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EC79-1509 Insect Control Guide for Corn and Sorghum in Nebraska

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INSECT CONTROL GUIDE FOR CORN AND SORGHUM

NEBRASKA

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Insect control suggestions in this guide are based on University of Nebraska research results, U.S.D.A. recommendations, and label registrations. Insect control is never perfect. The suggestions are designed to benefit Nebraska farmers when they need control programs.

In some instances trade names have been used. No endorsement is implied by the Nebraska Cooperative Extension Service and no discrimination is intended.

TOXICITY OF INSECTICIDES

All insecticides are poisonous and must be used with caution. They should always be stored in the original container out of the reach of children, uninformed adults, and livestock. It is very important that the labels of every insecticide be studied until they are understood. Follow these completely to avoid accidental poisoning or death, and to prevent illegal residues in crops.

The highly toxic insecticides in this publication are ethyl parathion, methyl parathion, EPN, Di-Syston, Thimet, Counter, and Dyfonate. Skull and crossbones and the word Poison appear in red on the label of highly toxic materials. These chemicals are not recommended for farmer application as sprays. They must be applied only by certified commercial operators. However, with proper precautions, farmers should be able to use granular formulations for soil application to control corn rootworms. Furadan 4F is highly toxic orally--farmers can use this product if special precautions are taken.

Moderately toxic insecticides are Furadan 10G, Mocap, Lorsban, Metasystox-R, toxaphene, Ethion, Trithion and lindane. They must be used with special care. Familiarize yourself with all warnings given on the labels.

Registrations of some chemicals listed in this publication are subject to review and withdrawal in 1979. Visit with your county agricultural agent before making the final decision of which insecticide to use.

Extension work in "Agriculture, Home Economics and subjects relating thereto," The Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Cooperating with the Counties and the U.S. Department of Agriculture
Leo E. Lucas, Director

Revised November, 1978

INSECTS BELOW GROUND

CORN ROOTWORM LARVAE

Corn rootworm larval damage is most likely to occur in continuous corn production fields. If one or more beetles per plant were observed the previous August, soil insecticides at planting or cultivation are indicated. Corn following other crops may be damaged by rootworm larvae if beetles in adjacent corn fields were numerous the previous August. Rotation is usually an effective prevention for corn rootworms and soil insecticides are not necessary in most first year corn fields. Always leave a small untreated strip for comparison.

Effectiveness of soil insecticides is reduced if soil remains dry after application, excessive rainfall occurs, soils are highly alkaline, or if corn is planted very early. Control on alkaline soils is more reliable if applied at cultivation time in early June. If corn is to be planted in late April or the first week of May, it may be best to delay soil insecticide application until first cultivation, before June 10.

Many failures to control rootworms in previous years could be traced to poor calibration of granular applicators. In most cases, amounts used were below recommended amounts. REMEMBER THAT LABEL RECOMMENDATIONS ARE BASED ON 40 INCH ROW SPACINGS. If corn is planted in rows narrower than 40 inches, there are more rows per acre. This means that more insecticide must be applied per acre to obtain the proper rate needed to protect the corn. By calibrating applicators to deliver the suggested amount per 1000 feet (305 meters) of row, the amount per acre will be correct regardless of row spacing. Refer to NebGuide G76-283.

It is essential that insecticides be covered with soil. Granules or liquids remaining on the surface are lost and poor control is likely.

Fertilizer in combination with a soil insecticide must be applied in bands on each side of the seed furrow at seed level, not in the furrow or below the seed. Placement below seed level is not effective. Seed furrow applications of liquid or granular insecticides for rootworm control are not recommended because some compounds may reduce the stand when in direct contact with germinating seeds. Seed furrow placement reduces the effectiveness of any compound because the treated zone is too narrow to protect lateral roots.

Some feeding on roots will occur, regardless of material or placement used. When rootworm numbers are high or egg hatch is extended, do not expect complete control.

Growers who have experienced unsatisfactory results at planting time with any insecticide, especially after using it 2 or more years, should consider switching to one in a different category. It an organic phosphate (Counter, Dyfonate, Lorsban, Mocap, or Thimet) has not provided acceptable control, rotate to a carbamate (Furadan). If Furadan has not performed well, rotate to an organic phosphate.

