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EC84-1509 Field Crop Insect Control Guide for Nebraska Corn and Sorghum

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EC 84-1509

FIELD CROP INSECT CONTROL GUIDE FOR NEBRASKA
CORN AND SORGHUM

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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. NebGuides containing additional information on identification, damage and life cycles are listed under insect headings. They are available from county extension offices.

Often the choice of a pesticide is based mainly on its cost. However, several other factors should be considered in the decision, including efficacy for the particular pest or pest combination, formulation of the pesticide, label restrictions, safety to non-target species (including man) and environmental conditions present at the time of application.

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

Recommendations enclosed in boxes indicate that these compounds may provide more consistent or efficient results based on University of Nebraska and other states' research and field experience. This does not indicate that these products are the only ones that should be used or that other products are ineffective.

IMPORTANT

All insecticides listed in this publication are subject to many label restrictions on use or on use of the crop after application. Restrictions are so lengthy it is not practical to list all of them. Therefore, it is essential that labels be read and understood before purchasing or using any product to be certain that its use does not result in illegal application, danger to the user or environment, or residues that exceed tolerances.

Insecticides that are classified RESTRICTED USE that require EPA certification for use in this circular are: carbofuran (Furadan 4F), disulfoton (Di-Syston), EPN emulsifiable concentrates greater than 65%, fonophos (Dyfonate) emulsifiable concentrates greater than 44%, methomyl (Lannate), ethyl parathion, methyl



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parathion, Penncap M, methomyl (Nudrin), toxaphene, permethrin (Pounce), and fenvalerate (Pydrin). Applications, must be made by or under the direct supervision of a certified applicator. Other products may be classified restricted use in 1984.

TOXICITY OF INSECTICIDES

All insecticides are poisonous and must be used with caution. Always store them in their original containers out of the reach of children, uninformed adults and livestock. It is essential that the label of every insecticide be studied and understood before use. Follow directions completely to avoid accidental poisoning and to prevent illegal residues in crops.

 Compounds so marked are restricted use. Applicators must be EPA certified. The highly toxic insecticides in this publication are ethyl parathion, carbofuran (Furadan 4F), methyl parathion, EPN, disulfoton (Di-Syston), phorate (Thimet), terbufos (Counter) and fonophos (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 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 only if special precautions are taken.

Moderately toxic insecticides are diazinon, carbofuran (Furadan 15G), ethoprop (Mocap 15G), chlorpyrifos (Lorsban), carbaryl (Sevin), malathion, permethrin (Pounce), dimethoate (Cygon), oxydemetonmethyl (Metasystox-R), toxaphene, carbophenothion (Trithion), fenvalerate (Pydrin), 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 1984. Visit with your county agricultural agent if you are uncertain of which insecticides to use.

INSECTS ON PIK ACRES IN 1983 AND POTENTIAL FOR 1984

The impact of PIK on insect problems in 1983 was hard to measure, but some unusual things did occur, at least in part, we feel due to the presence of weedy, residue-covered, idled acres. Heavy infestations of first generation corn borer, while mostly due to very favorable weather, were likely enhanced by greater survival of overwintering larvae on PIK acres. Undisturbed residues, left to prevent soil erosion, provided harborage for the borers and permitted high numbers of moths to emerge. Also, the buildup of flea beetles was in part due to an abundance of weed hosts. The same may probably be said for the problems we experienced with woollybear caterpillars in soybeans. The false chinch bug, while not a significant pest on row crops, did raise many concerns because of its abundance in corn and sorghum, but little or no damage was realized.

Extensive acreages of weeds are attractive to many insects as places to feed (on pollen or leaf surfaces) or hide. These insects include corn rootworm beetles, flea beetles, click beetles (which lay the eggs for wireworms), June beetles (the adults of various kinds of white grubs), and various moths (which lay eggs which develop into cutworms). Also, these fields once worked will be relatively high in organic matter, and may be attractive to adults of the seed corn maggot in the spring.

While the potential for these pests to occur in every first year corn or sorghum field planted on 1983 PIK acres is not high, some additional activity from these pests can be anticipated for 1984. Generally, seed treatments should be used on all of these fields in 1984, just in case seed-attacking insects are present in damaging numbers. Rootworms will be impossible to predict. Because of the severe drought in southeast Nebraska in 1983, beetles were likely forced into soybeans, milo, or PIK acres. More rootworm activity in first year corn is anticipated in these counties and in northeast Nebraska where the northern rootworm persists. Flea beetles, which overwinter outside the fields, can occur in any field of corn, not just those that are planted to land that was in PIK in 1983. Seed treatments are a standard recommendation for all corn, every year. A white grub treatment may be considered if high numbers of white grubs are seen when the field is worked in the spring. What about planting time treatments with soil insecticides, just in case? We feel soil insecticides will be unnecessary in most first year corn fields. Exceptions are most likely to occur in 1983 drought-affected counties or in northeast Nebraska. Otherwise, check the soil for grubs and wireworms when conducting spring tillage operations. Consider using a baiting method to detect wireworms 3-4 weeks before planting. Use a planter box seed treatment regardless and/or an in-furrow treatment if wireworms or grubs are present. Keep a close watch on the crop after emergence to monitor for cutworm or flea beetle activity. Spray if necessary to control them when and if they become a problem.

