1988 Insect Pest Management Guide

FIELD and FORAGE CROPS

CONTENTS

POLICY STATEMENT

This publication is provided for use by people who desire insect control guidelines and suggestions for field and forage crops in Illinois. It is revised annually and is intended for use during the current calendar year only. The insecticides suggested in this publication should be used only to supplement a complete insect pest management program that also includes the use of cultural, mechanical, and biological control tactics.

Selection of the insecticides and the guidelines for insect control that are included in this circular was based on EPA registrations and research results from the Illinois Natural History Survey, the University of Illinois College of Agriculture, other land grant universities, and the United States Department of Agriculture. Not all insecticides registered for control of crop insect pests are included in this circular. Insecticides that are effective and do not present an undue hazard to the user or the environment are suggested whenever possible.

At the time this publication was in preparation, only currently registered insecticides were included. New registrations and changes in registration, labels, and recommendations will be announced through appropriate media sources and county Extension advisers. If you have questions about the use of insecticides for management of insect pests in field and forage crops, consult your county Extension adviser.

The information in this circular is provided for educational purposes only. Trade names of insecticides have been used for clarity, but reference to trade names does not imply endorsement by the University of Illinois, nor is discrimination intended against any product. The reader is urged to exercise the usual caution in making purchases or evaluating product information.

PEST-MANAGEMENT SCOUTING PROGRAMS

Integrated Pest Management (IPM) is a systematic method of looking for pests in the field, of determining whether control measures are needed, and, if there is a problem, of deciding on the proper measures to use. Pest scouting enables farmers to detect and control pest outbreaks before significant yield losses occur. Because decisions on chemical control are based on economic thresholds, IPM programs eliminate unnecessary pesticide use.

Pest scouting has been accepted as an important management tool by many Illinois farmers. As farming costs increase, growers are realizing the advantages of treating a field only when an economically harmful pest population occurs, rather than treating it automatically regardless of the situation. By using pesticides on this basis, farmers have a better chance of reducing management costs.

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Pest scouting programs have been initiated by several pest-management consulting firms throughout the state. In addition to pest scouting, most offer other services such as soil testing and nematode monitoring.

Many growers and their family members have received training for pest identification and scouting techniques. Programs are offered at various locations around the state and on the University of Illinois campus. If you are interested in attending a scout training course, contact your county Extension adviser.

FEDERAL AND STATE LAWS

The U.S. Environmental Protection Agency (USEPA) classifies pesticides for ***general*** or ***restricted*** use; several insecticides have been classified for restricted use (Table 1).

Commercial applicators who apply restricted-use pesticides must be certified. Commercial applicators include persons applying a pesticide for hire and governmental personnel, chemical company representatives, and others involved in demonstrational, regulatory, and public health pest control. Certification as a commercial applicator requires passing written examinations administered either by the Illinois Department of Agriculture or the Department of Public Health.

Table 1. Insecticide Classifications

Common name	Trade name	Classification
acephate	Orthene	general
Bacillus thuringiensis	Dipel	general
carbaryl	Sevin	general
carbofuran	*Furadan	restricted
chlorpyrifos	Lorsban	general
diazinon	Diazinon	general
dimethoate	Cygon	general
esfenvalerate	*Asana	restricted
ethoprop	*Mocap	restricted
fenvalerate	*Pydrin	restricted
flucythrinate + phorate	*Aastar	restricted
fonofos	*Dyfonate	restricted
malathion	Cythion, malathion	general
methidathion	*Supracide	restricted
methomyl	*Lannate, *Nudrin	restricted[a]
methyl parathion (microencapsulated)	*Penncap-M	restricted
permethrin	*Ambush, *Pounce	restricted
phorate	*Thimet	restricted
phosmet	Imidan	general
terbufos	*Counter	restricted
thiodicarb	Larvin	general
trichlorfon	Dylox	general
trimethacarb	Broot	general

[a] All formulations except water-soluble packages, 25% wettable powder, and granulars are restricted.

Asterisks (*) are used throughout this circular to indicate insecticides classified for "restricted" use.

Private applicators (farmers) who use restricted-use pesticides "for the purpose of producing any agricultural commodity on property owned or rented by him or as exchange labor (no compensation) on the property of another" must be certified by passing an examination.

Educational training programs for farmers (private applicators) and commercial pesticide applicators are conducted by the Cooperative Extension Service to prepare persons for certification. For additional information, consult your county Extension adviser in agriculture. The actual certification and the issuing of permits or licenses are handled by the Illinois Department of Agriculture or the Illinois Department of Public Health.

Special Local Need Registrations

Section 24(c) of the amendments to the Federal Insecticide, Fungicide, and Rodenticide Act of 1972 allows states the right to register pesticides for use within the state to meet special local needs (SLN). The authority for state registration of pesticides is the Illinois Department of Agriculture. A special label, which lists the new 24(c) uses, is printed by the formulator. A copy of this label must be in the possession of the operator during application of the pesticides.

Groundwater Statements on Pesticide Labels

The USEPA has started requiring pesticide manufacturers to include groundwater statements on labels if the product has been detected in samples of groundwater associated with monitoring programs.

Most groundwater statements now on labels have identical wording: "*Pesticide X* is a chemical which can travel (seep or leach) through soil and can contaminate groundwater which may be used as drinking water. *Pesticide X* has been found in groundwater as a result of agricultural use. Users are advised not to apply *Pesticide X* where the water table (groundwater) is close to the surface and where the soils are very permeable, i.e., well-drained soils such as loamy sands. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater."

Groundwater statements that are present on labels help the applicator to choose appropriate treatments where soils are sandy or where extra precautions are needed to reduce the risk of groundwater contamination. Pesticide applicators should use alternative products in areas with sandy soils and shallow groundwater.

Currently, the only agricultural **insecticide** product that includes a groundwater statement on the label is Furadan.

The leaching potential of pesticides is affected by many properties, including how tightly they are adsorbed by soil particles, solubility, and persistence. Adsorptivity,

solubility, and persistence properties of pesticides are usually not included on pesticide labels.

Endangered Species Act

In order to protect endangered species from adverse effects of pesticides, many product labels will soon change. The changes, which are required by the Endangered Species Act, are being implemented by the USEPA.

In compliance with the Endangered Species Act, the USEPA has instructed registrants to modify the labeling of products that contain certain pesticides and are intended for certain uses. Products subject to these modifications cannot be released for shipment after February 1, 1988, nor sold or distributed after February 1, 1989, unless they bear the required labeling.

The labels on affected products will, for the first time, require pesticide users in counties listed on the label to obtain additional information on the ranges of endangered species before applying the pesticide. The U.S. Fish and Wildlife Service (FWS) is defining geographic areas where certain pesticides jeopardize the survival of endangered species. The USEPA is protecting such species by prohibiting use of these pesticides or instituting other safeguards in the ranges of the designated species.

Additional information regarding the affected pesticides and endangered species will be provided to pesticide users. This new information will clearly identify the areas in listed counties where the pesticides may not be used. The information will be distributed in two ways: (1) product labels will direct users of forest pesticides and mosquito larvicides to call the U.S. Fish and Wildlife Service (telephone numbers provided on the label); and (2) product labels will direct users of pasture, rangeland, corn, cotton, sorghum, soybean, and small grain pesticides to obtain a copy of a county-specific ***Pesticide Endangered Species Bulletin.***

The *Pesticide Endangered Species Bulletin* will include: (1) a county map that identifies the ranges of each endangered species by using commonly recognized borderlines such as roads, powerlines, and bodies of water; (2) a listing of pesticides, by active ingredient, that jeopardize the species; and (3) a list of the endangered species in the county that are protected under the Federal Endangered Species Act. Use of listed pesticides in the range of the endangered species will be prohibited or limited.

Range and Pastureland. After February 1, 1988, pesticide users in 14 Illinois counties will be instructed by labeling to obtain a *Pesticide Endangered Species Bulletin* from the county Extension adviser, State Fish and Game Office, or a local pesticide dealer before using certain pesticides on range and pastureland. Counties listed on the labeling of one or more of the pesticides will be DuPage, Gallatin, Henderson, JoDaviess, Lee, Massac, McHenry, Mercer, Ogle, Pike, Pulaski, Rock Island, and White.

All pesticide products listed below and which are registered for use on range and pastureland are subject to the labeling requirements of EPA PR Notice 87-5:

2,4-D	Malathion
2,4-D (esters, salts)	MCPA (acid)
2,4-DP	MCPA (amine)
Acephate	MCPA (salts)
Aluminum phosphide	Methyl parathion
Ammonium sulfamate	Naled
Atrazine	Paraquat
Bacillus thuringiensis	Picloram
Carbaryl	Potassium picloram
Chlorophacinone	Sodium cyanide
Clopyralid	Sodium dicamba
Diazinon	Strychnine
Dicamba	Tebuthiuron
Dimethylamine dicamba	Trichlorfon
Hexazinone	Triethylene picloram
Magnesium phosphide	Zinc phosphide

Forest and Mosquito. After February 1, 1988, product labels will direct users of certain forest pesticides and mosquito larvacides to contact the U.S. Fish and Wildlife Service office in Rock Island, IL, at (309) 793-5800 and leave their names, telephone numbers, the products to be used, and the specific locations where they will be used. The FWS representative will inform the user whether the proposed use is within the range of an endangered species.