MATERIAL	AMOUNT FORMULATION PER 1000 LINEAR FEET (305 METERS)	RESTRICTIONS

(Some of these insecticides may be restricted for use only by certified applicators)

PLANTING TIME BEFORE MAY 7:

Insecticides applied at early planting are subject to decomposition in the soil, which will reduce efficiency. Applications at first cultivation, and before June 10 may be more reliable.

PLANTING TIME:

Counter 15G (terbufos)	8.0 ounces (227 g)	Field, sweet & popcorn.
Dyfonate 20G* (fonofos)	6.0 ounces (170 g)	Field, sweet & popcorn.
Furadan 10G (carbofuran)	12.0 ounces (340 g)	Field corn.
Furadan 4F (carbofuran)	2.4 Fluid ounces (71 milliliters)	Apply in split boot in combination with starter fertilizer at seed depth or above, or in 7" band over the row.
Lorsban 15G (chlorpyrifos)	8.0 ounces (227 g)	Field corn. See label for subsequent crops.
Mocap 10G* (ethoprop)	12.0 ounces (340 g)	Field corn.
Thimet 15G* (phorate)	8.0 ounces (227 g)	Field and sweet corn.

* Do not allow to fall into seed furrow, or stand reduction may occur.

FIRST CULTIVATION BEFORE JUNE 10 (at lay-by for emergency control)

Diazinon 14G	8.5 ounces	Basal or over plants.
Dyfonate 20G (fonofos)	6.0 ounces (170 g)	Basal or over plants.
Furadan 10G (carbofuran)	12.0 ounces (340 g)	Basal or over plants.
Mocap 10G (ethoprop)	12.0 ounces (340 g)	Basal application only.
Thimet 15G (phorate)	8.0 ounces (227 g)	Basal or over plants.
Counter 15G (terbufos)	8.0 ounces (227 g)	Basal application only.

RESCUE TREATMENTS

Diazinon AG 500	2.4 Fluid ounces (71 milliliters)	Basal spray on each side of row and cover with soil immediately.

Any of the granules recommended for cultivation, or 2.4 fluid ounces of diazinon AG 500 per 1000 linear feet of row (305 meters) in 10 to 20 gallons of water, can be applied at lay-by as rescue treatments. The insecticide must be applied at the base of plants and covered with disk-hillers or similar device. Insecticides applied at this time will not penetrate into the soil and kill rootworms below the chemical. It will provide protection to roots developing above the band, if sufficient moisture is present to promote root development.

CUTWORMS

Corn following sod, soybeans, or small grain stubble or fields with heavy crop residues are most likely to be damaged by cutworms. Treatment is justified when one plant out of 20 shows cutworm feeding injury. Early detection is essential. Crusting, or dry surface soil will reduce efficacy of control. If surface is dry or fields crusted, rotary hoeing immediately before or after insecticide application may increase control.

POSTEMERGENCE

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Toxaphene	3 pounds	3.36 kg	Band spray 10" (25 cm) side over rows when first evidence of cutworm infestation is detected and before worms are more than 1" (2.5 cm) long.
Diazinon	2 pounds	2.24 kg	
Dylox (trichlorfon)	1 pound	1.12 kg	Apply in a 10" (25 cm) band using at least 20 gallons of water per acre.
Sevin (carbaryl)	2 pounds	2.24 kg	
Sevin 5% bait (carbaryl)	1 pound	1.12 kg	Broadcast
Lorsban 4E	1 pound	1.12 kg	Broadcast

WIREWORMS AND SEED DESTROYING INSECTS

First year corn, eco-fallow and early planted fields are more likely to be damaged.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Counter 15G (terbufos)	1 pound	1.12 kg	Apply 8 oz. (227 g) per 1000 ft. (305 m) 15% granules in seed furrow at planting.
Mocap 10G (ethoprop)	1 pound	1.12 kg	Apply 7 inch band at time of planting. May reduce stand if in seed furrow.
Furadan 10G (carbofuran)	1 pound	1.12 kg.	Apply 12 oz. (340 g) per 1000 ft. (305 m) 10% granules in seed furrow at planting.
Seed treatment lindane diazinon heptachlor			Mix with seed in planter box. Follow package directions for amount. Never mix treated seed with feed grains.