CORN INSECTS BELOW GROUND

CORN ROOTWORM LARVAE (NebGuides G82-597 and G83-634)

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 late July and August, a soil insecticide is indicated (See NebGuide G83-634). Corn following other crops may be damaged by rootworm larvae if beetles in adjacent corn fields were numerous the previous August and were attracted to flowering weeds, sorghum, or sunflower. Crop rotation is the most effective prevention for corn rootworms in over 90% of first year fields. In northeast Nebraska, first year corn following oats is occasionally damaged by northern corn rootworms.

Effectiveness of soil insecticides is reduced if soil remains dry after application, if excessive rainfall occurs, if soils are highly alkaline, or if applied at planting time on early planted corn. Control is more reliable if an insecticide is applied at cultivation time in late May or early June. If corn is to be planted before May 15 it may be best to delay soil insecticide application until first cultivation, before June 10. Cultivation treatment is particularly desirable if soil is alkaline, since high pH accelerates decomposition of insecticides.

Many failures to control rootworms can be traced to poor calibration of granular applicators. In many cases, amounts used are below those recommended on the label. REMEMBER THAT LABEL RECOMMENDATIONS ARE BASED ON 40 INCH ROW SPACINGS. If corn is planted in rows narrower than 40 inches, there are more linear feet of row 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 of granules per 1,000 feet of row, the amount per acre will be correct regardless of row spacing. Refer to the following table when calibrating an insecticide applicator and when planning purchases.

Amounts of formulated insecticide needed per acre at various row spacings based on the recommended rate of ozs/1000 ft of row for four different percentage granular formulations of rootworm insecticides.

Recommended amount of formulated insecticide per 1000 feet of row	Pounds of formulated insecticide needed to cover one acre					
	40 inch rows	38 inch rows	36 inch rows	34 inch rows	32 inch rows	30 inch rows
10% granules - 12.24 oz	10.00	10.51	11.11	11.77	12.48	13.33
14% granules - 8.75 oz	7.15	7.51	7.94	8.42	8.92	9.53
15% granules - 8.16 oz	6.67	7.01	7.41	7.85	8.32	8.88
20% granules - 6.12 oz	5.00	5.26	5.55	5.89	6.24	6.66

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 both sides 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. Also, 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.

Leave an untreated strip in each field to evaluate control. Mark untreated rows and return to field in early July to dig roots for examination. Refer to NebGuide G82-597 to help you evaluate the performance of your soil insecticide.

RECOMMENDATIONS FOR REDUCTION OF CORN ROOTWORM LARVAE


A. Rotate corn with other crops.

B. If corn is planted prior to May 15, apply one of the granular insecticides at cultivation time between May 25 and June 10 and cover with soil at base of plants. If insecticides are used on early-planted corn, Counter 15G, Dyfonate 20G, Amaze 20G*, Lorsban 15G, and Furadan 15G (if there is no prior history of Furadan use) are more likely to provide economic control.

C. If planting after May 15, apply one of the granular insecticides in a 7-inch band over rows and cover with soil. If corn is listed, apply at cultivation time regardless of planting date.

D. Rescue Treatment - after June 10: Emergency treatment at lay-by time can be made by applying any of cultivation-time granules to the soil at the base of plants. Cover the insecticide with 1 to 2 inches of soil. This treatment will not kill all rootworms present because the insecticide will not penetrate the soil. It may help reduce further root damage by establishing a barrier between the rootworms and developing roots. If broadcast applications are made by aircraft, use Counter and Furadan granules and cultivate into rows immediately.

* Amaze 20G experienced some performance problems in Wisconsin and Illinois in 1983. Causes of these difficulties are under investigation by Mobay, the manufacturer. Performance of Amaze in tests at Mead and Clay Center has varied, perhaps slipped a bit in 1983. The product has given fairly consistent and good control over several years of testing in Nebraska. Only a couple of field performance problems were reported to us in 1983. Data and experience here and from neighboring states appear to support our decision to leave the product in our recommendations for 1984.

