

1979 Control Recommendations for Cutworm, Wireworm and Other Corn Soil Insects

George W. Thomas, Armon J. Keaster, Steven A. Myers, Rodney H. Ward and Fred J. Arnold
Department of Entomology, College of Agriculture

NOTE: Please refer to Guide 4151 "Corn Rootworm Control" for corn rootworm information.

This guide recommends management practices and insecticides for reduction or control of the following corn soil pests: cutworms, wireworms, white and annual white grubs, sod webworms, seed damaging insects such as seed corn beetle, seed corn maggot and wireworms, birds that damage seeds and seedlings, and insect pests associated with no-till sod plantings.

Cutworms

Numerous species of cutworms may attack corn by feeding on the leaves or cutting the plants above and below the ground line. Two common species known to damage corn are the black cutworm and the dingy cutworm.

Life Cycle. No one knows for sure just how the black cutworm overwinters in Missouri. Moths can be captured in light traps from late February into early December. The black cutworm probably can overwinter successfully as either a partially grown larva or as a pupa.

The dingy cutworm overwinters as a partially grown larva. This species appears to be more of a problem in corn following clovers or over-grazed grasslands.

Eggs are deposited on the soil near the base of a plant or on the soil after flooding. Newly hatched larvae feed on practically any available green vegetation until tillage begins. Depending on the type of tillage employed, the partial or total destruction of green vegetation forces the nearly half-grown larvae to forage on any available source of vegetation, including plant residues. By the time corn has germinated, these larvae are hungry and feed heavily on the two to four leaf stage seedlings.

Laboratory reared black cutworms have either six or seven larval instars (stages between successive molts), but we believe six larval instars are more common under natural field conditions. Under ideal laboratory condition, a generation may be completed in as little as 21 to 23 days. Under field conditions, a minimum of four weeks is required for the completion of a generation. The time required increases with lower temperatures and lack of food.

The dingy cutworm has only one generation a year, but the black cutworm may have from two to five overlapping or continuous generations per year as occurred during 1977 and 1978. Pupation occurs in the soil, and the moth emerges about two weeks following pupation.

Factors Affecting Infestations. Above normal temperatures, particularly warm nights, during late March and April provide conditions favorable for egg laying by black cutworm moths.

An early spring allows early weed growth that may influence cutworm egg laying and larval survival.

Traditionally, black cutworm infestations follow flooding. This species also occurs most commonly on the heavy, blackland soils (river bottoms) and around low, wet spots in fields.

Tillage practices that allow crop residue and living vegetation to remain on or very near the soil surface are more favorable to egg laying and larval survival for several species of cutworms. Reports during the past four years indicate an increase in the frequency of black cutworm infestations in corn following soybeans, particularly in those fields where reduced tillage practices were used and where soybean harvest residues were unevenly spread or not spread.

The lack of effective, preplant, broadcast, incorporated insecticides certainly contributed to the postemergence cutworm control problem in both 1977 and 1978, although this was not a factor causing the cutworm outbreaks.

Cutworm Management Practices. Cutworms are among the insects that continue to defy man's efforts at pest management. Although a few cultural practices tend to reduce the intensity of the problem, in some years nothing works.

Some practices that may prove advantageous to some growers are:

- Avoid planting corn on soils following long-standing pastures, meadows, alfalfa or red clover.
- Avoid planting corn in fields with a known history of cutworm problems.
- Where practical, combine fall plowing and shallow tillage to keep down late fall and early spring vegetation.

Insecticidal Control. Cutworms still will be difficult to control, even with use of the insecticides registered for this purpose.

Preplant, Broadcast, Incorporated Application. This application method, for all practical purposes, has been eliminated by the Environmental Protection Agency's suspension and cancellation of aldrin, chlordane and heptachlor. However, a settlement agreed upon at the close of cancellation hearings does allow continued but restricted usage of heptachlor for corn cutworm control through 1980. The provisions for this heptachlor usage are:

- Heptachlor* was classified as a restricted use pesticide in Missouri, thereby requiring a certified private or commercial applicator's license plus the completion of a special restricted use permit to purchase.
- Designated dosage rate is two pounds actual (emulsifiable or granular) per acre broadcast and incorporated before planting field corn grown for grain only.
- Use on dairy farms is prohibited.
- The following crops shall not be grown in a field treated with heptachlor in the year of treatment or the following year:

Legumes - including soybeans, alfalfa, clover, peas and other beans

Root crops - including potatoes, sugar beets, rutabagas and peanuts

Oil Crops - including cotton and safflower

Vegetable Crops

Tobacco

Pumpkins

- No ensilage crop shall be cut from a field treated with heptachlor in the year of treatment or the following year.
- Corn which has been treated with heptachlor shall not be followed with any other dairy or meat animal forage crop, nor shall livestock be permitted on treated land for a period of two years following treatment.
- Permitted rotational crops include small grains, grain sorghums and corn.

