and sometimes insects are eaten. During the past two seasons (1940-1941) thousands of acres of clover, vetch, and peas in the Willamette Valley have been destroyed by this pest.

Slugs can go for long periods of time without food. During drought periods they may go deeper into the soil or under boards where they remain inactive until humid conditions prevail.

Slugs Destroy Seedlings.

Tiny plant seedlings just pushing through the ground appear to be the favored food. It is this attack on the seedlings that makes the slugs such a serious pest of leguminous crops. Small seeds such as Crimson clover and Ladino clover often are eaten. The injury to larger plants is recognized by the large, irregular holes in the leaves, and the trail of sticky mucus left on the plants and along the ground.

Slugs Omnivorous Feeders.

In the garden, the greenhouse, and in the field, practically all crops are attacked. Among the vegetables, the cruciferae seem the favorite host. Among field crops, Austrian winter peas, hairy vetch, crimson clover, and ladino clover appear to be favored, although common vetch, barley, rye grass, rape, hops, wheat, and many other field crops are attacked. Strawberry and gooseberry plants also are susceptible to attack. Almost all plants grown under glass, including vegetables,

flowers, and ornamentals, are often seriously damaged. In the flower garden, various annuals and perennials may be eaten down to the surface of the ground, and the slugs may even continue their tunneling into the stems below the ground. Violets are especially susceptible to slug damage. Various species of mushroom are fed upon. Although showing a decided preference for a plant diet, slugs at times feed upon disabled earthworms, injured slugs and snails, sow bugs, aphids, and various other insects.

Life Habits of Slugs.

Slugs belong to the phylum Mollusca of the animal kingdom along with snails, clams, and oysters. The three species of slugs of economic importance in Oregon in order of frequency of occurrence are: The grey garden slug, Agriolimax agrestis; the greenhouse slug, Milax gagates; and the reticulated slug, Prophysaon andersoni. Practically all the damage to field crops is done by the grey garden slug. This species varies in color from jet black to grey, and thus gives the grower the impression that his fields are infested with several different species.

Recently two species of slugs new to Oregon have been found in Multnomah County. They are: Arion hortensis and Arion ater. Arion hortensis previously was known to be in the United States along the Eastern seaboard, in Wisconsin, and in Seattle, Washington. Arion ater previous to its appearance in Oregon was known to occur only in one locality, a garden in Detroit, Michigan.

Slugs have soft bodies covered with a sensitive, moist skin, provided with minute glands, from which they expel a mucus slime. This material is produced in abundance when they are disturbed and is exuded on objects over which the slugs crawl, remaining as a dried mucus trail behind them. Slugs desiccate rapidly when exposed to the sun. They thrive best under moist conditions, and by far the majority of their activities are carried on at night. During the day, they normally conceal themselves in dark places, such as brushy fence rows, weed patches, old clover fields, or other fields with heavy growth, under boards or trash, under clods, and in cracks and tunnels, in the soil. During dark, cloudy days, however, slugs often remain active throughout the day.

It is not known definitely how long a slug will live, but individuals have been known to live for $2\frac{1}{2}$ years. The period of development from egg to adult varies. Under favorable conditions this period might be less than three months. Slugs are bisexual--every individual is capable of laying eggs. The eggs are rather large--about 1/10 of an inch in diameter, pearly white, and are laid under boards and debris, and in cracks and tunnels in the soil. They are laid singly or in small groups. It is estimated that an individual may lay as many as 800 eggs. Eggs are deposited at all seasons of the year, but are laid in larger numbers during mild, wet weather.

Control Measures.

Until recently no very satisfactory control was known for slugs. During the past two seasons experiments have been carried on by the entomology department of the

Oregon State College experiment station with various baits for slug control. It has been found that metaldehyde Calcium arsenate bran bait is effective in killing slugs. The bait consists of $1\frac{1}{2}$ pounds of metaldehyde, 5 pounds of Calcium arsenate thoroughly mixed into 100 pounds of wheat bran. The bait was used both in the loose bran form and in pellet form. Both forms gave equally good results, but it was found that better distribution of the bait was obtained with the pellet form. As little as 4 pounds of pellets per acre gave good control. The bait is broadcast by hand or with a horn seeder. If a horn seeder is used, the screen is removed from the spout and part of the opening is closed with a cork. In most seeders about half the opening is sufficient to spread 4 to 5 pounds per acre. Best results are obtained by applying the bait during fair weather.

When to Bait.

When slugs are present in a field, the bait is applied after the seed is planted, but before it has had time to sprout. Slugs often work out from fence rows, pasture lands, etc., into the newly planted vetch, pea, or clover fields. They may occur only in portions of a field. Often it is desirable to bait only the portions of the field that are infested. The infested areas are determined by test baiting. This is done by putting out a number of baits in various parts of the fields. Each bait is marked with a stake. The baits are examined after 24 hours, and, if slugs are found, the area is then baited in the usual way.

Metaldehyde, Calcium arsenate, bran bait is put out by different companies, under various trade names, and may be procured from your local insecticide dealer.

Effect of Freezing on Slugs.

Slugs that are frozen solid do not survive. Many slugs in unprotected places were killed by the recent cold spell (January 1942). In grassy fence rows and other protected areas, probably few slugs were killed. The effect of the freeze on the eggs is not yet known.