Insecticide	Amount Formulation Per 1,000 Feet	Restrictions
carbofuran (Furadan 15G)	8.16 oz	Field and popcorn. Planting <u>1</u> / cultivation - over plants or basal.
chlorpyrifos (Lorsban 15G)	8.16 oz	Field, sweet and popcorn. Planting, cultivation over plants or basal.
diazinon 14G	8.75 oz	Field, sweet and popcorn. Cultivation only - over plants or basal.
ethoprop (Mocap 15G)	8.16 oz	Field and sweet corn. Planting <u>2</u> / cultivation basal only.
 fonophos (Dyfonate 20G)	6.12 oz	Field, sweet and popcorn. Planting <u>2</u> / cultivation - over plants or basal.


isofenphos (Amaze 20G)	6.12 oz	Field, sweet and popcorn. Planting, cultivation - basal only. Wait 75 days before harvest.
phorate (Thimet 20G)	6.12 oz	Field and sweet corn. Planting <u>2/</u> , cultivation - basal only.
terbufos (Counter 15G)	8.16 oz	Field, sweet and popcorn. Planting, cultivation - basal or over plants.
trimethacarb (Broot 15G)	8.16 oz	Field and popcorn. Planting only.

- 1/ In certain locations the continued use of Furadan has resulted in unreliable control. It is advisable to use one of the other listed compounds if application is at planting time, and Furadan has been used previously.
- 2/ Do not allow granules to fall into seed furrow, as stand reduction may occur.

CUTWORMS (NebGuide G80-501)

Corn following sod, alfalfa, soybeans or small grain stubble or fields with heavy crop or weed 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 insecticide efficacy. If surface is dry or crusted, rotary hoeing immediately before or after application may increase control if soil is not dry more than one inch deep.

RECOMMENDATIONS FOR CONTROL OF CUTWORMS IN CORN WHEN
5% OF PLANTS HAVE BEEN CUT OR HAVE FEEDING INJURY,
AND CUTWORMS ARE PRESENT.

 fenvalerate (Pydrin 2.4EC).....0.15 pound AI/acre

chloryprifos (Lorsban 4E).....1.0 pound AI/acre

If soil is dry or crusted, follow immediately with a rotary hoe.

OTHER PRODUCTS REGISTERED Amounts Active Ingredient per Acre

chloryprifos (Lorsban 15G)..... 1.0 lb banded at planting
trichlorfon (Dylox 80SP)..... 1.0 lb
diazinon (AG 500)..... 2.0 lbs
carbaryl (Sevin XLR, Sevimol 4).... 2.0 lbs
carbaryl (Sevin 20% or 5% bait).. 5-10 lbs (20%) or 40 lbs (5%)
ethoprop (Mocap 10G)..... 1.0 lb banded at planting
terbufos (Counter 15G)..... 1.0 lb banded or in-furrow

WIREWORMS AND SEED DESTROYING INSECTS

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

RECOMMENDATIONS FOR CONTROL OF WIREWORMS, SEEDCORN MAGGOTS, AND SEEDCORN BEETLES IN FIELD CORN:

isofenphos (Amaze 20G).....	6.12-12.24 oz per 1,000 feet of row in seed furrow.
carbofuran (Furadan 15G).....	16.32 oz per 1,000 feet of row in seed furrow for wireworms.
terbufos (Counter 15G).....	8.16 oz per 1,000 feet of row in seed furrow for maggots, banded for wireworms.

Planter box treatments of diazinon, lindane or chloryprifos (Lorsban SL). See labels for rates and restrictions.

OTHER PRODUCTS REGISTERED:

phorate (Thimet 20G).....	6.12 oz per 1,000 feet of row. Reduction of wireworms only. Seed furrow placement will reduce stand.
ethoprop (Mocap 15G).....	8.16 oz per 1,000 feet of row as a 7" band over rows. For wireworm only. Seed furrow placement will reduce stand.
chloryprifos (Lorsban 15G)....	8.16 oz per 1,000 feet of row in-furrow. For maggot and seedcorn beetle. Use 16.32 oz per 1,000 row feet for wireworms, banded or in-furrow.

WHITE GRUBS (GRUBWORMS)

There is no effective control for white grubs after infestations in planted fields are detected. Counter is labeled for control of white grubs, and Amaze for low to moderate populations used as a 7 inch band at planting.

They may be useful in fields that need to be replanted because of grubs, or if large numbers of grubs are observed while preparing fields for planting corn.

Insecticide	Rate	Directions
isofenphos (Amaze 20G)	6.12-12.24 oz formulation/1000 feet of row.	Apply in a 7 inch band at planting and cover with soil.
terbufos (Counter 15G)	8.16-16.32 oz formulation/1000 feet of row.	Apply in a 7 inch band or in-furrow (low rate only) at planting time.

