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# *Wireworms*

## AND THEIR CONTROL

ENTOMOLOGY  
ZOOLOGY  
DEPARTMENT

*South Dakota*

*Agricultural Experiment Station*

SOUTH DAKOTA STATE COLLEGE

BROOKINGS

# Wireworms and Their Control

By H. C. SEVERIN<sup>1</sup>

## Introduction

Wireworms (Elateridae) may be recognized because of their resemblance to a short piece of shiny copper or bronze wire. In color, most wireworms vary from light yellow to a light, or even dark brown. The body is long and worm-like, cylindrical or flattened, and covered by a comparatively hard skin. Three pairs of short legs are present on that part of the body immediately back of the head. Most of the native wireworms when full-grown, measure from  $\frac{1}{2}$  to  $1\frac{1}{4}$  of an inch in length. An occasional species measures more than  $1\frac{1}{2}$  inches.

Wireworms are classed as destructive because they feed on living plants. Usually the portions of the plants that are attacked are in the soil, such as planted seed, germinating seed, roots, crowns, tubers, bulbs, corms, stems, etc., but sometimes the wireworms may work their way up inside the stems of plants a short distance above the surface of the ground. Unsprouted seed, germinating seed, and young plants suffer more damage than do older plants.

In completing their life cycle, wireworms (Elateridae) pass through four

radically different stages, namely, egg, larva or wireworm, pupa, and beetle. The beetles are the adult insects, commonly known as elater-beetles, click beetles, snapping beetles, or skip-jacks, from their habit of making a clicking noise when they throw themselves in the air after falling, or being placed on their backs.

The duration of the life cycle of the various species is by no means identical. Some species complete their entire life cycle in one year, while others require as much as five years. The eggs of most of the wireworms are laid in the spring by beetles that hibernated over the winter, but there are some that lay their eggs in the fall of the year. In the latter case, the eggs hatch later in the fall, and the young wireworms hibernate. Pupation takes place usually late in the summer or early fall, and the pupal stage extends over a period of three or four weeks.

Nearly 7000 species of Elateridae have been recorded in the world, and of these, about 700 are found in America, north of Mexico. Sixty species and varieties have been found in South Dakota.

## Habitats Preferred by Wireworms

Each species of wireworm is usually adapted to live in a soil having certain characteristics. Certain wireworms prefer poorly drained soil, and others prefer to live in semi-arid soils. Some flourish in sandy soils, while in contrast, heavy gumbo soils attract and favor a different group of wireworms. Soils of the open

prairie or plains are the chosen habitats of certain kinds of wireworms; the soils of parks and forested areas are preferred by others. Acid, neutral, alkaline soils, each have their quota. Wireworms, therefore, may become a problem to a grower of crops in practically any section of the state.

<sup>1</sup>Entomologist, South Dakota Experiment Station.

## Finding Wireworms

Wireworms are best found by sifting soil, by turning over logs, boards, rocks or other objects lying on the ground, by pulling off loose bark from trees or fallen logs, or by breaking up rotting logs. Some wireworms may be found by examining moss-like growth, or by work-

ing over the underground parts of damaged plants, such as potatoes or other tubers, sprouting seed such as corn, wheat, etc., seedlings, stems of plants in the soil or slightly above the soil, roots of such plants as grasses, etc.

## Control Measures

Control is directed against the larval, pupal, and egg stages. By adopting the control measures that are practical and fitting, the grower should be able to reduce wireworm damage to a minimum.

**Rotation of Crops.** Wireworms have a tendency to increase on land that is used year after year for growing vegetable crops, corn, and small grain, especially wheat and barley. Pastures, grass haylands, and fields of sweet clover usually accumulate large numbers of wireworms. On the other hand, clean alfalfa fields, receiving a minimum of water through rain or irrigation, usually do not contain an abundance of wireworms.

Alfalfa, soy beans, and sweet clover suffer little damage from wireworm attack, but since wireworms are likely to be abundant in fields of sweet clover, rotations of crops should be planned accordingly with these facts in mind.

If a field is suspected of harboring wireworms in injurious numbers, the grower should make a thorough examination of the field before deciding upon the crop that is to be grown. By sifting cubic-foot samples of soil and counting the wireworms in each sample, he can form a fairly accurate opinion of the conditions existing in that field. Window screen, tacked to a frame, will make a satisfactory sifter. Should an average of six or more wireworms be found in each sample, it should be considered hazardous to grow a susceptible crop such as corn, potatoes, sugar beets, wheat, barley, flax, or most vegetables on that land. Re-

seeding during the same season with the same kind of seed after one seeding has been destroyed, is not advisable.