NOTE: Some uses of pesticides are exempted from the Endangered Species Act. Products used directly on humans or pets; in, on, or around any structure, vehicle, article, surface, or area associated with the household, including but not limited to areas such as out-buildings, non-commercial greenhouses, pleasure boats, and recreational vehicles, or in any preschool or day care facility, and which are labeled only for such uses, are exempt from the labeling requirements of this notice.

INSECTICIDE NOMENCLATURE

The chemical names used in this circular may be unfamiliar to you. These names are the common, coined chemical names and as such are not capitalized (for example, terbufos). Trade names are capitalized (for example, Counter). In the tables of suggestions for control, only the trade name is listed. In the table of limitations (Table 13), the trade names are listed first, with the common name in parentheses following the trade name.

PESTICIDE LABELS AND SAFETY

Certain precautionary steps should be taken when handling insecticides. The insecticides suggested in this publication can be poisonous to the applicator. The farmer or applicator is expected to protect himself, his workers, and his family from needless exposure.

When using insecticides, apply all the scientific knowledge available to make sure that there will be no illegal residue on the marketed crop. Such knowledge is condensed on the label. **Read the label carefully and follow the instructions. The label is the law.** The label should be recent and not from a container several years old. Do not exceed the maximum rates suggested. Observe the interval between application and harvest. Apply only to crops for which use has been approved. Keep records of pesticide use for each field. Record the product used, the trade name, the percentage content of the insecticide, the dilution, the rate of application per acre, and the date or dates of application.

Always handle insecticides with respect. The person most likely to suffer ill effects from insecticides is the applicator. Accidents and careless, needless overexposure can be avoided. Following these rules will prevent most insecticide accidents:

- Wear rubber gloves when handling insecticide concentrates.
- Do not smoke, eat, or drink while handling or using insecticides.
- Keep your face turned to one side when opening, pouring from, or emptying insecticide containers.
- Leave unused insecticides in their original containers with the labels on them.
- Store insecticides out of the reach of children, irresponsible persons, and animals; store preferably in a locked building. Do not store near livestock feeds. Better yet, buy no more pesticide than you will use, thus eliminating a pesticide storage and disposal problem.
- Triple rinse, bury, or burn all empty insecticide containers or take them to an appropriate sanitary landfill.
- Do not put the water-supply hose directly into the spray tank or blow out clogged nozzles or spray lines with your mouth.
- Wash with soap and water exposed parts of the body and clothes contaminated with insecticides.
- Do not apply to fish-bearing or other waters.
- Do not leave puddles of spray on impervious surfaces or apply insecticides near dug wells or cisterns.
- Do not apply insecticides, except in an emergency, to areas with abundant wildlife.
- Do not spray or dust when weather favors drift.
- To avoid bee kill, apply insecticides after bee activity has ceased for the day; use the least toxic materials. *Warn beekeepers that you are applying insecticides.*

Refer to the *Illinois Pesticide Applicator Study Guide* for more information concerning safe handling of pesticides and treatment of pesticide poisoning.

POISON RESOURCE CENTERS

The Poison Resource Centers listed below have been established to provide information about the treatment of poisoning cases. Anyone with a poisoning emergency can call the toll-free telephone number for help. Personnel at the Resource Center will provide first-aid information and refer callers to local treatment centers if necessary.

Poison Resource Centers supplement, but do not replace, local emergency medical services. Do not delay calling local emergency medical personnel to request immediate assistance or transportation. If possible, have the pesticide container and label present when you call or reach a treatment center or hospital.

Chicago and northeast Illinois
1753 West Congress Parkway
Chicago, Illinois 60612
Telephone: 800-942-5969

Northern and central Illinois
530 N.E. Glen Oak
Peoria, Illinois 61603
Telephone: 800-322-5330

Central and southern Illinois
800 East Carpenter
Springfield, Illinois 62702
Telephone: 800-252-2022

POTENTIAL FOR SOIL INSECT PESTS IN CORN

There are many factors that affect soil insect populations and their potential to damage corn. The type of crop rotation greatly influences whether a soil insect problem will occur and what kind it will be. Weather, weeds, soil type, planting date, hybrid, tillage, and natural enemies also influence insect populations. Knowledge about damage caused by certain soil insects in particular fields during previous years may also be useful for anticipating problems.

Illinois Extension entomologists have estimated the probability of the occurrence of soil insect pests in corn on the basis of cropping sequence (Table 2). These estimates can serve as a guide to determine the risk of damage caused by soil insects and the need for applying a soil insecticide at planting.

Corn After Soybeans. The potential for soil insect problems in corn after soybeans is generally low, and the use of soil insecticides rarely pays. Corn rootworms rarely cause damage to corn after soybeans. In most fields, a lindane or diazinon + lindane planter-box seed

treatment will be adequate to protect against attack by seedcorn beetles, seedcorn maggots, and wireworms. Scout the field for cutworm damage as the plants emerge from the soil.

White grubs are an occasional problem in corn after soybeans.

Corn After Corn. The potential for rootworm damage is moderate to severe wherever corn follows corn in Illinois. A rootworm soil insecticide may be needed in most fields of corn after corn. Wireworms are occasionally a problem in the southern part of Illinois. Scout for cutworm damage.

Corn After Grass Sod. Wireworms and white grubs are potential problems. Apply a labeled soil insecticide at planting time. Scout for cutworm damage.

Corn After Sorghum. A planter-box seed treatment of diazinon or diazinon + lindane will protect the corn seeds against seedcorn maggots. Scout the fields for cutworms as the corn emerges. Corn rootworms are rarely a problem where corn follows sorghum.

Corn After Legumes. Cutworms, grape colaspis, grubs, and wireworms occasionally damage corn planted after clover and alfalfa. In addition, adult northern corn rootworms are sometimes attracted to legumes or to blooming weeds in legumes for egg laying, particularly in years when beetles are forced to leave adjacent fields of drouth-stressed corn to seek food. A soil insecticide should be considered for this cropping sequence.

Corn After Small Grain. There is a slight potential for damage by wireworms, seedcorn beetles, and seedcorn maggots in corn after small grain, particularly wheat. In most instances, a diazinon + lindane planter-box seed treatment will be adequate. If wireworms are present, use a soil insecticide at planting time. Excessive weed cover in small grain stubble fields may have been attractive to northern corn rootworm beetles for egg laying as the beetles moved from adjacent fields of drouth-stressed corn.

CORN ROOTWORM SITUATION

Problem Area

Populations of northern and western corn rootworm beetles were extremely high in 1987. Although the potential for rootworm damage to corn following corn is greatest in the northern two-thirds of the state, moderate to severe damage to corn roots by larvae may occur in any field where corn follows corn in Illinois.

Rootworm Control Problems

Corn rootworm larval control with soil insecticides has been variable in Illinois during the past few years, in both farmers' fields and research trials. Instances of poor control have been observed with all rootworm soil insecticides over a wide geographical area with various soil types and weather conditions. An investigation of some of the problem fields has disclosed several factors that probably contributed to poor control with the insecticides. The factors that stand out but are not easily quantifiable include dry soil conditions during May, June, and July, above-average rootworm larval populations, and improper calibration of insecticide applications (rates that were too low).

In some fields, lack of rain prevented the movement of the insecticide from the soil surface or off the granular carrier to the area where rootworm larvae were feeding. Early planting also may have been a contributing factor in some fields because soil insecticides applied in April could have lost much of their potency by the time eggs hatched. Undoubtedly, several of these conditions in

Table 2. Probability Estimates of Economic Soil Insect Damage in Corn and Suggestions for Control According to Cropping Sequence, Illinois

Crop preceding corn	Insect pest							Need for a soil insecticide	Recommended pest management practices
	Wireworm	Cutworm	Corn rootworm	White grub	Seedcorn maggot	Billbug	Grape colaspis		
Soybeans	1:100	1:25	1:1,000	1:500	1:150	1:1,000	1:1,000	very low	Use planter-box seed treatment; scout for cutworms; bait for wireworms.
Corn	1:200	1:100	2:3	1:1,000	1:50	1:1,000	1:5,000	mod-high	Scout for rootworm beetles; treat corn if population exceeds 0.75 per plant at any time during August.
Small grain	1:100	1:50	1:100	1:250	1:50	1:200	1:5,000	low	Bait for wireworms prior to planting; scout for cutworms.
Legume	1:25	1:25	1:50	1:150	1:10	1:50	1:4	low-mod	Bait for wireworms prior to planting; scout for cutworms.
Grass sod	1:10	1:25	1:500	1:10	1:25	1:50	1:1,000	mod-high	Use soil insecticide for wireworms and white grubs; if no-till, scout for foliar insect damage as corn emerges.

combination could have affected the performance of soil insecticides.

Unfortunately the factors that influence the performance of soil insecticides under field conditions are not well understood. Recent research indicates that the breakdown of some soil insecticides by soil microorganisms is accelerated after repeated applications of the same compound. The soil microorganisms use the insecticide as an energy source. As a result, the insecticide has a progressively shorter residual time in the soil. This seems to be most prevalent in fields where the same soil insecticide has been used for several consecutive years; however, the pattern is neither clearcut nor predictable. In all probability, environmental conditions combined with accelerated degradation of the insecticides are causes for rootworm control problems.

Are the rootworms more tolerant to the soil insecticides? Although this has not been confirmed, some research data suggest that some slight change in susceptibility has occurred with some compounds. At this point, tolerance to insecticides cannot be ruled out.