CORN INSECTS ABOVE GROUND

CORN ROOTWORM ADULTS TO PREVENT SILK CLIPPING (NebGuide G82-613)

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 25-50 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. Delay spraying fields within 2 miles of apiaries, unless absolutely necessary when fields are shedding pollen. Warn beekeepers and apply treatments in late afternoon or evening when bees are not foraging. Bees normally collect corn pollen during the morning hours.

REGISTERED TO CONTROL CORN ROOTWORM ADULTS

Amounts are active ingredient per acre

- diazinon (AG500)..... 0.5 lb
- disulfoton (Di-Syston 8EC)..... 0.25 lb
- EPN (4EC, 5EC)..... 0.5 lb
- phosmet (Imidan 50WP)..... 0.5-1.0 lb
- malathion (57EC)..... 1.0 lb
- malathion (9.33 ULV)..... 0.3 lb
- parathion (ethyl or methyl)..... 4 oz
- carbaryl (Sevin XLR, 80S, Sevimol) 1.0 lb
- fenvalerate (Pydrin 2.4EC)..... 0.1 lb

● Restricted use


CORN ROOTWORM ADULTS TO REDUCE LARVAE THE NEXT YEAR (NebGuide G83-634)

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. Also, since long residual chemicals are not available, 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, begin weekly scouting in early July. 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 control. If beetles recur, make a second application when populations reach one beetle per two plants. The cost of two treatments will exceed that of a single soil treatment applied at planting or first cultivation.

CHINCH BUGS (NebGuide G78-427)

Preventing chinch bug damage by cultural practices is more reliable than chemical controls. Where possible, do not plant corn into wheat stubble or adjacent to wheat fields. If chemical controls are necessary, apply a suggested insecticide 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 are not effective. Sprays will not last more than 4 to 7 days. If migrations from adjacent wheat fields are heavy, reapplication may be necessary. Under heavy populations, chemical control may not be satisfactory.

RECOMMENDATIONS FOR CONTROL OF CHINCH BUGS IN CORN

Insecticide	Rate	Directions, Restrictions, Comments
carbaryl (Sevin XLR)	2.0 lbs a.i. per acre	Apply as directed spray with at least 40 gallons of water per acre.
chlorpyrifos (Lorsban 4E)	1.0 lb a.i. per acre	Apply as directed spray with at least 40 gallons of water per acre, using ground equipment only. Wait 35 days for grain, 35 days fodder, 14 days for silage.
 parathion	12 oz a.i. per acre	Aerial application only. Do not apply within 12 days of harvest. Apply only when chinch bugs are exposed.
phorate (Thimet 20G)	6.12 oz a.i. per 1,000 ft	Apply granules at time of cultivation in a band at base of plants just ahead of cultivator shovels so granules are covered with soil as for corn rootworm control. One postemergence application per season. Do not graze or cut for forage within 30 days of treatment

EUROPEAN CORN BORER (NebGuide G75-217, G82-613)

The decision to treat for corn borers is a complex one because of the many variables involved - weather, plant maturity, borer development, anticipated corn prices, insecticide efficacy, difficulty of scouting fields and application costs versus anticipated returns. However, enough is known about these variables to help growers make intelligent assessments as to the need for control of each of our (normally) two annual generations of the European corn borer.

First Generation

To determine the need to treat for first generation borer, you must examine corn whorls in each field, noting the percent of total plants infested, and determine the average number of worms per infested stalk. Also note the position of the worms, since if many have left the whorls and have entered the side of the stalk, it is too late to attempt control. FOR FIRST GENERATION, AERIAL AND GROUND APPLICATIONS OF RECOMMENDED GRANULAR INSECTICIDES HAVE BEEN SUCCESSFUL WHILE LIQUIDS HAVE GENERALLY FAILED. However, liquids that are approved for center pivot application have given control of first generation European corn borer. Expect heaviest concentrations of first generation borers in earliest planted fields seeded with susceptible varieties of corn. When purchasing seed, ask your seedsman about locally adapted varieties that produce well and carry some resistance to the borer.

To make a decision on first generation treatment, the following information is needed:

1. Average percent infested whorls in the field, also average number of worms per infested plant.
2. Cost per acre of the insecticide application.
3. Anticipated value of the grain per bushel.
4. Expected percent control given by a particular insecticide.*

INSECTICIDES REGISTERED FOR FIRST GENERATION BORER CONTROL

Insecticide	Rate AI/acre	Average % Reduction (No. years tested)
carbofuran (Furadan 15G)	1.0	85% (3)
fonofos (Dyfonate 20G)	1.0	82% (8)
diazinon 14G	1.0	78% (5)
chlorpyrifos (Lorsban 15G)	1.0	72% (5)
☐ fenvalerate (Pydrin 2.4EC)	0.15	71% (4)
phorate (Thimet 20G)	1.0	64% (6)
terbufos (Counter 15G)	1.0	91% (5)
chloryprifos (Lorsban 4E)	1.0 + oil (pivot)	80% (1)

* These data (on ground applications) are summarized from screening studies on first generation borers at the Northeast Station at Concord. Use them as guidelines when considering treatment decisions.

