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THE SAND WIREWORM

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The sand wireworm (*Horistonotus uhlerii* Horn) is a serious pest of corn, cotton, cowpeas, and other crops in certain areas of the coastal plain of South Carolina, and also, at times, in parts of Illinois, Missouri, Arkansas, Louisiana, Texas, Mississippi, Florida, Georgia, and North Carolina. It is found in porous, light, sandy soils, which are usually deficient in humus.

How the Wireworm Lives

In the life of a wireworm (fig. 1) there are four stages—egg, larva (wireworm), pupa, and adult. The adult is a small, slender, dark-

brown click beetle about one-fourth to three-eighths inch in length. After mating, the female burrows into the soil and deposits her eggs, which hatch into the tiny wireworms about 12 days later. The egg-laying period in South Carolina is during June and July.

The newly hatched wireworms soon find their way through the soil to the roots and underground stems of certain plants, where they feed and develop throughout the summer. The larvae are approximately half grown by October. With the approach of winter the larvae go deeper into the soil and remain there until spring. Some have been found during the winter at a depth of 30 inches. During March and April the wireworms move upward and again start feeding on the subterranean parts of certain plants. Feeding continues, usually until June, when the larva becomes fully mature. At this time it is dirty white, slender, and threadlike, with a characteristic knotted appearance, and $\frac{3}{4}$ to $1\frac{1}{4}$ inches long. Altogether the larval stage requires about 350 days.

FIGURE 1.—Life stages of the sand wireworm: A, Egg; B, larva; C, pupa; D, adult; A about 20 times natural size, D about 8 times, B and C about 4 times.

The fully mature wireworm then enters the pupal stage, during which it neither feeds nor moves about. This stage lasts approximately 12 days, after which the adult, or click beetle, appears.

In South Carolina the entire life cycle from egg to beetle requires almost exactly 1 year. Seasonally it may be summarized about as follows: June and July, eggs; July to May, wireworms; May and June, pupae; June and July, adults. Figure 2 shows the life stages of the sand wireworm at various times during the year, together with that portion of the year when the wireworms damage crops.

How the Wireworm Damages Crops

Damage by the sand wireworm is caused by the feeding of the larvae upon the roots, underground stems, seeds, seed pieces, and tubers of plants. They may bore into a stem, gnaw small pits in the surface

FIGURE 2.—The life stages of the sand wireworm at various times during the year at Fairfax, S. C., showing the period when the wireworms (larvae) damage crops.

of a seed, seed piece, or tuber, or cut off small roots. The injury caused by this insect often kills the germinating seed (fig. 3) of plants such as beans, peas, cotton, and melons, resulting in poor stands of the plants. Injury to corn (fig. 4) is most noticeably a stunting or dwarfing of the plants caused by the cutting off of the feeder roots.

The adult, or click beetle, is winged and is a comparatively strong flier. It rasps the leaves and stems of plants and feeds upon the sap which comes from the injured plant tissues.

Farm Practices that Will Reduce Losses from the Wireworm

The treatment of soil with chemicals for the control of the sand wireworm is not practical because of the prohibitive cost, but the cultural practices outlined below will serve to lessen crop losses. In following the cultural practices recommended it must be kept in mind that the crop-planting plans and planting dates are given for South Carolina and that in other sections they may differ.

FIGURE 3.—Injury done by the sand wireworm to seedlings of (A) beans and (B) cotton.

Increasing Soil Fertility

Land infested with the sand wireworm is almost invariably deficient in humus (fig. 5). Experiments have shown that much benefit can be obtained and losses due to wireworms reduced by means of farm

practices that will build up soil fertility, especially those practices that will add organic matter to the soil.

Resting the Land

Land resting is one of the oldest and most effective methods of reducing damage by the sand wireworm. The female beetles are attracted to fields of corn, cotton, cowpeas, or other crops to lay their eggs. When the adult beetles emerge in uncultivated land, many fly to adjacent planted fields. As a result, in the following year the infestation is lighter in the untilled or rested field. Resting land for 1 year is usually

FIGURE 4.—Two corn plants of the same age: The one on the left was injured by the sand wireworm; the one on the right is healthy and normal.

FIGURE 5.—Effect of humus on land infested with the sand wireworm: *A*, The spot in the center of the picture, with normal growth of corn, is where a haystack stood during the previous fall and winter. Much of the hay which was in contact with the wet ground rotted and was plowed under. *B*, The spot with normal growth of corn is where oats were threshed the previous year and a large quantity of the remaining litter was plowed under. The corn surrounding this spot is severely stunted by wireworms.

sufficient, but when the land is heavily infested it may be desirable to rest a field for two successive seasons. Such fields may be used satisfactorily for pasturing.

Growing Resistant Crops

Some crops are less susceptible to wireworm injury than others, either because of their ability to withstand the attack or because of the time the crop is planted.