Extended Diapause

During 1986 and 1987 in the northern half of Illinois, a small number of fields of corn following soybeans were damaged by corn rootworm larvae. Entomologists have verified that the damage was caused by northern corn rootworms, some of which are known to undergo extended diapause (a period of suspended development) in the egg stage.

Apparently crop rotation coupled with certain environmental conditions favor the expression of extended diapause, thereby enabling rootworm eggs to survive two winters before hatching. Ordinarily rootworm eggs hatch the year after they are deposited. Extended diapause is not known to occur in the western corn rootworm population, the predominant species of rootworms in Illinois.

Should a farmer use a corn rootworm soil insecticide on corn following soybeans to control corn rootworms in 1988? Although the answer is not a clear-cut "no," the percentage of cornfields following soybeans that were economically damaged by corn rootworms was extremely small in 1986 and 1987. Based on a random survey of 590 fields of corn following soybeans in the northern half of Illinois, only 1 percent of the fields sampled had economic rootworm damage in 1986 and 1987. At this point there is little justification for using a soil insecticide in corn following soybeans on the vast majority of fields. A few isolated fields may sustain damage in 1988, but it is impossible to predict where these will be.

What scenerio might best describe how corn rootworm damage to corn following soybeans might occur in 1988 as a consequence of extended diapause in the northern corn rootworm population? Northern corn rootworm beetle numbers would likely have to have exceeded 2 beetles per plant in a field of corn during August, 1986, to result in a sufficient number of diapausing eggs to cause larval damage to corn after soybeans in 1988. Research entomologists in Illinois are conducting investigations into the phenomenon of extended diapause within the northern corn rootworm populations to determine the extent of this trait in Illinois.

Determining Potential for Damage in 1988

Corn growers should base the need for using a rootworm soil insecticide in 1988 on the abundance of rootworm beetles in cornfields during late summer of 1987. Generally, if beetle numbers reached or exceeded 0.75 per plant at any time during late July, August, or September, 1987, plan to apply a rootworm soil insecticide if the field is to be replanted to corn in 1988.

However, if the field scouted in 1987 was corn following any crop other than corn, the threshold (beetles per plant) is lower. The ratio of female to male beetles in first-year corn is usually higher than in continuous corn. The females apparently migrate into first-year cornfields, so most of the beetles found there are females. As a consequence, the threshold for determining whether to rotate away from corn or to use a soil insecticide in 1988 may be as low as 0.5 beetle per plant.

Fields of corn planted in late May or June, 1987, may have extensive rootworm damage if replanted to corn in 1988. During August and September, rootworm beetles are especially attracted to late planted or late maturing fields. Seeking fresh pollen and silks to feed on, the beetles lay millions of eggs in these fields. Planting the fields to a crop other than corn in 1988 is suggested to reduce the rootworm population.

SUGGESTIONS FOR ROOTWORM CONTROL, 1988

During the past 10 years, the performance of rootworm soil insecticides has been variable. They have provided effective control at some locations and have been marginal or ineffective at others. An immediate solution to the problem of erratic rootworm soil insecticide performance is not readily available. Perhaps there is none. It is entirely possible that changes brought about by treating millions of acres of corn with soil insecticides over the past 20 years have introduced an era when rootworm control with current soil insecticides will be highly variable.

Looking to 1988, you should seriously consider crop rotation, particularly in fields where there is a high probability of rootworm damage. Other alternatives include applications of a soil insecticide at planting or at cultivation. Planting time treatments of a soil insecticide will be the predominant method of rootworm control. However, a cultivator application in early June

near the beginning of rootworm egg hatch can be an effective option. If you use a soil insecticide at planting, plan to check fields in early to mid June to determine whether damage is occurring. If so, a cultivator application may be needed as a rescue treatment.

Crop Rotation

Crop rotation is an extremely effective way to prevent damage by northern and western corn rootworm larvae. If feasible, do not grow corn two years in succession in the same field. First-year corn following soybeans will generally not require a soil insecticide for rootworm control (see "Extended Diapause").

Although rootworm beetles can be found in "clean" or weed-free soybean fields, and may even lay a few eggs there, the number of eggs is not great enough to warrant the use of a soil insecticide on corn the following season. In a few instances, rootworm larval damage has occurred to corn planted after soybeans when the bean field had been heavily infested with volunteer corn or weeds during August of the preceding year. Adult northern and western corn rootworms were attracted to these fields to deposit eggs. As a result, root damage by larvae occurred the following season. Soybean fields with 5,000 or more volunteer corn plants per acre will usually warrant treatment for rootworm control the following year if planted to corn. Good weed control in soybeans will prevent rootworm damage in corn following soybeans.

Corn rootworm beetles deposit the vast majority of their eggs in cornfields. The larvae cannot survive on the roots of broadleaf crops (soybeans or alfalfa) or broadleaf weeds. Consequently, when a crop other than corn, soybeans for example, is planted in a field with soil containing millions of rootworm eggs, the rootworm larvae die from starvation.

Soil Insecticides

The suggestions for rootworm control that follow are based on research conducted by entomologists in Illinois and other states.

At Planting. Apply Aastar G, Broot 15GX, Counter 15G, Dyfonate 20G or 4EC, Furadan 15G or 4F, Lorsban 15G, Mocap 15G, or Thimet 20G at the suggested rate (see Table 3). IMPORTANT: Read the suggestions in the section on alternating rootworm soil insecticides.

The rates suggested in Table 3 should not be exceeded for rootworm control. Research has shown that increasing the rates of soil insecticide application does not improve rootworm control. Increasing the rate of the product will not solve rootworm control problems and may even accelerate the onset of resistance in the rootworm population.

Proper calibration, placement, and incorporation of rootworm soil insecticides will improve the likelihood of good control. See the section "Calibration for Granular Soil Insecticides" in this circular.

Insecticide Placement at Planting. The soil insecticides are labeled for application in a 7-inch band ahead of the planter press wheel or firming wheels. Counter 15G and Furadan 15G can also be applied in the seed furrow for rootworm control. Mocap 15G is labeled for application over a closed seed furrow. All insecticides should be lightly incorporated with spring tines or drag chains mounted behind the planter units.

Soil insecticides will give 50 to 70 percent control of corn rootworm larvae. This degree of control is adequate to prevent economic levels of larval damage in most fields. But in some heavily infested fields enough larvae may survive to cause economic levels of root damage, and beetle populations may be large enough to interfere with pollination.

Planting-time treatments applied in early April may provide only marginal control. Consider a cultivator application in late May or early June in such fields, rather than a treatment at planting time.

Liquid Formulations. Dyfonate 4E or Furadan 4F may be mixed with water and applied as a spray in a 7-inch band ahead of the press wheel. They may also be mixed with liquid fertilizer and used with a split-boot applicator at planting.

Incompatibility or crop injury may be a problem in treatments using a liquid insecticide with a liquid fertilizer at planting. The insecticide *must* be compatible with the fertilizer. Conduct a test before planting to make certain that the two are physically compatible. Maintain agitation in the tank after mixing and during application to prevent separation. **Use caution when handling liquid insecticide formulations.**

At Cultivation. Apply Broot 15GX, Counter 15G, Dyfonate 20G, Furadan 15G or 4F, Lorsban 15G or 4E, Mocap 15G, or Thimet 20G on both sides of the row at the base of the plants just ahead of the cultivator shovels. Cover the insecticides with soil. The best time to apply a basal treatment of a soil insecticide by cultivator is in late May or early June, near the beginning of egg hatch.

A cultivation-time application of a soil insecticide is an alternative to a planting-time application or may be used as a "rescue" treatment if the planting-time insecticide fails to control rootworm larvae. In either case, you should dig up several plants and examine the roots and surrounding soil for rootworm larvae and damage. If you find 3 or more larvae per plant and the field was not treated at planting, a cultivator application is warranted. If the field was treated at planting and rootworm larvae and damage are obvious in June, plan to apply a cultivator treatment. "Obvious" rootworm damage is characterized by brown root tips and roots that have been tunneled in or chewed back toward the base of the plant.

Table 3. Soil Insecticides Suggested for Rootworm Control, Illinois, 1988

Insecticide[a]	Time of application	Ounces of product per 1,000 ft. of row	Amount of product needed per acre			
			40″ rows	38″ rows	36″ rows	30″ rows
*Aastar G	At planting	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
Broot 15GX	At planting or cultivation	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
*Counter 15G	At planting or cultivation	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
*Dyfonate 20G	At planting or cultivation	6	5.0 lb.	5.3 lb.	5.6 lb.	6.7 lb.
*Dyfonate 4E	At planting	2.5 fl. oz.	2 pints	2⅛ pints	2¼ pints	2¾ pints
*Dyfonate 4E	Preplant	Broadcast	3 quarts	3 quarts	3 quarts	3 quarts
*Furadan 15G	At planting or cultivation	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
*Furadan 4F	At planting or cultivation	2.5 fl. oz.	2 pints	2⅛ pints	2¼ pints	2¾ pints
Lorsban 15G	At planting or cultivation	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
Lorsban 4E	At cultivation	2.5 fl. oz.	2 pints	2⅛ pints	2¼ pints	2¾ pints
*Mocap 15G	At planting or cultivation	8	6.7 lb.	7.0 lb.	7.4 lb.	8.7 lb.
*Thimet 20G	At planting or cultivation	6	5.0 lb.	5.3 lb.	5.6 lb.	6.7 lb.