EXAMPLE:

Let us assume that 50% of the corn plants in a field are infested with an average of 4 worms/infested plant, final yield expectation is 125 bu/acre, and that corn is worth \$2.75/bu. Additionally, let us assume a 5% yield loss for each borer/plant, that insecticide costs are \$8.00/acre, and that application costs are another \$4.00/acre (Total = \$12.00/acre).

1. Calculate the final average number of larvae per plant
 $50\% \times 4 \text{ larvae/infested plant} = 2 \text{ larvae/plant}$
2. Calculate potential yield loss if all worms survive
 $2 \text{ larvae/plant} \times 5\% = 10\% \text{ loss in yield}$
3. Calculate potential bushel loss
 $10\% \text{ loss} \times 125 \text{ bu/a yield} = 12.5 \text{ bu/acre}$
4. Calculate potential dollar loss
 $12.5 \text{ bu/acre loss} \times \$2.75/\text{bu} = \$34.37 \text{ loss/acre}$
5. Calculate the corrected preventable yield loss assuming the insecticide application only controls 75%* of the borers
 $\$34.75 \times 75\% = \$25.78/\text{acre preventable loss}$
6. Compare this dollar amount with the application costs
 $\$25.78 \text{ vs. } \12.00
7. IF PREVENTABLE LOSS EXCEEDS THE TOTAL COST OF APPLICATION - TREAT AS SOON AS POSSIBLE.

* See First Generation Borer Control table. Percentage control expectations will vary depending on timing of application, choice of insecticide and method of application. Contact your county extension agent for current information.

RECOMMENDATIONS FOR CONTROL OF FIRST GENERATION EUROPEAN CORN BORER

Insecticide	AI/Acre	Restrictions (always read label)
carbofuran (Furadan 15G)	6.7 lbs	Do not make a foliar application if Furadan 15G was applied at more than 8 ounces per 1000 linear feet of row at planting (6.7 lbs/acre with 40 inch row spacing) at planting. No more than two foliar applications per season. Field corn only.
chloryprifos (Lorsban 15G)	6.7 lbs	No more than two applications per season. Field, sweet and popcorn.

chlorpyrifos (Lorsban 4E)	1 qt	Lorsban 4E insecticide may be applied through an overhead sprinkler irrigation system. This method of application dictates the use of specific equipment, specific application conditions, accurate calibration, and critical safety precautions. Consult the label for complete directions prior to use. Field, sweet and popcorn.
diazinon 14G	7.0 lbs	Labeled on corn.
fonofos (Dyfonate 20G)	5.0 lbs	Field, sweet and popcorn.
terbufos ^{1/} (Counter 15G)	6.7 lbs	No more than one application after plant emergence. Do not graze or cut for forage within 30 days after application. Do not enter treated fields for 7 days. Field corn only.

^{1/} Supplemental label subject to change.

REGISTERED FOR FIRST GENERATION EUROPEAN CORN BORER CONTROL
Amounts of material are formulation per acre.

carbofuran ^{1/} (Furadan 4F).....	1.0 lb
phorate (Thimet 20G).....	1.0 lb
① fenvalerate (Pydrin 2.4EC).....	0.15 lb


^{1/} Supplemental label subject to change.

Second Generation

Fields that have green silks and are shedding pollen during the peak period of moth flight are the most susceptible to second generation infestation. To determine the need for second generation ECB control, begin weekly scouting in mid-July, examining the undersides of leaves for white borer egg masses. These masses, usually found on leaves in the middle third of the plant (frequently near the midrib) normally hatch in about 5 days.


Timing of applications is critical if reasonably good control is to be achieved. Accumulate the percentages of plants infested on successive weekly scoutings. When 50 percent of the plants are infested and eggs are beginning to hatch, plan to treat immediately. The development of the corn plant is also important. As the plant matures and dry matter accumulates, the potential benefits of insecticide application decline. If other insect pests are present and/or moth populations are high, liquid formulations are preferred over granules because of their broader spectrum of activity, and the added advantage of obtaining some moth control. Otherwise, granules should give adequate control of second generation borers. Be alert for possible buildup of spider mites after insecticide application.