Planting Time Application of Some Granular Rootworm Insecticides. During the past two seasons, research and grower use experience has shown that planting time application of the rootworm rate (one pound actual) of Lorsban or Mocap* granules does aid in control of or reduces damage from light to moderate cutworm infestations. When such applications are made at the time cutworm larvae are present in the fields, Lorsban usually keeps cutting below 10 percent while Mocap usually keeps cutting between 10 to 20 percent. Heavy infestations of cutworms and/or making an application several weeks before occurrence of cutworm larvae (April or early May plantings) may result in stands reduced to point of replanting.

Since one cannot predict intensity of cutworm infestations or planting dates, planting time applications of either of the above two rootworm insecticides is not recommended as a method of cutworm control.

Postemergence or Rescue Application. If cutworms are to be successfully controlled after the crop has germinated, all fields must be observed closely for development of infestations. Then, bait or sprays must be properly applied while cutworms are small and immediately after you find an economic infestation. (An economic infestation is the level of infestation that causes crop loss equal to or more than cost of control).

To determine the need for postemergence control, begin watching for plant damage when corn is up to a stand and continue observing until lay-by or mid-June. A bait or spray application is justified if 6 to 8 percent of seedling plants are being fed on or cut above ground or if 2 to 4 percent of the plants are cut below ground. Use the lower percentage figure with lower plant populations (14,000 to 15,000 range), gradually increasing to the higher percentage figure with higher plant populations (20,000 to 22,000 range).

As *bait*, use a 5 percent carbaryl apple pomace bait applied broadcast at the rate of 20 pounds per acre.

As *broadcast spray*, use one pound actual chlorpyrifos (Lorsban 4E) per acre applied in a minimum of two gallons of water for aerial application and 20 gallons for ground application. Rotary hoe or lightly cultivate either before or after application when soils are crusted or when top 2 to 3 inches are dry.

As *basal directed spray*, use either 2 pounds actual carbaryl or 3 pounds actual toxaphene* or one pound actual trichlorfon (Dylox) per acre. Don't use toxaphene on dairy farms. Apply minimum of 20 gallons of diluted spray per acre during late afternoon or evening and concentrate the spray at the base of plants on soil on both sides of plants, making a band 10 to 12 inches wide. When soils are crusted or when top 2 to 3 inches of soil are dry, rotary hoe or lightly cultivate before application of toxaphene or trichlorfon.

Don't expect acceptable performance with either bait or spray unless proper application is made when soil surface is moist and while worms are small and feeding at or very near the soil surface.

Wireworms

Some 12 to 14 species of wireworms are known to attack corn in Missouri; however, only six species are considered major pests.

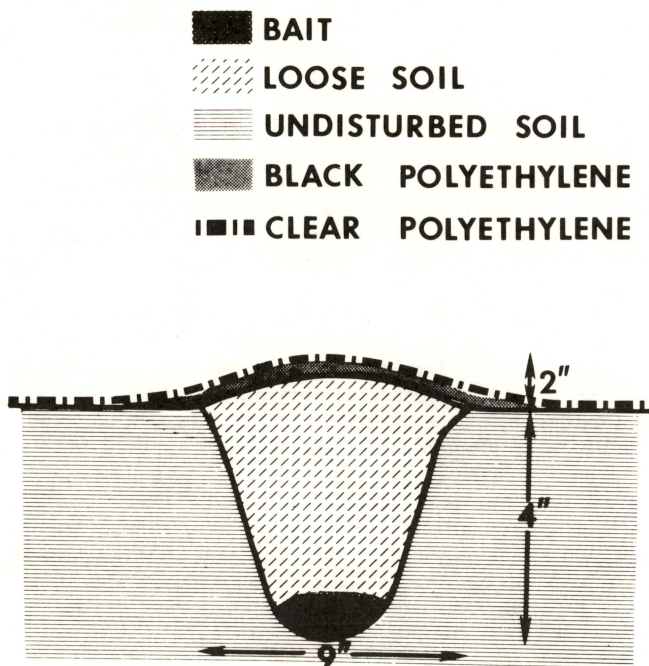
Wireworms cause three types of injury to corn: 1) They cause poor germination by eating the germ and hollowing the remainder of the seed. 2) The larger wireworm larvae bore into the underground stem just above the roots, and once the growing point is destroyed, the plant withers and dies. 3) During the remainder of the season, wireworm larvae feed on the smaller, more tender roots of the corn plants.