[a] Consult text for more information. LIQUID FORMULATIONS ARE HIGHLY TOXIC.
* Use restricted to certified applicators only.

Soil moisture may affect both application and effectiveness of cultivation-time treatments. Fields that are too wet may never be cultivated. On the other hand, the insecticide may not perform satisfactorily if the soil is too dry.

Suggestions For Alternating Rootworm Soil Insecticides. Avoid using the same soil insecticide for several consecutive years or in fields where there have been performance problems. The continuous use of one insecticide may enable soil microorganisms to break it down rapidly or may hasten the onset of insect resistance. **Illinois entomologists encourage growers to consider alternating rootworm soil insecticides, rather than using one product for several consecutive years.** Consider the following suggestions for alternating rootworm soil insecticides:

1. If performance of a soil insecticide has been poor in a particular field in recent years, do not use the same insecticide in that field in 1988.
2. Avoid using carbamates in consecutive years.
3. Avoid using the same organophosphate for several consecutive years.

Laboratory and field research indicates that using the same rootworm soil insecticide for several consecutive years can eventually lead to erratic, if not poor, rootworm control.

Control of Rootworm Beetles to Prevent Egg Laying

Research conducted during the mid 1970s indicated that properly timed sprays to prevent rootworm beetles from laying eggs could eliminate the need for a soil insecticide the following year. However, the procedure is not foolproof. Factors beyond the control of the operator, such as beetle migration and weather, may minimize the treatment's effectiveness.

Growers who have experienced erratic rootworm control with soil insecticides the past few years and who are committed to a continuous corn program may look to beetle control as an alternative, or an addition, to soil insecticides at planting. Ideally, one properly timed spray should *replace* a soil insecticide. Unfortunately, some fields will require two sprays to combat extended beetle emergence and egg laying. Two sprays or a spray plus a soil insecticide the following season may hasten the onset of rootworm resistance to insecticides.

A rootworm beetle suppression program should be employed only if the fields are under the supervision of trained pest management personnel in weekly scouting programs. Careful field scouting is a requirement.

Summary: Planning Your Rootworm Control Program

A management plan for rootworms should be long range (not a year at a time) and include crop rotation, insecticide rotation, cultivator treatments, and scouting to determine the need for rootworm control.

1. Alternate corn with another crop when possible, particularly in fields where rootworm beetles averaged 0.75 or more per plant last summer, or if the soil insecticide did not give effective rootworm control in 1987.

2. If you intend to grow corn after corn and rootworm beetles averaged 0.75 or more per plant in corn after corn or 0.5 beetle per plant in first-year corn last summer, apply a rootworm soil insecticide at planting time. Apply the rate suggested in Table 3 and consider our suggestions for alternating rootworm soil insecticides.

3. Consider a cultivation-time application of a rootworm soil insecticide if you intend to plant in early April or if your planting-time insecticide does not provide effective control.

4. Scout for rootworm beetles in July and August, 1988, to determine the potential for rootworm larval damage in 1989.

Scouting to Determine Rootworm Potential in 1989

The abundance of rootworm beetles in a cornfield in July and August is an excellent indicator of future rootworm problems. You can determine the potential for rootworm damage in 1989 by counting western and northern corn rootworm beetles from mid-July through August, 1988, in this way:

1. Make 3 or more counts for western and northern corn rootworm beetles at 7- to 10-day intervals between mid-July and late August in fields to be replanted to corn.

2. Examine 5 plants selected at random in each of 10 areas of the field. Count all of the western and northern corn rootworm beetles on 50 plants each time. The counts take about 45 minutes in a 40-acre field.

3. As you approach a plant, move quietly to avoid disturbing the beetles. Count the beetles on the entire plant, including the ear tip, tassel, leaf surface, and behind the leaf axils.

4. Record the number of beetles you find per plant. If the average is more than 0.75 beetle per plant in corn after corn or 0.5 beetle per plant in first-year corn for any sampling date, plan to rotate away from corn or apply a rootworm soil insecticide to corn in 1989. If populations do not exceed an average of ½ beetle per plant for any sampling date, a soil insecticide will not be needed the following season.

Rootworm Life Cycle

Western and northern corn rootworm beetles deposit their eggs in the soil at the base of the corn plants or between rows during August and September. The eggs overwinter in the soil and begin hatching in late May. Egg hatch usually takes place over a period of 3 to 5 weeks. Consequently, in July and August all stages of the corn rootworm — egg, larva, pupa, and adult — may be found. The rootworm larvae feed on the roots of corn plants during June, July, and August. When a larva is fully grown (½ inch), it builds a cavity in the soil and goes into the pupal or resting stage. After 5 to 10 days, the beetle emerges from the soil. The development from egg hatch to adult emergence takes 27 to 40 days. After the females emerge from the soil and mate, 14 days or more elapse before they begin laying eggs. Rootworm beetles may deposit as many as 1,000 eggs; an average of 500 per female is probably common. Most egg laying in Illinois occurs after August 1.

CORN CUTWORMS

The occurrence and extent of cutworm infestations are difficult to predict each year. ***Sandhill, dingy,*** and ***claybacked cutworms*** all overwinter in Illinois as partially grown larvae, but their populations are seldom widespread. As a result, they cause damage early in the growing season in scattered areas. Sandhill cutworms are a problem in sandy areas almost every year. Dingy and claybacked cutworms occur more frequently in corn planted after sod or forage legumes than in other crop rotations.

Black cutworms do not overwinter in Illinois, so outbreaks are difficult to forecast. Infestations of black cutworm larvae arise from eggs laid by moths that fly into Illinois in the early spring. A statewide program of monitoring black cutworm pheromone traps provides information about the time and intensity of spring moth flights.

Certain factors favor black cutworm outbreaks. The most important factors may be late planting and preplant weed infestations. Fields that are tilled and planted late are more likely to develop a preplant weed infestation than fields that are planted early. These late-planted fields with weeds are more attractive to cutworm moths as a site on which to deposit their eggs.

Currently, two options are available for cutworm control: applications of soil insecticides to prevent damage and rescue treatments after the infestation appears.

Because of the uncertainty in predicting which fields will have light, moderate, or heavy infestations of cutworms, it may be more feasible to use rescue treatments for cutworm outbreaks rather than to use a preplant or planting-time treatment unnecessarily.

Based on the relatively low incidence of cutworm problems over the past 30 years, a grower may find an economic advantage to the wait-and-see system, which involves field scouting rather than a costly always-apply program in which the soil insecticide is routinely applied at or before planting for a problem that may not exist.

Rescue (or emergency) treatments to control outbreaks of cutworms include broadcast sprays of Ambush, Asana, Lorsban, Pounce, or Pydrin.

The keys to effective cutworm control with rescue treatments are the amount of surface moisture and the movement of the worms. Control may be poor, regardless of the insecticide used, if the topsoil is dry and crusted and the worms are working below the soil surface. When the soil is dry, the high rate of Ambush, Asana, Lorsban, Pounce, or Pydrin is recommended.

To determine the need for rescue treatments, scout the fields during plant emergence, particularly those fields considered to be high-risk. Early detection of leaf-feeding or of cutting by cutworms is vital. When the corn plants are beginning to emerge, check the fields for leaf-feeding, cutting, wilting, or missing plants. Small cutworm larvae (less than ½ inch) feed on the leaves and do not begin cutting plants until they are about half grown.

A control measure is needed on corn in the 2-leaf stage if 3 percent or more of the plants are cut and if there are 2 or more cutworms per 100 plants. At the 4-leaf stage, control is justified if 3 percent or more of the plants are cut and if there are 4 or more worms per 100 plants. A single cutworm will cut fewer of the 4-leaf plants than those in the 2-leaf stage.

Planting-time treatments are relatively effective in controlling light to moderate infestations, but control may be unsatisfactory for heavy infestations particularly under dry soil conditions. Lorsban 15G and Aastar G are registered for control of cutworms in corn and have provided the best cutworm control in research trials. In fields with a history of cutworm problems or in high-risk fields, Lorsban 15G or Aastar G should give the most consistent control of cutworms.

Pre-emergent sprays of Ambush, Asana, Pounce, and Pydrin may be applied in fields where the probability of cutworm damage is great.

A preplant broadcast treatment of Lorsban 4E is registered for corn cutworm control at rates of 1 to 2 quarts per acre; the higher rate is suggested. The insecticide should be incorporated into the top 2 to 4 inches of soil immediately after application.

Replanting may be required if cutworm damage is severe. Before replanting apply Lorsban 4E as a broadcast spray at 3 to 4 pints per acre, and incorporate the insecticide into the top 2 to 4 inches of soil. Or you can apply a pre-emergent spray of Ambush, Asana, Pounce, or Pydrin after replanting.

WIREWORMS

During the past five years wireworm damage to corn has occurred with increasing frequency. Even so the proportion of fields of corn affected by wireworms in Illinois is small (less than 1 percent) and does not justify the widespread use of a soil insecticide on first-year corn after soybeans. A lindane or diazinon + lindane planter-box seed treatment may help deter the wireworms from attacking the seed but will not protect the seedling.

Wireworms may attack the seed or drill into the base of the stem below ground level, damaging or killing the growing point. Damage will show up as wilted, dead, or weakened plants and spotty stands. Wireworm larvae are yellowish-brown and wirelike; several species are known to attack corn. They live for two to five years in a field in the larval stage, feeding on the roots of grasses and crops. Their presence is often related to the crops or weeds that were in the field two to four years before damage to the corn is apparent. Most reports of damage to corn have been in fields where corn follows soybeans or where there has been a corn-soybean-small grain rotation. The adult (a click beetle) prefers to deposit its eggs in small-grain stubble or in grassy fields.