Tomatoes, asparagus, early-planted melons and cucumbers, peanuts, oats, rye, Austrian winter peas, velvetbeans, sweetpotatoes planted after July 10, and dewberries are often attacked but are seldom seriously injured.

Cabbage and bur-clover are seldom injured.

Corn, cotton, cowpeas, potatoes, late-planted melons and cucumbers, early sweetpotatoes, and native lespedeza, however, are especially liable to injury.

Planning Favorable Crop Rotations

Land planted in susceptible crops for 2 or more years may quickly build up a large wireworm infestation. Hence it is important to use a crop-planting plan that will avoid this danger and at the same time build up soil fertility. Two plans are suggested.

(1) *When the land is heavily infested with wireworms*, the following 2-year cropping plan should reduce losses from wireworms:

First year: Starting in the fall, sow a cover crop of small grain such as oats or rye. After harvesting the grain in the spring, let the land lie idle until about July 10, when sweetpotatoes, a cover crop, or hay can be planted. Late in the fall, plant a winter cover crop such as Austrian winter peas or vetch.

Second year: Early in the spring of the second year, turn under the winter cover crop and plant the land to corn, cotton, or other crop susceptible to wireworm injury. Immediately after harvest of the susceptible crop, seed the land to oats or rye, beginning again the first year of the 2-year planting plan.

(2) *When the wireworm infestation is known to be light*, the following 3-year cropping plan may often be used to advantage:

First and second years: Use the 2-year plan for the first 2 years. After the susceptible crop is harvested in the fall of the second year, plant a winter cover crop of Austrian winter peas or vetch.

Third year: Turn under the cover crop early in the spring and plant the land to one of the crops less susceptible to wireworm injury, such as velvetbeans, tomatoes, or early watermelons. As soon as this crop is harvested, seed the land with a winter cover crop of oats or rye, beginning again the first year of the 3-year cropping plan.

Figure 6 is a diagram showing both the 2-year and the 3-year cropping plans that have been outlined above.

Avoiding Unfavorable Planting Dates

The eggs laid during June and July produce the injurious infestations of wireworms for the following spring. In South Carolina the period of greatest damage to crops from the wireworms which overwinter in the soil occurs from about April 15 to June 15. Therefore crops susceptible to severe injury, such as corn, cotton, cowpeas, potatoes, sweetpotatoes, or melons, should not be planted during this period in lands known to be heavily infested with wireworms.

Since about 75 percent of the eggs are laid by the females during the period June 15-July 10, there is a likelihood of avoiding a heavy wireworm infestation the following spring in fields that are not in crops attractive to the beetle during this important egg-laying period. A further advantage of planting attractive crops after about July 10 is that a crop planted after this date will not be subject to appreciable damage from the small wireworms that hatch during the season.

TWO-YEAR CROPPING PLAN

FIRST-YEAR PLANTING		SECOND-YEAR PLANTING	
NOVEMBER TO LATE FEBRUARY OR EARLY MARCH <u>WINTER COVER</u> OATS OR RYE	MARCH TO JULY 10 <u>SPRING</u> GRAIN FOLLOWED BY STUBBLE	JULY 10 TO OCTOBER <u>SUMMER</u> COVER CROP, HAY, OR SWEETPOTATOES	NOVEMBER TO LATE FEBRUARY OR EARLY MARCH <u>WINTER COVER</u> AUSTRIAN WINTER PEAS OR VETCH
			MARCH TO SEPTEMBER <u>MAIN CROP</u> COTTON OR CORN

THREE-YEAR CROPPING PLAN

FIRST-YEAR PLANTING		SECOND-YEAR PLANTING		THIRD-YEAR PLANTING	
NOVEMBER TO LATE FEBRUARY OR EARLY MARCH <u>WINTER COVER</u> OATS OR RYE	MARCH TO JULY 10 <u>SPRING</u> GRAIN FOLLOWED BY STUBBLE	JULY 10 TO OCTOBER <u>SUMMER</u> COVER CROP, HAY, OR SWEETPOTATOES	NOVEMBER TO LATE FEBRUARY OR EARLY MARCH <u>WINTER COVER</u> AUSTRIAN WINTER PEAS OR VETCH	MARCH TO SEPTEMBER <u>MAIN CROP</u> COTTON OR CORN	OCTOBER TO FEBRUARY OR MARCH <u>WINTER COVER</u> AUSTRIAN WINTER PEAS OR VETCH
					MARCH TO OCTOBER <u>SPRING</u> VELVETBEANS, TOMATOES, OR EARLY WATERMELONS

FIGURE 6.—Cropping plans for reducing the damage done to crops by the sand wireworm. The 2-year plan is for land having a heavy wireworm infestation and the 3-year plan is for land having a wireworm infestation known to be light.