Wireworms are most apt to be problems on corn following long-standing meadows, pastures, small grains and forage sorghums.

No postemergence wireworm controls are available. Therefore, control efforts, if needed, must be employed at planting time.

Determining Need for Control. Populations of any insect pest whose damaging stage occurs only in the soil are hard to detect and harder to evaluate. A workable method for evaluating wireworm potential before planting time has been developed during recent years. This is a modified system of baiting.

Cross Section Of A Wireworm Solar Bait Station.



Establish bait stations two to three weeks before anticipated planting date, especially in those fields following grasses, small grain stubble and forage sorghums. Since heavy numbers of wireworms can occur in relatively small and scattered areas throughout the field, randomly locate these bait stations throughout the field at the rate of two bait stations per acre.

Each bait station should be dug approximately 4 inches deep and about 9 inches wide at the soil surface. Place ½ cup of an equal mixture of untreated corn and wheat into the bottom of each station. Fill and slightly mound each station with soil. Cover each mound with an 18 x 18 inch piece of black polyethylene or similar black plastic and cover this with a one-yard square sheet of clear polyethylene or similar clear plastic. Cover edges of plastic with soil to prevent wind damage.

A few days before planting, remove the plastic and soil covering the bait; then count the number of wireworm larvae found within and around the bait. Record the number of wireworms found at each station. You may determine wireworm population per acre or for the field from these recorded figures.

When two or more wireworm larvae per bait station are found, or an average of one wireworm larva for each of the two bait stations per acre, insecticidal control at planting time is justified. The average of one wireworm per bait station is roughly equivalent to 31,000 wireworms per acre.

Insecticidal Control. No post-planting or postemergence insecticidal control for wireworms is available simply because there is no way to mix the insecticide with the soil at the depth at which wireworms feed. Therefore, control efforts, if needed, must be employed at planting time.

Preplant, Broadcast, Incorporated Application. This application method, for all practical purposes, has been eliminated by the EPA suspension and cancellation of aldrin, chlordane and heptachlor. Any carry-over supplies of these products labeled for this type of application may still be used.

Although diazinon and fonofos* (Dyfonate) at 4 pounds actual ingredient per acre and ethoprop* (Mocap) at 6 pounds actual per acre are registered as a preplant, broadcast, incorporated application for wireworm control, their cost makes them economically impractical for most field corn producers.

Seed Treatment. Since we recommend that a seed treatment insecticide be added to all corn seed planted before mid-May, this is one way growers can protect seed from destruction by light numbers of wireworms and other seed damaging insect pests. Seed treatment protects only the seed and will not protect the plant following germination.

Mix the seed treater insecticide thoroughly with the seed so each kernel is covered before putting seed in planter box, or follow label instructions for planter box application. These dry seed treatment insecticides do not perform satisfactorily in planters using air metering devices; therefore, the use of seed treatment insecticides with these types of planters requires a commercial slurry treatment of the seed. Use 1.5 ounces actual diazinon formulated with graphite, or 1 ounce actual aldrin, dieldrin, heptachlor or lindane seed treater formulation per bushel of seed.

In Furrow and Row Band Application. Where economically damaging populations of wireworms are known to occur or have been established via the baiting technique, a planting time application is the best and easiest method of control. In-furrow application gives better control than does row band application. For in-furrow application, use either one pound actual carbofuran* (Furadan) or one pound terbufos* (Counter) per acre.

For row band application, use either of the above in-furrow dosages or use 1 pound actual ethoprop* (Mocap). Do not place ethoprop in the seed furrow or allow granules to contact the seed.

White Grubs and Annual Grubs

Numerous species of white and annual grubs may be pests of the root system or can be found in the vicinity of the roots. Major differences in these grubs include the number of years spent in the larval or root damaging stage, size of mature larvae and their primary host preferences.

White grubs (*Phyllophaga spp.*) may spend from two to three years as larvae in the soil. As the name implies, the annual grubs complete a single generation each year, being in the larval stage during early spring and again during late summer, fall and winter. All of these white grub species prefer to feed on the roots of grasses, and the majority of eggs are deposited in grasslands and grassy spots in fields.

Current tillage and other soil management practices will provide little relief from white grub problems. Likewise, insecticidal control of this problem is noticeably lacking, as is evidenced by the registration of a single material for this purpose. For first year corn following long established sod or for known infested spots in fields, use ethyl parathion* at the rate of 3 to 6 pounds actual per acre applied broadcast and incorporated just ahead of planting.