SOD WEBWORMS

Sod webworms frequently occur in first year corn following pasture, or when slot planting in grass.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Toxaphene	2.5 pounds (1.13 kg)	2.8 kg.	Do not feed treated forage to dairy animals or animals being finished for slaughter. Broadcast or apply in 10" band, using at least 20 gallons water per acre.

INSECTS DAMAGING CORN ABOVE GROUND

CORN ROOTWORM ADULTS TO PREVENT SILK CLIPPING

Corn rootworm beetles occasionally interfere with pollination if there are sufficient beetles to chew silks to husks during the pollen-shedding period. Controls are indicated only when severe silk chewing is occurring at 25 to 50 percent pollen shed. In an average year, few fields will need to be sprayed to prevent silk clipping by beetles. Beetles are most likely to cause a problem in late-planted or late-silking fields. Be certain to warn beekeepers within 2 miles (3.22 km) of a field if a field must be sprayed when it is shedding pollen.

CORN ROOTWORM ADULTS TO REDUCE LARVAE THE NEXT YEAR

Controlling rootworm adults to reduce the number of larvae the next season may not be as reliable as soil insecticides because precise timing of control is essential, and more than one application of an insecticide may be necessary. If this method

is used, it should be under the supervision of trained pest management personnel. To have a reasonable chance of success, control should be applied when there is an average of one rootworm beetle per plant and 10 percent of the female beetles have mature eggs. When this population is first recorded, apply one quart of Sevin 4 Oil per acre. The length of time one application is effective will depend upon rainfall or irrigation practices. If beetles reoccur, make a second application when populations again reach one beetle per plant. The cost of two treatments will exceed that of a single soil treatment.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Diazinon	8 ounces (227 g)	561 g	None
Di-Syston (disulfoton)	4 ounces (113 g)	279 g	28 days. Certified applicators only. One treatment per season.
EPN	4 ounces (113 g)	279 g	14 days. Certified applicators only.
Ehtyl or methyl parathion	4 ounces (113 g)	279 g	12 days. Certified applicators only.
Malathion	1 pound (454 g)	1.12 kg	5 days
Malathion ULV	4 ounces (113 g)	279 g	5 days. Certified applicators only.
Sevin (carbaryl)	1 pound (454 g)	1.12 kg	None
Sevin 4 Oil	1 pound (454 g)	1.12 kg	None

CHINCH BUGS

Preventing chinch bug damage by cultural practices is more reliable than chemical controls. Where possible, do not plant corn or sorghum into wheat stubble, or adjacent to wheat fields. If chemical controls are necessary, apply one of the suggested insecticides in at least 30 gallons of water per acre. Use drop pipes from sprayer booms, so that spray is directed onto the lower stalks and soil around the plants. Broadcast sprays over plants is not effective. Sprays will not last more than 4 to 7 days. If migrations from adjacent wheat fields are heavy, reapplication may be necessary.

Seed furrow application of Furadan 10G at planting time is registered on corn for rootworm and wireworm control and on sorghum for greenbug control. These applications have reduced chinch bug infestations in some experimental plots. Use 12 ounces (340 g) of Furadan 10G per 1000 feet of row, and drop granules into the seed furrow.

One of the following sprays can be used:

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Toxaphene	2 pounds (907 g)	2.24 kg	Do not feed treated foliage.
Sevin (carbaryl)	2 pounds (907 g)	2.24 kg	Nebraska only.

EUROPEAN CORN BORER

The need for insecticide treatment for first brood is determined by examining early planted corn. Treat if 50 percent of the corn plants on dryland, 35 percent on irrigated, 25 percent on popcorn or 15 percent on seed fields show shotholes in whorl leaves. Heaviest first brood borer activity is expected in earliest planted fields or fields planted to susceptible varieties. If borers have already entered stalks, control is impossible. It is difficult to tell when control of second brood borers will be profitable. Fields that have green silks during the second brood moth flight in late July and August are attractive to moths for egg laying. When late developing fields have an average of one egg mass per plant, or most plants have small borers feeding on leaf axils, controls may be feasible. In most cases, control would probably not be highly beneficial. Harvest heavily infested fields early to prevent field losses. Second brood is most serious in late-planted or long season hybrid corn. Granular formulations of insecticides are more effective than sprays.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Diazinon 14G	1 pound (454 g)	1.12 kg	10 days
Dyfonate 20G (fonofos)	1 pound (454 g)	1.12 kg	30 days harvest or grazing.
EPN 4G	0.3 pound (136 g)	336 g	14 days
Furadan 10G (carbofuran)	1 pound (454 g)	1.12 kg	Do not make a foliar application if more than 10 pounds per acre were used at planting. Do not make more than 2 foliar applications per season.