Wireworms are usually most damaging in bottomlands or in poorly drained areas on upland soils. Low spots in the field often have the heaviest populations.

Attempts to control wireworms with an insecticide rescue treatment after the damage appears are not very successful. Therefore, if an infestation is known to be present, an insecticide should be applied at planting.

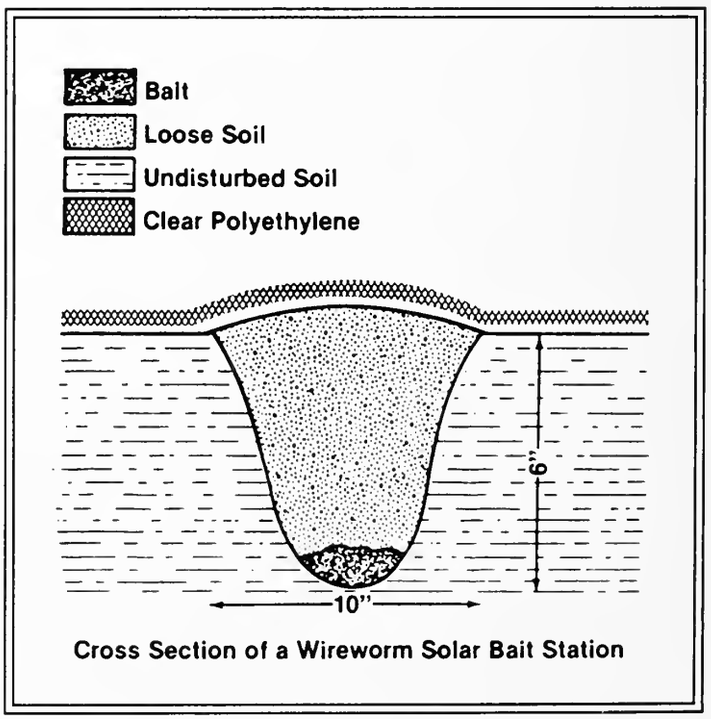
Checking for Wireworms

A technique using baits has been developed for evaluating wireworm potential before planting. The bait stations should be established 2 to 3 weeks before the anticipated planting date. Fields where small grain or grasses have been grown the preceding 2 or 3 years are the best candidates for bait stations.

Since wireworm infestations are usually not uniform within a field, it will be necessary to place the bait stations randomly throughout the field. One bait station per acre is desirable. As a minimum, place 2 stations at the highest elevation in a field, 2 on a slope, and 2 in the lowest area.

Follow this procedure for baiting:

1. Use a mixture of 1 cup of untreated wheat and 1 cup of untreated shelled corn at each station.
2. Bury the bait about 4 inches deep. It is also desirable to cover the ground over each bait station with an 18-inch square of clear plastic (see diagram). The plastic collects solar heat and speeds germination of the corn and wheat, which attracks overwintering wireworms.
3. Mark each station with a flag or stake.
4. Dig up the bait stations in 10 to 14 days and count the number of wireworms.



Cross Section of a Wireworm Solar Bait Station

Need for Treatment

If you find an average of one or more wireworm per bait station, use a labeled soil insecticide. In some instances, several wireworms may be found in one bait station and none in others. Wireworm infestations tend to concentrate in some locations. It may be possible to limit treatment to areas where the concentration is heaviest.

WHITE GRUBS

Several species of economically important white grubs have 3-year life cycles. Peak years of damage usually occur during the year following large flights of May beetles, the adult stage of white grubs. The beetles prefer to lay their eggs in ground covered with vegetation, such as weedy soybean fields and sod.

The C-shaped white grub larvae chew on the roots and root hairs of corn seedlings. During peak years of damage, the grubs feed all season long. Damage to a cornfield is most apparent in the spring. Symptoms of white grub injury visible aboveground are irregular emergence, reduced stands, and stunted or wilted plants. The damage is usually spotty throughout the field.

There are no effective rescue treatments for white grubs after the damage appears. However, if plants show symptoms of injury, dig around the root system of several corn plants. If white grubs are causing the problem and replanting is warranted, use a labeled soil insecticide.

PLANTER-BOX SEED TREATMENTS

Corn. Use a seed treatment in fields that do not receive a soil insecticide at planting time. A planter-box seed treatment containing diazinon will protect germinating corn against attack by seedcorn beetles and maggots. A lindane or diazinon + lindane planter-box seed treatment protects seed from attack by seedcorn maggots, seedcorn beetles, and wireworms. Lorsban 50-SL is labeled as a slurry treatment on seed before planting to protect germinating seed against injury by seedcorn maggots and beetles. NOTE: Excess dust from the seed treater may interfere with the electronic monitor in air planters.

Some seed may have already been treated with a certain combination of insecticide and fungicide. Addition of diazinon + lindane may cause planter units to gum up. Consult your seed or insecticide dealer to obtain specific information about seed treatment combinations.

Soybeans. Use a diazinon or diazinon + lindane seed protectant to prevent damage to germinating soybeans from seedcorn maggots. Follow the label directions for application. The potential for damage is greatest during cool, wet springs when germination is slow.

CALIBRATION FOR GRANULAR SOIL INSECTICIDES

Calibrate the applicators for granular soil insecticides before the planting season begins. In some instances, poor control is caused by applying rates that are too low. Proper calibration will help avoid this problem. Most soil insecticide bags have a list of suggested settings for the particular model of applicator. The settings are based on planting speed. The *beginning settings* are helpful, but be sure to check your actual application rate under your own operating conditions.

Follow these steps for calibrating the applicator:

1. Calibration of granular applicators for soil insecticides is usually based on ounces of product needed per 1,000 feet of row. Consult the insecticide label or Table 3 for labeled rates for rootworm control. These rates are expressed in ounces per 1,000 feet of row and in pounds of product per acre.
2. Consult the label or manufacturer's recommendation for an approximate application setting. Adjust the setting on each hopper.
3. Select an area for a test run, preferably in the field so that speed and traction conditions are constant. Measure off 1,000 feet.
4. Fill the hoppers and attach a plastic bag or container to each delivery tube to catch the granules from each hopper.
5. Drive the premeasured distance (1,000 feet) at the same speed to be used during the planting operation.
6. Weigh the material collected from each hopper. Use a scale that weighs in ounces (e.g., a postal scale or a diet scale).
7. Compare the quantity (ounces) per bag against those given in Table 3. The following amounts of material should be collected:

Formulation, percent	Oz. collected per 1,000 ft.
10	12
15	8
20	6

8. Recalibrate if the difference in quantity applied during the calibration process is more than 10 percent over or under the rate suggested on the label.

EUROPEAN CORN BORER

The European corn borer (ECB) usually has two generations a year in Illinois. In some years there may also be a partial third generation in southern and central Illinois. There are four stages in each generation: egg, larva, pupa, and adult (moth). The ECB overwinters as a full-grown larva in corn stalks, cobs, and plant residue.

First Generation

The ECB moths that lay eggs for the first generation begin to emerge in late May in southern Illinois and mid- to late-June in the central and northern regions. The females lay most of their eggs in the evening and spend the daylight hours in fencerows and other protected areas.

First generation ECB larvae reduce yields by stalk-tunneling, which weakens the plant and destroys the tissue used to transport food within the plant.

Different corn hybrids have variable degrees of tolerance or resistance to leaf-feeding by first generation borers. Consider this trait when selecting varieties.

Scouting Procedure. Corn that is planted early (the fields with the tallest corn) should be monitored closely from mid-June to early July for signs of whorl-feeding by corn borer larvae. The fields with the tallest corn in mid-June are the most attractive to moths laying eggs for the first generation larvae.

Plan to scout cornfields for damage at least once a week for a 2- to 4-week period following peak corn borer moth flight, generally from early June to early July.

To determine the need to treat, examine 100 plants (20 consecutive plants at 5 different locations in a field) for shot-hole feeding in the whorl leaves. Unroll the whorl leaves of 10 infested plants (those with shot-hole feeding) and count the *live* corn borers per infested plant. Calculate the percentage of plants infested and the average number of larvae per infested plant. Also note the location of the corn borer larvae. Those that are still in the whorl leaves can be controlled, while those that have bored into the stalk are inaccessible to the insecticide. If all larvae have left the whorl leaves and bored into the stalk, it is too late to attempt control.

Treatment Guidelines. To decide whether it will be profitable to treat a field to control first-generation corn borers, the following information is needed:

1. Average percentage of plants with whorl feeding.
2. Average number of larvae per infested plant.
3. Expected yield per acre.
4. Value of grain per bushel.
5. Cost per acre for insecticide treatment.

Enter these data into the worksheet below to calculate the gain or loss for applying an insecticide to control corn borer.

Second Generation

European corn borer moths laying eggs for the second generation are attracted to fields of corn that have recently tasseled or are in the pollen shedding or green silk stage. Late-planted fields of full season hybrids are usually more attractive and are more likely to sustain economic damage.

Yield losses caused by second generation ECB are primarily the result of physiological injury, although stalk breakage and ear droppage may become significant if harvest is delayed. Corn borers' tunneling in the stalk also increases the likelihood of stalk rot.