RECOMMENDATIONS FOR CONTROL OF SECOND GENERATION EUROPEAN CORN BORER

Insecticide	Rate Form/Acre	Restrictions (always read label)
carbofuran (Furadan 15G)	6.7 lbs	Do not make a foliar application if Furadan 15G was applied at more than 8 ounces per 1000 linear feet of row at planting (6.7 lbs per acre, 40 inch row spacing). No more than two foliar applications per <u>season</u> . Field corn only.
 carbofuran $\frac{1}{2}$ (Furadan 4F)	1.5-2 pts	Do not make a foliar application if more than 6.7 lbs of Furadan 15G or 1 quart of Furadan 4F were used per 13,000 linear feet (one acre with 40 inch row space) at planting. No more than two applications per season. Do not apply within 30 days of harvest. Do not apply on seed corn prior to tasseling or rogueing. Do not re-enter treated fields within 14 days of application. Field corn only.
chlorpyrifos (Lorsban 4E)	1 qt	In addition to aerial or ground application, Lorsban 4E may be applied through an overhead sprinkler irrigation system. This method of application dictates the use of specific equipment, specific application conditions, accurate calibration and critical safety precautions. Consult the label for complete directions prior to use. Do not apply within 35 days before harvest of grain. Do not apply more than a total of 14 pints of Lorsban 4E per acre per season. Do not allow livestock to graze in treated areas, do not harvest treated corn silage as feed for meat or dairy animals within 14 days after last treatment. Do not feed treated corn fodder to meat or dairy animals within 35 days after last treatment. Field, sweet and popcorn.
diazinon 14G	7.0 lbs	Do not feed treated fodder to dairy or beef cattle or sheep for 10 days following application. Corn may be picked immediately.

chlorpyrifos 6.5 lbs
(Lorsban 15G)

No more than two applications per season. Do not apply within 35 days before harvest of grain. Do not allow livestock to graze in treated areas nor harvest treated corn silage as feed for meat or dairy animals within 14 days after last treatment. Do not feed treated corn fodder to meat or dairy animals within 35 days after last treatment. Field, sweet and popcorn.

 fenvalerate 5.3-10.6 oz
(Pydrin 2.4EC)

21 days to harvest. Apply as necessary to maintain control but do not exceed 1.0 lb ai/acre per season. Field and sweet corn.

fonofos 5.0 lbs
(Dyfonate 20G)




Do not apply within 30 days of harvest or feed or graze livestock within 30 days of treatment. Field, sweet and popcorn.

terbufos ^{1/} 6.7 lbs
(Counter 15G)

No more than one application after plant emergence. Do not graze or cut for forage within 30 days after application. Do not enter treated fields for 7 days. Field corn only.

^{1/} Supplemental label subject to change.

Additional Registrations


- | | |
|---|--|
|  1. Penncap M | both generations, field & sweet corn |
|  2. Lannate L & Lannate 90 | both generations, sweet corn only |
|  3. Parathion | both generations, label states just corn |

GRASSHOPPERS ON CORN (NebGuide G74-106)

Prevent damage to corn by controlling grasshopper nymphs when there are 20 or more immature grasshoppers per square yard in margins around fields.

RECOMMENDATIONS FOR CONTROL OF GRASSHOPPERS ON CORN:
Amounts are active ingredient per acre.

dimethoate (Cygon 400)..... 0.5 lb

 carbofuran (Furadan 4F)..... 0.25 lb

REGISTERED FOR GRASSHOPPER CONTROL IN CORN:

Amounts are active ingredient per acre.

● fenvalerate (Pydrin 2.4EC).....	0.15 lb
chlorpyrifos (Lorsban 4E).....	0.5 lb
malathion 5.7EC.....	1.0 lb
● parathion.....	0.5 lb
● PennCap 2FM 1/.....	0.5 lb
carbaryl (Sevin 80S, XLR, Sevimol 4)	1.5 lbs
diazinon (AG500).....	0.5 lb
carbaryl (Sevin 20% Bait).....	5-10 lbs/acre

● Restricted use

- 1/ Do not use PennCap M or Sevin on corn shedding pollen, if beehives are within 2 miles.

FLEA BEETLES

Many problems were reported on seedling corn in May and June of 1983 and later in September and October, when the insects moved into rye and oats planted as cover crops on PIK acres and also on winter wheat. We expect more troubles with flea beetles on corn in 1984, particularly if the winter is mild. The pests are small, about 1/16 inch long, shiny black, and they are good jumpers. Injury is first noted by a silvery white appearance on seedlings where beetles have gouged leaf tissues, producing a "scratching" effect. If injury is present and there are 5 or more beetles per plant (4-6 inches tall), treatment is probably necessary. Fewer beetles can injure smaller plants, whereas corn over 6 inches can probably tolerate 5 beetles per plant.

