



## WIREWORM CONTROL IN WESTERN GRAIN FIELDS

**W**IREWORM control is one of the surest and simplest ways of increasing net revenue on many farms in Western Canada. On many of these, severe wireworm injury occurs every year; on others, it takes place only in seasons favourable to damage by this pest. Crops seeded after summer-fallow suffer most. The problem is, however, a perennial one because the wireworms live many years in the soil. The majority of farmers do not realize these facts, because wireworms are not readily noticed and the damage they do is blamed on other causes.

Most of this damage can be prevented, with little or no additional cost or effort. Control depends upon farm practice, poisons being too costly. The use of the best seeding methods brings large immediate savings, even where many wireworms are present. Frequent, clean summer-fallowing gradually reduces the heavier infestations, or prevents lighter infestations from increasing. Together, these methods take care of the problem in the majority of instances. The requirements are: first, to recognize the problem; next, to understand the principles of control; finally, to apply these principles to the local conditions of soil, climate, and farming system.

### ARE WIREWORMS THINNING YOUR CROPS?

To recognize the wireworm problem, it is of help to know the districts most severely infested, and to become familiar with the appearance of damaged fields and the nature of the injury to plants. The final proof, however, must be the finding of the pest itself.

Particular care is needed to distinguish wireworm injury from that of cutworms and rootrots. While the damage is somewhat similar and occurs at much the same time, quite different control methods are required.

#### *Where Prevalent*

Severe and widespread infestations are commonly found in medium, light, or moderately heavy soil, in districts of prairie or open parkland. Older land is most subject to trouble, and wireworm numbers usually increase decidedly in fields cropped to grains or grasses for 5 or more years without summer-fallowing. Idle land is often dangerously-infested. In very heavy clay soils, the worst and often the only serious infestations are encountered after the breaking of native

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or tame grass sod. In willow-scrub land, trouble with one type of wireworm may occur for the first few years after breaking; several years later, another kind of wireworm may build up a more permanent infestation.

### Field Symptoms

Suspect the presence of wireworms: when injury is more common and more severe to the crop on summer-fallow than to that seeded on stubble; when loss is worse in warm dry springs; and when the damage tends to recur in the same fields, and in the same spots. Damage is more severe on knolls, infertile spots, and places that have been weedy or grassy for some years. Thin, poor stands or general patchiness is typical. In more severe cases, nearly the whole crop may be eaten out, but with plants still growing in the drill-wheel tracks, on headlands, and in other well-packed soil. On closer examination, skips will be found where the crop has failed to emerge, and many dead or wilting seedlings will still be plainly visible during the early season.

### Damage to Seed and Plants

Grain may be attacked within a few days after seeding. The kernel may be entirely eaten out, leaving only the empty seed-coat; but more frequently, and especially in dry soil, only the sprouting germ is destroyed before another seed is attacked. Usually, however, the main injury is to the young shoots. The wireworms bore into the underground parts of the stems, feeding mainly on the centre tissues. The stem is often "shredded" and discoloured, but rarely completely severed. The withered tops of dead seedlings remain for some time in the drill row. With older seedlings, it is very typical to find the central shoot dead while the outer leaves remain green for some time. Serious damage usually ceases when stooling begins.

In contrast, cutworms completely sever the young stems, and frequently feed on the tops, especially in wet weather. With rootrots, the outer leaves of the plant die first, while discoloration and shrivelling of the stem may be noticeable below ground.



Fig. 1.—Prairie grain wireworms (*Ludius acripennis destructor* Brown). Natural size.

Photograph by K. M. King.



### ***The Wireworm Itself***

Wireworms are slender, shiny, yellow, hard-bodied "worms". In contrast, cutworms are thick, dull-greyish, soft-bodied "worms" which curl up when disturbed. Wireworms are most easily found if the search is made near young grain plants when first observed in a dying condition. This will be in May or early June, at which time the wireworms are gathered along the drill rows. Later the pests will probably not be found because they scatter through the ground when the top soil becomes hot and dry.

Because wireworms require from 5 to 10 years to mature, various sizes are usually found together, the largest about an inch in length. In late July, those wireworms which are fully grown change to fragile pupae, found in the top 3 inches of soil. The pupae soon develop to the parent "click-beetles," which however do not appear above the surface until early the following spring. The beetles lay their eggs in the soil during June. The eggs soon hatch, but the wireworms are so tiny at first that they may not be observed at all for a year or two.