GRASSHOPPERS ON CORN

Prevent damage to corn by controlling grasshopper nymphs when there are 10 or more immature grasshoppers per square yard in field margins.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Parathion EC	8 ounces (227 g)	561 g	Certified applicators only. 12 days.
Dimethoate	8 ounces (227 g)	561 g	14 days
Furadan 4F*	4 ounces (113 g)	280 g	30 days. 14 day re-entry. Commercial applicators only.
Penncap M*	8 ounces (227 g)	561 g	12 days. Bee hazard. See label.
Lorsban 4E*	8 ounces (227 g)	561 g	14 days
Sevin 80WP (carbaryl)	2 pounds (907 g)	2.24 kg	None
Sevimol (carbaryl)	1.5 pounds (681 g)	1.68 kg	None
Sevin 4 Oil (carbaryl)	1.5 pounds (681 g)	1.68 kg	None
Toxaphene EC	2 pounds (907 g)	2.24 kg	Field margins only. Do not feed treated forage.

* Special local needs registrations for 1978. Check labels for 1979 use.

WESTERN BEAN CUTWORMS

Use chemical controls when 14% of the plants are infested with larvae in tassels and/or eggs on leaves and corn is 95-100 percent tasseled, and before worms have entered silks.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Sevimol (carbaryl)	2 pounds (907 g)	2.24 kg	None
Sevin 4 Oil (carbaryl)	2 pounds (907 g)	2.24 kg	Apply in 2 qts. (1.9 L) crop oil per acre.

SPIDER MITES

Apply chemical control if 1 lower leaf is killed by mites and mites are present to the ear zone before corn has reached the hard dent stage. Insecticides do not kill eggs, so reinfestation frequently will occur. Develop more when grassy weeds are in or adjacent to fields.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Before August 1			
Di-Syston 15G (disulfoton)	1 pound (454 g)	1.12 kg	40 days. Certified applicators only.
Thimet 15G (phorate)	1 pound 454 g)	1.12 kg	30 days. Certified applicators only.
After August 1			
Diazinon EC	8 ounces (227 g)	561 g	None
Cygon (dimethoate)	8 ounces (227 g)	561 g	14 days forage, 42 grain. Not more than 3 applications.
Di-Syston 15G (disulfoton)	1 pound (454 g)	1.12 kg	40 days. Certified applicators only.
Metasystox-R EC (oxydemetonmethyl)	8 ounces (227 g)	561 g	7 days
Thimet 15G (phorate)	1 pound (454 g)	1.12 kg	30 days. Certified applicators only.
Di-Syston LC (disulfoton)	1 pound (454 g)	1.12 kg	28 days. Certified applicators only.

ARMYWORMS

Control when migration from adjacent grassy fields is sufficient to damage margin rows, or when field infestations are consuming lower leaves before hard dent stage. Develop in fields with grassy weeds.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Sevin (carbaryl)	1.6 pounds (726 g)	1.79 kg	None
Dylox SP	1 pound (454 g)	1.12 kg	21 days. One application.
Malathion 57% EC	1.5 pounds (680 g)	1.68 kg	5 days
Toxaphene EC	2.5 pounds (1134 g)	2.80 kg	Do not feed treated forage to dairy cattle or animals being finished for slaughter. No restrictions on grain.

methomyl	6 ounces (168 g)	415 g	3 days. Certified applicators only.
Parathion	8 ounces (227 g)	561 g	12 days. Certified applicators only.

SORGHUM INSECTS

GREENBUGS AND CORN LEAF APHIDS

Corn leaf aphids (referred to as "aphids") are not known to cause economic damage to grain sorghum grown under Nebraska conditions. Treatments applied for this insect would seldom result in a yield increase that would pay for the cost of treatment.

Greenbugs have frequently caused serious yield losses in Nebraska grain sorghum since 1968. For a discussion of treatment guidelines on susceptible and resistant grain sorghum hybrids, refer to NebGuide G76-266, available at your county extension office.