**Summer and early fall plowing.** Plowing to a depth of 6 to 9 inches as soon as possible after a crop of small grain or early potatoes has been harvested, will destroy many young wireworms as well as pupae and young adults. After this, keeping down all grass and weed growth until late fall will aid materially in destroying additional wireworms. It is believed that high heat, low humidity, and mechanical injury due to plowing are mainly responsible for the death of the larvae, pupae, and adults.

**Flooding soil to kill wireworms.** Flooding land for 5 to 7 days and maintaining the water depth so that it is not more than 2 to 3 inches deep anywhere, will kill the larval, pupal, and even the beetle stage of Elateridae. The soil, however, must be warm (70° F. or warmer) during the flooding period. The land should first be plowed, leveled, and diked into plots, thus making it possible to flood the entire field with a more or less even coating of water. When the soil is cold (60° F. or colder) the wireworms become inactive and a poor kill can be expected by flooding. Only level fields can be flooded and then only if plenty of water is available.

**Drying soil to kill wireworms.** A field that is low, usually wet and poorly drained and more or less regularly infested with wireworms, should be tilled or otherwise drained of excess moisture.

The resulting reduction in moisture will tend to kill the wireworms in that field, for the species concerned are moisture demanding ones. Further, the adults or beetles will no longer be attracted to the field for egg-laying purposes. On irrigated land, any practice which will dry out the upper 18 inches of the soil during the heat of the summer will help to solve the wireworm problem.

Fallowing the land for a portion of a season does not dry out the soil so that the wireworms will be killed, but if the fallowing is clean and no grass or weeds are permitted to grow, some of the wireworms will be starved out. Growing a crop of small grain without irrigation, if possible, will remove much water and help to dry out the soil.

**Chemical control of wireworms.** Chemical control of wireworms has not been very popular, largely because of the labor and expense involved. During the past 10 years carbon bisulphide or crude naphthalene have been used as soil fumigants against wireworms in certain sections of the United States, but the cost of such chemical treatments was practical only on land that produced a high income crop. During the past year or two, considerable experimental work has been done with benzene hexachloride to rid the soil of wireworms. The percentage of kill of the wireworms with this chemical has been surprisingly satisfactory and fairly cheap, and it is not very difficult to apply the chemical. It was found, however, that some plants, such as tubers of potatoes, sometimes absorb sufficient quantities of the odor associated with benzene hexachloride as to give them a musty taste. As a consequence, these became unfit for human consumption and were unsalable.

During the past few years, ethylene dibromide has been used successfully as a soil fumigant against wireworms on the Pacific Coast and elsewhere. The cost of treatment with this chemical runs approximately \$20 per acre. Consequently

soil treatment with ethylene dibromide is practical in South Dakota only under extremely limited conditions.

The recommended dose, according to Lane,\* is 10 gallons per acre of a 20 per cent solution by volume of ethylene dibromide in a light solvent oil. Lane recommends that the chemical be applied to the soil with a commercial injection machine or by gravity flow from a tank attached to a plow or tractor. According to Lane, the chemical should be placed at least 8 inches deep in the soil or on the bottom of a plow furrow a week or two before the crop is planted. For best results, the soil should not be saturated with moisture and the temperature should be above 40° F.

DDT has been found to kill wireworms, but its use for this purpose is still in the research stage and therefore cannot be recommended at the present time. The same is true of chlorinated camphene.

**Trapping wireworms by means of baits.** Baits of many kinds have been used in soil to attract wireworms. To trap wireworms by means of bait, it is necessary first of all to prepare the bait (pieces of potatoes, bran mash, dough balls made of wheat flour etc.), bury it in the soil in numerous marked spots, leave it in the soil for several days to attract the wireworms and then dig up the bait, and gather up and destroy the wireworms.

It is necessary to repeat these processes again and again, but even with the best of luck, less than 50 percent of the wireworms in a given field can be destroyed through this method. This control practice also involves altogether too much labor to make it practical on a farm scale.

**Killing wireworms by means of poisoned bait.** Numerous attempts have been made to control wireworms through the use of poisoned baits buried in the soil. However, the practice cannot be recommended for it is neither effective nor practical.

\*M. C. Lane, Entomologist, U. S. Bureau of Entomology and Plant Quarantine.