REGISTERED TO CONTROL FLEA BEETLES

Amounts are active ingredient per acre unless otherwise noted

terbufos (Counter 15G).....	8.16 oz/1000 row
	feet, banded or in seed
	furrow at planting.
carbofuran (Furadan 15G).....	8.16 oz/1000 row
	feet, banded or in seed
	furrow at planting.
chlorpyrifos (Lorsban 4E).....	1.0 lb
diazinon (AG500).....	0.5 lb
carbaryl (Sevin 80S, XLR, Sevimol 4)	1.0 lb

WESTERN BEAN CUTWORMS




(NebGuides G76-290, G82-613)

Several factors influence the decision to control this insect including weather, corn maturity, and time of cutworm infestation. Generally, corn is

most attractive to egg laying moths during the late whorl stages and less attractive when the corn is small or when the corn has already pollinated. Generally, a chemical control should be used if 8 percent of the plants are infested with newly hatched larvae in tassels and/or eggs on leaves and corn is at least 95 percent tasselled. Poor control is likely if worms have already reached the ear tips. If corn is developing late in relation to the western bean cutworm infestation, the treatment threshold should be raised since fewer are likely to survive.

Many products used to control western bean cutworms have been shown to increase the risk of spider mite infestations. Fields treated for western bean cutworms should be watched closely for increasing mite populations.

RECOMMENDATIONS FOR CONTROL OF WESTERN BEAN CUTWORMS ON CORN:
Amounts are active ingredient per acre.


carbaryl (Sevin XLR, 80S, Sevimol 4).....	2.0 lbs
chlorpyrifos (Lorsban 4E*).....	1.0 lb
 carbofuran (Furadan 4F).....	1.0 lb
 fenvalerate (Pydrin 2.4EC).....	0.1 lb
 methyl parathion + EPN.....	0.5 lb

* Lorsban 4E may be applied through an overhead sprinkler system. Follow label directions carefully.

SPIDER MITES
(NebGuide G75-50)

Spider mites are most likely to develop economic populations in fields that are moisture stressed during June and early July, particularly if weather is hot and dry. Mite buildup can occur even in irrigated fields, especially if irrigation is delayed during stress periods prior to blister stage of corn. Other fields likely to develop mite problems are fields that have received foliar applications of insecticides for other pests or those situated next to ripening wheat. Watch these situations closely for rapid mite increase. Plan to treat immediately if 1 lower leaf is yellowing from spider mite damage and mite colonies are present to the ear zone. Corn that has dented will not likely benefit from the treatment.

REGISTERED FOR CONTROL OF SPIDER MITES ON CORN:
Amounts are active ingredient per acre.

dimethoate (Cygon 400).....	0.5 lb
disulfoton (Di-Syston 15G).....	1.0 lb
 disulfoton (Di-Syston 8EC).....	1.0 lb
oxydemetonmethyl (Metasystox-R 2EC).....	0.5 lb



phorate (Thimet 20G).....	1.0 lb
carbophenothion (Trithion 8E).....	1.0 lb
propargite (Comite 6.55EC).....	1.6 lb
terbufos (Counter 15G).....	1.0 lb

ARMYWORMS

(NebGuides G82-613, G82-615)

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.

RECOMMENDATIONS FOR CONTROL OF ARMYWORMS IN CORN:
Amounts are active ingredient per acre.

	chlorpyrifos (Lorsban 4E).....	1.0 lb
	methomyl (Lannate 1.8EC, Nudrin 1.8EC).....	0.45 lb
	carbaryl (Sevin XLR, 80S, Sevimol 4).....	1.5 lbs
	malathion 57EC.....	1.25 lbs
	parathion.....	0.5 lb

REGISTERED FOR ARMYWORM CONTROL:

carbaryl (Sevin 20% Bait).....	5-10 lbs/acre
trichlorfon (Dylox 80SP).....	1.0 lb

SORGHUM INSECTS

GREENBUGS AND CORN LEAF APHIDS

Corn leaf aphids (referred to as "aphids") rarely 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 are frequent pests in Nebraska milo. These small insects are bright green, with a dark green stripe down the back. Typically they feed on the undersides of leaves on larger plants. The appearance of the new Biotype E, which is capable of damaging many of the seedling resistant lines was a serious development. Because of the new biotype, farmers will need to treat grain sorghums more frequently. Seedling milo can be treated at planting time with soil systemics which typically protect the plants until about early

July. These treatments do not usually prevent mid-to-late season buildup, which normally peaks in late July or early August. Unless plants are threatened in the seedling stage, it may be best to withhold treatment until early July, and to spray when aphid colonies are small. Foliar treatments applied around July 7 have given good control and have often prevented midseason damage.

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.