Scouting Procedure. To assess the need for controlling second-generation ECB, start checking for egg masses when moth flight is underway, usually around mid-July in southern Illinois and late July to mid-August in central and northern Illinois. Concentrate initial scouting efforts in late-planted fields where the probability of an economic ECB infestation is greatest.

Treatment Worksheet
for First Generation
Corn Borer Control

_____ % of 100 Plants Infested × _____ Average No. Borers/Infested Plant = _____ Borers/Plant
(determined by checking whorls from 10 plants)

_____ Borers/Plant × 5% Yield Loss/Borer = _____ % Yield Loss

_____ % Yield Loss × _____ Expected Yield (Bu/A) = _____ Bu/A Loss

_____ Bu/A Loss × $_____ Price/Bu = $_____ Loss/A

$_____ Loss/A × _____ % Control = $_____ Preventable Loss/A
(80% for granules)
(50% for sprays)

$_____ Preventable Loss/A − $_____ Cost of Control/A =
$_____ Gain (+) or Loss (−) per acre if treatment is applied

Treatment Worksheet
for Second Generation
Corn Borer Control

_____ Number of Egg Masses/Plant × 2 Borers/Egg Mass* = _____ Borers/Plant
(cumulative counts, taken 7 days apart)

_____ Borers/Plant × 4 % Loss/Borer** = _____ % Yield Loss

_____ % Yield Loss × _____ Expected Yield = _____ Bu/A Loss

_____ Bu/A Loss × $_____ Price/Bu = $_____ Loss/A

$_____ Loss/Acre × 75 % Control = $_____ Preventable Loss/A

$_____ Preventable Loss/A − $_____ Cost of Control/A =
$_____ Gain (+) or Loss (−) per acre if treatment is applied

* Assumes survival rate of 2 borers/egg mass.
** Use 3% per borer per plant if infestation occurs after silks are brown. The potential economic benefits of treatment decline rapidly if infestations occur after corn reaches the blister stage.

Examine a minimum of 25 plants, selected at random throughout the field, and count the number of ECB egg masses that are found on each plant. European corn borer moths usually lay their eggs on the underside of the two or three leaves above or below the developing ear. However, you should check all leaves on the plant for egg masses. One technique is to remove the leaves one by one, starting at the bottom of the plant, and carefully scan them for egg masses. The eggs, which are deposited in masses of 15 to 30, overlap like the scales of a fish.

Egg masses are flat and about one fourth inch in diameter. Newly deposited eggs are white, then turn pale yellow, and become darker just before hatching. Eggs that are about to hatch have distinct black centers. These are the black heads of the larvae that are visible through the translucent eggshell. The eggs hatch in 3 to 7 days, depending on the temperature.

The female moth hides in grassy areas during the day. Noncrop areas that border cornfields may harbor large numbers of corn borer moths. Check these areas for moths as you enter the field to determine the potential for corn borer infestation.

Calm nights favor egg deposition by the moths. The absence of hard, beating rains during moth emergence also increases the potential for infestations.

Treatment Guidelines. To determine whether it will be profitable to treat a field to control second-generation corn borers, the following information is needed:

1. Average number of ECB egg masses per plant.
2. Crop maturity.
3. Expected yield per acre.
4. Value of corn per bushel.
5. Cost per acre for insecticide treatment.

For best results, treatment should be applied soon after egg hatch to kill the young larvae before they bore into the plant. The larvae begin tunneling into the stalks about 10 days after hatching. Occasionally, two treatments may be necessary for satisfactory control if egg laying extends over a 3- to 4-week period.

REDUCED TILLAGE AND NO-TILL CORN INSECT PESTS

Concern about insect problems should not keep growers from adopting conservation tillage practices. The soil-insect complex in corn, which is similar in many ways in conventional and reduced-tillage systems, can be readily controlled by applying soil insecticides at planting time. Outbreaks of insects feeding on foliage can usually be controlled with properly timed insecticide treatments. Close monitoring of fields to detect insect outbreaks is essential, regardless of the tillage system.

Weather conditions and the type of crop rotation determine to a great extent whether a soil insect problem will occur and what kind it will be. In some instances, tillage may also influence the kind and abundance of an insect pest. Some tillage operations favor specific pests. Others tend to reduce pest problems. The general expectation is that insect infestations will be more pronounced where no-tillage is used in corn than where conventional or reduced-tillage systems are used.

No-Till Pests

Insect problems occur more frequently in no-till corn than in any other conservation tillage system and are often more serious. Crop residue left by the use of no-till practices provides a stable environment for pest survival and development. Pests occurring under these conditions include *European corn borer, cutworms, armyworm, common stalk borer, wireworms, seedcorn maggots, billbugs, slugs,* and *mice.* Soil insecticides may be needed on no-till corn following corn (in rootworm area), grass sod, legumes, or following any crop in which grasses and broadleaf weeds are prevalent.

Soil Insect Control

Select a soil insecticide that will control the anticipated soil insect pest. Consult Table 5 for suggestions. If a soil insecticide is not applied at planting, a diazinon + lindane planter-box seed protectant will give protection against seedcorn maggots, seedcorn beetles, and light infestations of wireworms.

Crop residues from no-till and reduced-tillage systems may present some problems with the placement and incorporation of granular soil insecticides applied at planting. To be most effective, the soil insecticide should be incorporated into the upper ½ inch of soil, and not just broadcast on the surface. Granules remaining on the soil surface are degraded by sunlight, resulting in erratic or poor control.

NOTE: Before using Broot, Dyfonate, Mocap, or Thimet on no-till corn, be sure that soil moisture is low enough to ensure closing of the seed furrow to prevent the insecticide granules from contacting the seed. Crop injury may occur with these products.

Aboveground Insect Pests

Aboveground insects will be more of a problem in no-till corn than under reduced or conventional tillage. Corn planted in grass sod or fall-seeded rye is vulnerable to attack by **armyworms.** The moths lay eggs on the grasses during April or early May. After vegetation is killed by a herbicide, the larvae move to the young corn seedlings and feed on them. Control is justified when 25 percent of the plants are being damaged. Rescue treatments are effective, but a spray volume of 15 to 20 gallons per acre will improve coverage and control.

Instances of damage to corn by the **common stalk borer** have been greater in no-till corn than with other tillage systems. Moths of this insect deposit their eggs on weeds in late August and September. When a herbicide is applied in the spring to no-till corn in fields previously infested with host weeds, the newly hatched stalk borer larvae move from the dead vegetation and attack newly emerging corn plants. Rescue treatments may give erratic control of common stalk borer because the chemicals cannot reach the worms inside the stem. To reduce the potential of stalk borer damage in a subsequent season, it is essential to have good weed control within a field during August and September, when moths are laying eggs.

FORAGE INSECTS

Alfalfa weevils may cause moderate to severe damage to the first cutting of alfalfa in most areas of Illinois. In the southern counties, where a lot of egg laying takes place in the fall, alfalfa-weevil larval damage occurs early in the spring. Damage to the first cutting in northern Illinois is more likely to occur if hay harvest is delayed. Otherwise the injury to alfalfa in the northern counties will occur on the stubble and new growth of the second cutting.

Numbers of alfalfa weevils are regulated to a large extent by winter weather. During a cold, open winter the mortality rate is high in overwintering weevil populations; during mild winters the mortality rate is low.

A parasitic wasp and a fungal disease organism that attack alfalfa weevil larvae sometimes regulate weevil numbers in the spring. Although the wasp and the fungus will be present in alfalfa fields in 1988, we cannot yet predict their effect on weevil numbers.

Alfalfa growers in southern and central Illinois should inspect their fields closely in April, May, and June. Early larval damage appears as pinholes in the growing terminals. As the larvae grow, they skeletonize the leaves, and damaged fields appear tattered. Growers in northern Illinois should look carefully for larval damage in May and June. All growers should examine the stubble after the first cutting, because larval and adult feeding can slow or halt new growth. Follow the suggestions in Circular 1136, "Alfalfa Weevil Pest Management Program," to determine the need and proper timing of a treatment. If this circular is unavailable, a rule of thumb is to treat when 25 percent of the tips are being skeletonized. This threshold is 40 percent in northern Illinois where damage occurs later in the season.

Table 4. Economic Thresholds for Potato Leafhoppers on Alfalfa

Alfalfa height (inches)	Average number of leafhoppers per sweep of sweep net
0-3	0.2
3-6	0.5
6-12	1.0
12 or taller	1.5

Potato leafhoppers may cause moderate to severe damage to the second and third cuttings of alfalfa in all areas of Illinois. However, population levels are difficult to predict because the leafhoppers do not survive the winter in Illinois. They migrate from southern states into Illinois during May and June.

Damage first appears as a yellow, wedge-shaped area at the tip of the leaf and is more evident during dry weather. Many people confuse the damage with diseases or nutrient deficiency.

Damage may begin on the new growth as soon as the first hay crop is removed. Stunting and yellowing are signs of leafhopper injury. A swarm of leafhoppers at the time of the first cutting also indicates that there may be a problem in the new growth. The economic threshold for leafhoppers varies with the height of the alfalfa (see Table 4). A treatment is justified when the number of leafhoppers exceeds the economic threshold.

CHEMICAL INJURY TO SOYBEANS

There have been instances of phytotoxicity to soybeans when organic phosphate soil insecticides were used. The problems have occurred where growers started planting soybeans without first emptying the insecticide boxes. Organic phosphate soil insecticides applied in soybean fields treated with Sencor or Lexone may cause injury to a soybean crop, according to information on the labels.