Sod Webworms

During past seasons, mixed populations of several species of webworm larvae have become serious pests of seedling corn following fescue sod. Only the generation overwintering as partially grown larvae damage corn.

Larvae may chew into a leaf from the margin, cut one or more entire leaves or cut off individual plants near the surface of the soil. Examination around the base of damaged plants usually will show a small hole in the soil leading to a thin, silken web lining a narrow tunnel extending several inches downward. A tannish gray, spotted larva will be found in this tube along with bits of leaves, plants and grass.

Management Practices. Avoid planting corn on spring plowed fescue sod. Fall plow fescue sod if conservation practices allow. If replanting becomes necessary, plant between the rows leaving remaining old stand undisturbed.

Insecticidal Control. Although several insecticides probably would do an acceptable job of controlling webworm larvae, only a single registered product is considered practical for field use. This product is toxaphene*, used at the rate of 2 to 2.5 pounds actual per acre. Use sufficient gallonage to thoroughly cover the foliage and soil near the base of plants. Make spray application during late afternoon and evening hours because most webworm feeding occurs at night.

Seed Damaging Insects

The more common corn seed infesting insects include the seed corn beetle, slender seed corn beetle, seed corn maggot and wireworms. Depending on the intensity of other corn soil insects in fields, a seed treatment insecticide may be the only soil insect control needed.

A seed treatment insecticide is considered beneficial when added to all corn seed planted before mid-May because it helps protect the more slowly germinating seed. Reduced tillage practices which leave crop residues either on or very

An asterisk () following any insecticide means that all or some uses of the product have been or will be restricted by the Environmental Protection Agency. Applicators must be certified and licensed before they may purchase restricted products.

near the soil surface tend to increase the problem with both seed corn beetle and maggot.

These seed damaging insects may also be controlled, under favorable performance conditions, by a row band application at planting of any of the rootworm insecticides.

Both the seed corn maggot and slender seed corn beetle are resistant to chlorinated hydrocarbon type insecticides in the northern third and east-central area.

In the resistant areas, use 1½ ounces actual diazinon seed treater formulated with graphite per bushel of seed. Elsewhere, use either the above dosage of diazinon or 1 ounce actual aldrin, dieldrin, heptachlor or lindane seed treater per bushel of seed. Follow label directions for mixing with seed.

These dry seed treatment insecticides do not perform satisfactorily in planters using air metering devices. The use of seed treatment insecticides with these types of planters requires a commercial slurry treatment of the seed.

Don't use insecticide treated seed for any purpose other than planting.

Bird Damage to Seed and Seedlings

Corn planted within a radius of several miles of blackbird roosting areas is damaged frequently by birds digging up the seed or pulling up the germinating seedling. Some fields in the extreme southeastern and east-central areas have been damaged to the point of replanting.

There is one state registered seed treatment material for repelling blackbirds in popcorn, sweet and field corn fields. This product is Mesurol* 50% Hopper-Box Treater, at the rate of 1 pound of the formulated product per 100 pounds seed or 9 ounces per bushel. Please refer to the paragraph under Seed Damaging Insects for the statement regarding planters using air metering devices. *Caution:* This product may be phytotoxic (injurious) to corn under cool, wet, slow growing conditions.

Insect Control in No-Tillage Sod Plantings

This method of planting often results in severe stand losses from mice, cutworms, armyworms and other pests.

The choice of soil insecticides and their method of application is limited severely. Most soil insecticides should not be used with this planting method because they either are not registered for this type of planting application or should not be placed in the seed furrow in contact with the seed; or incorporation provided by most no-till planters is inadequate for effective results. Furthermore, soil moisture or tilling should allow the planter to completely close or cover the seed furrow. Otherwise, the insecticide remains exposed and creates an environmental hazard.

Only one soil insecticide, carbofuran* (Furadan), is registered for use with this specific planting method. However, this insecticide is recommended only where soil tilling is such that the seed and granular insecticide can be covered completely with soil immediately following application. Use 2 pounds actual carbofuran (20 pounds 10% Furadan granules) per acre applied directly into the seed furrow when planting. Such an application should protect the seed from most seed damaging insect pests, should help reduce cutworm and wireworm damage, will aid in or control both armyworm and flea beetle feeding damage and will not cause germination problems.

Use a seed treatment insecticide as discussed under *Seed Damaging Insects* when no insecticide application is made at planting with the no-till method.

* All or some uses of this product have been or will be restricted by the EPA. Applicators must be certified and licensed before they may purchase restricted products.

Missouri insect control recommendations are revised annually and are subject to possible change during the growing season. Therefore, this guide is intended for use during the 1979 season only.



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