RECOMMENDED FOR CONTROL OF GREENBUGS ON SORGHUM:

Amounts are active ingredient per acre.

diazinon (AG500).....	0.5 lb
dimethoate (Cygon).....	0.5 lb
disulfoton (Di-Syston 15G).....	1.0 lb
☉ disulfoton (Di-Syston 8EC).....	0.5 lb
☉ fonofos (Dyfonate 4E).....	1.0 lb
☉ carbofuran (Furadan 4F).....	0.5 lb
malathion 57EC.....	1.0 lb
oxydemetonmethyl (Metasystox-R 2SC).....	0.5 lb
☉ parathion.....	8 oz
phorate (Thimet 20G).....	1.0 lb

☉ Restricted use

REGISTERED FOR PLANTING TIME APPLICATION:

Amounts are formulation per 1000 feet of row

carbofuran (Furadan 15G).....	8.16 oz banded or in-furrow
disulfoton (Di-Syston 15G).....	8.15 oz banded only
phorate (Thimet 20G).....	6.12 oz banded only
terbufos (Counter 15G) <u>1/</u>	8.16 oz banded only

1/ Registered for use only on grain sorghum

CAUTION: Since certain sorghum varieties may be sensitive to organophosphate insecticides, Metasystox-R should be applied to a small area and observed for a few days to determine if any crop injury will occur.

WIREWORMS, SEEDCORN MAGGOT AND SEEDCORN BEETLE




Planter box seed treatment with lindane or diazinon. Follow package directions for amounts and restrictions.


CHINCH BUGS (NebGuide G78-427)

Preventing chinch bug damage to sorghums by cultural practices is more reliable than chemical controls. Do not plant sorghums following wheat stubble, or adjacent to winter wheat. Chinch bugs do not feed on legumes, so soybeans are ideal alternatives for sorghums in high chinch bug probability fields.

Research in Nebraska and Kansas indicates that Furadan granules applied in the seed furrow at time of planting provides the longest lasting control of chinch bugs moving into sorghums from adjacent wheat. Under conditions of high populations, chemical controls are not highly effective.

RECOMMENDATIONS FOR CHINCH BUG CONTROL IN SORGHUM

Insecticide	Rate	Directions, Restrictions, Comments
AT PLANTING		
carbofuran (Furadan 4F, 15G)	8.16 oz granules or 2.45 fl oz 4F per 1000 ft of row	Place in-furrow with seed. Should give 3 to 4 weeks protection.
 Furadan 4F only		
POSTEMERGENCE		
carbaryl (Sevin XLR, 80S, Sevimol 4)	2.0 lbs a.i. per acre	Apply as directed spray with at least 40 gallons of water per acre.
 carbofuran (Furadan 4F)	0.5 lb a.i. per acre	Apply as directed spray with at least 30 gallons of water per acre. Do not make more than two applications of Furadan per season, including planting time application. Do not apply after heads form. Do not harvest within 30 days of application.
chlorpyrifos (Lorsban 4E)	8 oz a.i. per acre	Apply as directed spray with at least 40 gallons of water per acre, using ground equipment only. Do not apply more than 12 oz of Lorsban 4E per season. The treated crop is not to be used for forage, fodder, hay or silage within 28 days after treatment. Do not treat sweet varieties of sorghum.
 ethyl parathion	12 oz a.i. per acre	Aerial application only. Do not apply within 12 days of harvest. Apply only when chinch bugs are exposed.
phorate (Thimet 20G)	6.12 oz per 1000 ft of row	Apply at base of plants at cultivation and cover with soil. One application per season.

 Restricted use

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 below the soil surface in a location that will not result in contamination of water, crops, man, or animals.

Abbreviations

AI - Active Ingredient	SP - Soluble Powder
EC - Emulsifiable Concentrate	S - Soluble
WP - Wettable Powder	LS - Liquid Solution
G - Granular	lb - Pound
LC - Liquid Concentrate	oz - Ounce
L - Liquid	F - Flowable

 - Restricted Use (applicators must have EPA certification)

Metric Conversion Table		
English	Multiply By	Metric
Inch (in)	25.4	Millimeter (mm)
Inch (in)	2.54	Centimeter (cm)
Foot (ft)	0.3	Meter (m)
Ounce (oz)	28	Gram (g or gm)
Pound (lb)	0.45	Kilogram (kg)
Ounce per acre (oz/A)	69.2	Gram per hectare (g/ha)
Pound per acre (lb/A)	1.1	Kilogram/hectare (kg/ha)
Gallon (gal)	3.8	Liter (l)
Gallon per acre (gal/A)	9.39	Liter per hectare (l/ha)
Fahrenheit (°F)	$^{\circ}\text{F}-32 \div 1.8$	Celsius (°C)