Certain sorghum varieties may be sensitive to organic phosphate insecticides. Red or brown spots where spray droplets contact leaves frequently occur. Usually these are not serious. Sensitivity can be determined by spraying a small area of a field and observing for several days for crop injury.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE	HECTARE	RESTRICTIONS
	AIR OR GROUND EQUIPMENT		
dimethoate	6 ounces (170 g)	420 g	28 days. Use drop nozzles and 20 gallons water per acre, so plant is covered.
Diazinon	8 ounces (227 g)	561 g	7 days. Use drop nozzles and 20 gallons water per acre.
Di-Syston 15% granules (disulfoton)	1 pound (454 g)	1.12 kg	30 days. Band over rows. 14 days, forage.
Thimet 15% granules (phorate)	1 pound (454 g)	1.12 kg	28 days. Band over rows.
Malathion EC	1 pound (454 g)	1.12 kg	7 days
Metasystox-R (oxydemetonmethyl)	8 ounces (227 g)	561 g	28 days. Band over rows.

COMMERCIAL APPLICATION - AIRCRAFT

Di-Syston EC (disulfoton)	8 ounces (227 g)	561 g	See label for post-treatment intervals with different treatment combinations.
Di-Syston 15% granules	1 pound (454 g)	1.12 kg	30 days - grain. 14 days - forage.
Ethyl parathion	8 ounces (227 g)	561 g	12 days. Apply in 2-4 gallons water.
Thimet 15% granules (phorate)	1 pound (454 g)	1.12 kg	28 days
Dyfonate 4EC (fonofos)	1 pound (454 g)	1.12 kg	Only on irrigated sorghum. 60 days.

SEED INSECTS IN SOIL

Seed treatment in planter box with heptachlor, lindane, or diazinon. Follow package directions. NEVER MIX TREATED SEED WITH FEED GRAINS.

CHINCH BUGS

Recommendations same as for corn.

CORN EARWORMS AND FALL ARMYWORMS

Infestations may occur in whorls and later in heads. Usually not feasible to control whorl infestations. If two or more larvae per head are present, controls may be profitable.

MATERIAL	AMOUNT ACTIVE INGREDIENT PER ACRE - HECTARE		RESTRICTIONS
Sevin 80 WP (carbaryl)	1.6 pounds (726 g)	1.79 kg	21 days for grain.
Toxaphene	1 pound (454 g)	1.12 kg	28 days. Do not feed forage to animals being finished for slaughter. DO NOT USE ON DAIRY FARMS.
Lannate SP (methomyl)	6 ounces (168 g)	415 g	14 days. Certified applicators only.

CONTAINER DISPOSAL

Proper disposal of insecticide containers is very important. Serious accidents have occurred when "empty" containers have not been disposed of safely. Suggested methods of disposal are:

PAPER BAGS: Be certain that all contents have been emptied into applicators or tanks. Burn paper containers, not to exceed 50 pounds, in open fields where; (1) regard is given to wind direction in relation to people, domestic animals, and water supplies, (2) where such burning is not in violation of Federal, State, or local ordinances, and (3) provisions are made to avoid contamination of surface water.

METAL, GLASS, OR PLASTIC CONTAINERS: Thoroughly rinse containers at least 3 times with water and dump rinse material into tanks to be used with regular applications. Recycle 5 gallon or larger metal drums where possible after complete decontamination. Containers that cannot be recycled should be punctured, crushed, and buried in a landfill, or 24 inches (60 cm) below the soil surface in a location that will not result in contamination of water, crops, man, or animals.

For more detailed information on corn and sorghum insects refer to the following NebGuides:

G 76-206 - "Corn Rootworm Control - 1979
G 76-283 - "Rootworm Insecticide Rate Conversions"
G 76-217 - "European Corn Borer - 1979"
G 76-290 - "Western Bean Cutworm in Corn"
G 75-50 - "Spider Mites in Corn"
G 76-266 - "Sorghum Greenbug Control"
G 74-106 - "Grasshoppers"
EC 78-1534 - "Insect Prevention & Control in Farm Stored Grain"

These and many other NebGuides on important insects are available from County Cooperative Extension offices or the Cooperative Extension Service of the Institute of Agriculture and Natural Resources in Lincoln, Nebraska.

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