Table 5. Field Corn Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Armyworms	*Furadan 15G	8 oz. per 1,000 ft. row	Band, furrow	Apply as a planting-time treatment for early season control of armyworms in corn planted no-till in grass sod or small grains.
	*Ambush 2E	6.4-12.8 oz.	Broadcast	At first migration, or when worms are eating leaves above ear level.
	*Asana 1.9EC	1.7-3.4 oz.		
	Dylox 80SP	10-20 oz.		
	Lorsban 4E	1-2 pt.		
	malathion 57%EC	1½-2 pt.		
	*Penncap-M	2-3 pt.		
	*Pounce 3.2EC	4-8 oz.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	2 pt.		
Billbug	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	At planting.
	Lorsban 15G	8-16 oz. per 1,000 ft. row	Band	
	Lorsban 4E	4 pt.	Broadcast-PPI[c]	
	Lorsban 4E	2-3 pt.	Broadcast	Apply as a postemergence rescue treatment with ground equipment when damage appears.
Chinch bug	*Asana 1.9EC	1.7-3.4 oz.	Spray at base of plant.	At start of migration from small grains. Use only ground equipment and apply 20 to 40 gallons of finished spray per acre.
	Lorsban 4E	2 pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	2-4 pt.		
Common stalk borer	*Ambush 2E	6.4-12.8 oz.	Broadcast	Apply postemergence sprays when damage first appears. See labels for specific instructions about effective control. Furadan 15G applied at 2-3 lb. a.i./acre at planting time may provide early season suppression of common stalk borers.
	*Asana 1.9EC	1.7-3.4 oz.		
	Lorsban 4E	2-3 pt.		
	*Pounce 3.2EC	4-8 oz.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
Corn earworm	*Ambush 2E	6.4-12.8 oz.	Overall spray or directed toward ear zone	Justified only in seed corn fields. Treatments are rarely effective for the control of earworms after worms enter ear tips.
	*Asana 1.9EC	1.7-3.4 oz.		
	*Pounce 3.2EC	4-8 oz.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
Corn leaf aphid	Cygon 400	1 pt.	On foliage	Apply during late whorl to early tassel when 50% of plants have light to moderate infestations and plants are under drouth stress.
	Lorsban 4E	1-2 pt.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	2-3 pt.		

Table 5. Field Corn (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Corn rootworm beetles	*Ambush 2E	6.4-12.8 oz.	Overall spray or directed toward ear zone	To protect pollination, treat if there are 5 or more beetles per plant, pollination is not complete, and if silk clipping is observed. Apply Ambush or Pounce prior to the brown silk stage.
	*Asana 1.9EC	1.7-3.4 oz.		
	Lorsban 4E	1-2 pt.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	2 pt.		
	*Pounce 3.2EC	4-8 oz.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	2 pt.		
Corn rootworm larvae	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	Broot 15GX	8 oz. per 1,000 ft. row	Band	Broot 15GX, Counter 15G, Dyfonate 20G, Furadan 15G and 4F, Lorsban 15G and 4E, Mocap 15G, and Thimet 20G can also be applied at cultivation time.
	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Dyfonate 20G	6 oz. per 1,000 ft. row	Band	
	*Dyfonate 4E	6 pt.	Broadcast-PPI[c]	
	*Dyfonate 4E	2.5 fl. oz. per 1,000 ft. row	Band	
	*Furadan 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Furadan 4F	2.5 fl. oz. per 1,000 ft. row	Band	
	Lorsban 15G	8 oz. per 1,000 ft. row	Band	
	Lorsban 4E	6 pt.	Broadcast-PPI[c]	
	*Mocap 15G	8 oz. per 1,000 ft. row	Band	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
Cutworms	Lorsban 4E	2-4 pt.	Broadcast-PPI[c]	Incorporate into the top 2 to 4 inches of soil.
	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	Lorsban 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Pounce 1.5G	8-16 oz. per 1,000 ft. row	Band	Counter 15G, Dyfonate 20G, Furadan 15G, and Mocap 15G will suppress or control light to moderate infestations of cutworms.
	*Ambush 2E	6.4-12.8 oz.	PRE[d]	Apply in the time period from 5 days prior to planting up to emergence of the crop.
	*Asana 1.9EC	1.7-3.4 oz.	PRE[d]	
	*Pounce 3.2EC	4-8 oz.	PRE[d]	
	*Pydrin 2.4EC	5⅓-10⅔ oz.	PRE[d]	
	*Ambush 2E	6.4-12.8 oz.	PE[e]	Apply as a postemergence rescue treatment when 3 percent or more of the plants are cut in the 2-leaf stage and there are 2 or more cutworms per 100 plants. At the 4-leaf stage, control is justified if 3 percent or more of the plants are cut and there are 4 or more worms per 100 plants.
	*Asana 1.9EC	1.7-3.4 oz.	PE[e]	
	Lorsban 4E	2-3 pt.	PE[e]	
	*Pounce 3.2EC	4-8 oz.	PE[e]	
	*Pydrin 2.4EC	5⅓-10⅔ oz.	PE[e]	
European corn borer, first generation	*Ambush 2E	6.4-12.8 oz.	On upper ⅓ of plant and into whorl	See "Treatment Guidelines" under European Corn Borer, first generation. Granular formulations are more effective than sprays when applied by air for control of first-generation borers. Sprays are most effective when directed by ground equipment over the row, rather than broadcast. Apply Dipel ES only by ground equipment or center pivot irrigation.
	Dipel 10G	10 lb.		
	Dipel ES	2 pt.		
	*Dyfonate 20G	5 lb.		
	*Furadan 15G	6.7 lb.		
	*Furadan 4F	2 pt.		
	Lorsban 4E	2 pt.		
	Lorsban 15G	6.5 lb.		
	*Penncap-M	4 pt.		
	*Pounce 3.2EC	4-8 oz.		
	*Pounce 1.5G	6.7-13.3 lb.		
European corn borer, second generation	Dipel 10G	10 lb.	On foliage	See "Treatment Guidelines" under European Corn Borer, second generation. Apply Dipel ES only by ground equipment or center pivot irrigation.
	Dipel ES	2 pt.		
	*Dyfonate 20G	5 lb.		
	*Furadan 15G	6.7 lb.		
	*Furadan 4F	2 pt.		
	Lorsban 15G	6.5 lb.		
	Lorsban 4E	2 pt.		
	*Penncap-M	4 pt.		
	*Pounce 1.5G	6.7-13.3 lb.		

Table 5. Field Corn (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Fall armyworm	Dylox 80SP	10-20 oz.	On foliage	Treat when 35% of plants have whorl damage and if worms are present. Ground sprays directed over the row are more effective than broadcast sprays. Treatments to control worms in ear tips are not effective.
	Lannate, Nudrin 90WSP	½ lb.		
	Lorsban 4E	2 pt.		
Flea beetles	*Ambush 2E	6.4-12.8 oz.	Over row as spray	When leaves on seedling plants are severely damaged and some plants are being killed.
	*Asana 1.9EC	1.7-3.4 oz.		
	Lorsban 4E	2 pt.		
	*Penncap-M	2-3 pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	2 pt.		
Grasshoppers	*Asana 1.9EC	1.7-3.4 oz.	On foliage	As needed. The higher rates are suggested for control of adult grasshoppers.
	Cygon 400	1 pt.		
	*Furadan 4F	¼-½ pt.		
	Lorsban 4E	½-1 pt.		
	malathion 57%EC	1½ pt		
	*Penncap-M	1-3 pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	1-3 pt.		
Hop vine borer	None labeled	. .	. . .	Postemergence sprays of Ambush, Asana, Pounce, Pydrin, or Lorsban may give some control if applied when damage first appears.
Japanese beetle	Sevin XLR	2 pt.	On foliage	During the silking period to protect pollination if there are 3 or more beetles per ear and pollination is not complete.
Picnic, sap beetles	Lannate 90WSP	¼-½ lb.	On foliage	Justified only in seed corn fields when beetles are feeding on ear tips.
	malathion 57%EC	1½ pt.		
	Sevin XLR	2 pt.		
Seedcorn beetles	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Dyfonate 20G	6 oz. per 1,000 ft. row	Band	
	Lorsban 15G	8 oz. per 1,000 ft. row	Furrow	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
	diazinon	See label	On seed	Use formulations that are prepared as seed treaters.
	diazinon + lindane	See label	On seed	
	Lorsban 50-SL	See label	On seed	
Seedcorn maggots	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Dyfonate 20G	6 oz. per 1,000 ft. row	Band	
	*Furadan 15G	8 oz. per 1,000 ft. row	Furrow	
	Lorsban 15G	8 oz. per 1,000 ft. row	Furrow	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
	diazinon	See label	On seed	Use formulations that are prepared as seed treaters. Seed treatments should be considered for fields that do not receive a soil insecticide at planting.
	diazinon + lindane	See label	On seed	
	Lorsban 50-SL	See label	On seed	
Sod webworm	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	Lorsban 4E	1-2 pt.	Broadcast	At time of initial attack.
Southwestern corn borer	*Dyfonate 20G	5 lb.	On foliage	Direct granules over row. Apply when 25% of the plants have egg masses or larvae on leaves. Early-planted corn usually escapes damage. Sprays are most effective when directed over the row, rather than broadcast.
	*Furadan 15G	6.7 lb.		
	*Furadan 4F	2 pt.		
	Lorsban 15G	6.5 lb.		
	Lorsban 4E	2 pt.		
	*Penncap-M	4 pt.		
	*Pounce 1.5G	6.7-13.3 lb.		