### **CONTROL MEASURES**

Extensive experiments have shown that poisons and repellents on the seed are ineffective against wireworms, while soil fumigants and baits are impracticable on a field scale. Nevertheless, *wireworms can be controlled*. The program consists of two main parts, as follows:—

#### **(A)—Proper Tillage to Reduce Gradually the More Serious Infestations of the Pest or to Hold it in Check in Fields where Wireworms are not yet Abundant.**

The essential thing is always to keep the summer-fallow clean from the middle of June to the end of July. At this time the newly hatched wireworms can be starved by the complete destruction of all weeds, especially volunteer grain and grass. Where large weeds have been missed by an implement, it is often practical economy to remove them by hand. Ploughing or other tillage should not be deeper or more frequent than is necessary for weed control. Weed control operations should be planned to give a thorough cultivation, 3 to 4 inches deep, during the last 10 days of July (slightly earlier in northern sections). The pupae of this pest are very fragile, and many of them will be destroyed by this treatment. To reduce heavy infestations, fields must be summer-fallowed properly every third year or oftener. Provided that proper timing and thoroughness of operations are observed, any method of clean summer-fallowing would seem to be effective. Each farmer should choose the procedure which he has found to be best suited to his local conditions and to the implements available.

#### **(B)—Proper Methods of Preparing the Seed-Bed and of Seeding to Lessen Crop Thinning.**

A large immediate reduction of damage by wireworms can be brought about by a combination of suitable tillage and seeding methods which speed up the early development of the crops and retard harmful activities of the pest. The main points are: (1) *Use a press attachment with a standard drill, or a press drill; seed shallowly into a firm clean seed-bed.* This will pack the moist soil around the seed itself, without the added cost and increased risk of soil drifting involved in using ordinary packers. The firmness of the seed-bed depends upon the depth of previous tillage, including that during the fallow year. While it is important that seed be placed in moist soil, deep seeding should be avoided. Seeding implements which leave the soil loose around the seed or place it at irregular depths are very undesirable. Where the one-way-disc seeder is used on fallow infested with wireworms, it is essential to adjust it very carefully and follow immediately by good packing. (2) *Seed more heavily and use good seed.*



For wheat, use about one-fourth more seed than required for land that is free from insect pests and weeds, and cross-drill patches where damage by wireworms has occurred previously. (3) *Avoid the use of formalin in treating wheat for smut* where wireworms are troublesome. Formalin retards germination and weakens seedling growth, thus giving a much longer period when the plants are highly susceptible to wireworm attack. On the other hand, mercury-dust treatments do not have this effect. Copper carbonate may be used. (4) *Seed early; and where practicable use phosphate fertilizer for wheat on fallow.* In order to start growth before wireworms are active, planting of infested fallow should be done as soon as there are good seeding conditions. Under very dry conditions, however, it is advisable to delay the seeding of heavily infested land until there is rain to ensure immediate germination. Where there is a good moisture reserve, or in districts where it is usually worth while, phosphate fertilizer is of marked advantage in wireworm control because of the more rapid early growth. Other fertilizers, such as barnyard manure, clovers and ammonium phosphate, are of advantage under certain conditions, such as in the grey soils of wooded areas. These seeding recommendations are essential for the protection of wheat seeded on fallow, in fields or districts where wireworms are troublesome. However, they are sound agricultural practices and may be safely and profitably employed even if there is no indication of trouble from this pest.

### **Choice of Crops**

Irrespective of the type of grain to be grown on a wireworm-infested field, the recommended measures for reducing the damage should be followed as closely as possible. Nevertheless, the choice of crop is of considerable importance, and where infestations are very severe it is advisable to seed crops which are more resistant to attack by this pest, and to continue the use of such crops until the infestation has been considerably reduced by the fallow method recommended above. Special attention should also be given to the first crops after breaking, in fields that have been idle or in grass for some years.

Although *wheat* and *spring rye* are the grain crops most susceptible to damage by wireworms, a high degree of protection is ordinarily given if the recommended precautions are taken. If the pest is exceedingly abundant, however, serious damage will result to these crops even when the entire recommended procedure is carried out. *Oats* are the most wireworm-resistant of the small grains and hence are fairly successful even on severely infested land. Under such conditions, however, it is highly important that oats be seeded early and not left until after the wheat crop is planted. Late-seeded oats may suffer severely, especially if the soil is hot and moisture scanty. *Barley* is also better than wheat because the surviving plants stool quickly and profusely to offset much of the general thinning. *Flax* seems valuable on breaking but otherwise often suffers severely from wireworms. *Fall rye* escapes much of the damage because of its early growth in the spring but sometimes is thinned considerably from attack in the autumn. *Sweet clover*, *alfalfa*, and *grasses* usually escape serious injury under field conditions. *Corn*, *potatoes* and *sunflowers* are so severely injured that they should never be used in seriously infested fields.

### **Reseeding**

Where a first seeding has been destroyed by wireworms, immediate reseedling is usually safe if the recommended seeding procedure is followed. Added safety is secured by using a resistant crop such as oats or barley.

For further information address enquiries to the nearest official Agriculturist or to the Dominion Entomological Laboratory, Saskatoon, Sask.

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