Table 5. Field Corn (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Spider mites	Cygon 400	1 pt.	On foliage	Begin control if the majority of plants are infested with mites severe enough to cause some yellowing or browning of the lower leaves before dent stage.
	Diazinon AG 500	1 pt.		
	*Thimet 20G	5 lb.		
Symphylans	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	At planting.
	*Dyfonate 4E	4 pt.	Broadcast-PPI[c]	
	Lorsban 15G	8 oz. per 1,000 ft. row	Band	
	Lorsban 4E	2-4 pt.	Broadcast-PPI[c]	
	*Mocap 15G	8 oz. per 1,000 ft. row	Band	
Thrips	malathion 57%EC	1½ pt.	On foliage	When severe wilting and yellowing of leaves are noticed.
White grubs	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	Furadan 15G is labeled to aid in the control of white grubs.
	Lorsban 15G	8-16 oz. per 1,000 ft. row	Furrow	
	Lorsban 4E	4 pt.	Broadcast-PPI[c]	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
Wireworms	*Aastar G	8 oz. per 1,000 ft. row	Band	At planting.
	*Counter 15G	8 oz. per 1,000 ft. row	Band, furrow	Dyfonate 20G is labeled for suppression of wireworms.
	*Dyfonate 4E	8pt.	Broadcast-PPI[c]	
	Furadan 15G	8 oz. per 1,000 ft. row	Band, furrow	
	Lorsban 15G	16 oz. per 1,000 ft. row	Band, furrow	
	Lorsban 4E	4 pt.	Broadcast-PPI[c]	
	*Mocap 15G	8 oz. per 1,000 ft. row	Band	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
	lindane	See label	On seed	Use formulations that are prepared as seed treaters.
	diazinon + lindane	See label	On seed	
Woollybear caterpillars	None labeled	. .	. . .	Silk clipping caused by caterpillars does not generally warrant control.

* Use restricted to certified applicators only.
[a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.
[c] PPI Pre-plant incorporated.
[d] PRE Preemergent application.
[e] PE Postemergent application.

Table 6. Soybean Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Bean leaf beetle	*Ambush 2E *Asana 1.9EC Cygon 400 Larvin 3.2F Lorsban 4E Orthene 75S *Penncap-M *Pounce 3.2EC *Pydrin 2.4EC Sevin XLR	3.2-6.4 oz. 1.7-3.4 oz. 1 pt. 18-30 oz. 1-2 pt. ⅔ lb. 2 pt. 2-4 oz. 5⅓ oz. 1-2 pt.	On foliage	**Before bloom:** when defoliation reaches 30%, at least 1 cotyledon per foot of row is destroyed, and there are 5 or more beetles per foot of row. **Bloom to pod fill:** when defoliation reaches 20% and there are 16 or more beetles per foot of row. **Seed maturation:** when 5 to 10% of the pods are damaged, the leaves are green, and there are 10 or more beetles per foot of row.
Blister beetles	Sevin XLR	2 pt.	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.
Corn earworm	*Ambush 2E *Asana 1.9EC Larvin 3.2F Orthene 75S *Pounce 3.2EC *Pydrin 2.4EC	6.4-12.8 oz. 1.7-3.4 oz. 10-16 oz. 1⅓ lb. 4-8 oz. 5⅓-10⅔ oz.	On foliage	Damage occurs when larvae feed on pods. Apply control if populations exceed 1 per foot of row.
Cutworms	*Asana 1.9EC Larvin 3.2F Lorsban 4E *Pydrin 2.4EC	1.7-3.4 oz. 20-30 oz. 2 pt. 5⅓-10⅔ oz.	Broadcast	Scout as plants are emerging. Treat if 20% of plants are cut and stand has gaps of one foot or more and cutworms are present.
Grasshoppers	*Asana 1.9EC Cygon 400 *Furadan 4F Lorsban 4E Orthene 75S *Penncap-M *Pydrin 2.4EC Sevin XLR	1.7-3.4 oz. 1 pt. ¼-½ pt. ½-1 pt. ⅓-⅔ lb. 1-3 pt. 5⅓-10⅔ oz. 1-3 pt.	On foliage	When migration into fields begins and defoliation or pod feeding reaches economic levels. When defoliation reaches 30% before bloom and 20% between bloom and pod fill. The higher rates are suggested for control of adult grasshoppers.
Green cloverworm	*Ambush 2E *Asana 1.9EC Dipel Larvin 3.2F Lorsban 4E Orthene 75S *Penncap-M *Pounce 3.2EC *Pydrin 2.4EC Sevin XLR	3.2-6.4 oz. 0.85-1.7 oz. See label 10-16 oz. ½-1 pt. ⅔ lb. 2 pt. 2-4 oz. 2⅔-5⅓ oz. 1-2 pt.	On foliage	When defoliation occurs during blooming, pod set, and pod fill. Usually requires 12 or more half-grown worms per foot of row and 20% defoliation to justify treatment.
Japanese beetle adults	*Asana 1.9EC *Penncap-M *Pydrin 2.4EC Sevin XLR	1.7-3.4 oz. 3-4 pt. 5⅓-10⅔ oz. 2 pt.	On foliage	When defoliation reaches 20% during bloom and pod fill.
Loopers	*Ambush 2E *Asana 1.9EC Larvin 3.2F Orthene 75S *Pounce 3.2EC *Pydrin 2.4EC Dipel	3.2-6.4 oz. 1.7-3.4 oz. 18-30 oz. ⅔-1⅓ lb. 2-4 oz. 5⅓-10⅔ oz. See label	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.

Table 6. Soybeans (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Mexican bean beetle	*Ambush 2E	3.2-6.4 oz.	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.
	*Asana 1.9EC	0.85-1.7 oz.		
	Cygon 400	1 pt.		
	*Furadan 4F	1 pt.		
	Larvin 3.2F	18-30 oz.		
	Lorsban 4E	1 pt.		
	Orthene 75S	⅔ lb.		
	*Penncap-M	2 pt.		
	*Pounce 3.2EC	2-4 oz.		
	*Pydrin 2.4EC	2⅔-5⅓ oz.		
	Sevin XLR	2 pt.		
Potato leafhopper	*Ambush 2E	3.2-6.4 oz.	On foliage	When leafhoppers are numerous and the edges of the leaves appear burned.
	*Asana 1.9EC	0.85-1.7 oz.		
	Cygon 400	1 pt.		
	*Penncap-M	2 pt.		
	*Pounce 3.2EC	2-4 oz.		
	*Pydrin 2.4EC	2⅔-5⅓ oz.		
	Sevin XLR	2 pt.		
Seedcorn maggot	diazinon	See label	On seed	At planting time. Use formulations that are prepared as seed treaters.
	diazinon + lindane	See label	On seed	
Spider mites	Cygon 400	1 pt.	On foliage	As needed on field margins or entire field.
	Lorsban 4E	1 pt.		
Stink bugs	*Asana 1.9EC	1.7-3.4 oz.	On foliage	When adult bugs or large nymphs reach 1 per foot of row during pod fill.
	Lorsban 4E	2 pt.		
	Orthene 75S	1-1⅓ lb.		
	*Penncap-M	2-3 pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	2-3 pt.		
Thistle caterpillar	Sevin XLR	4 pt.	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.
Thrips	*Penncap-M	2-3 pt.	On foliage	If seedlings are being seriously damaged and some plants are being killed.
	Sevin XLR	2 pt.		
Webworms	Sevin XLR	2 pt.	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.
Whitefly	None labeled	. .	. . .	High infestations are occasionally present on double-crop soybeans, but are rarely economic.
Woollybear caterpillars	*Ambush 2E	3.2-6.4 oz.	On foliage	When defoliation reaches 30% before bloom and 20% between bloom and pod fill.
	*Asana 1.9EC	0.85-1.7 oz.		
	Larvin 3.2F	10-16 oz.		
	Lorsban 4E	1-2 pt.		
	*Pounce 3.2EC	4 oz.		
	*Pydrin 2.4EC	2⅓-5⅔ oz.		

* Use restricted to certified applicators only. [a] See Table 13 for insecticide restrictions.

[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.

Spraying blossoming soybeans can be extremely hazardous to bees. Coordinate with local beekeepers before applying sprays. Beekeepers' names and colony locations may be obtained from your County Extension Office.

Table 7. Alfalfa and Clover Insect Control

To avoid injury to bees, do not spray alfalfa during bloom or if weeds are blooming.

Insect	Insecticide[a,b,c]	Amount of product per acre[c]	Placement	Timing of application, comments
Alfalfa caterpillar	Dipel Dylox 80SP Sevin XLR	See label 8-10 oz. 1-2 pt.	On foliage	When damage is obvious
Alfalfa weevil (spring treatment for larvae)	*Furadan 4F Imidan 50WP Lorsban 4E[d] *Penncap-M *Supracide 2E	½-1 pt. 2 lb. 2 pt. 2-3 pt. 2 pt.	On foliage	Refer to Circular 1136. Or when 25% to 40% of tips are being skeletonized and if there are 3 or more larvae per stem, treat immediately. Do not apply sprays during bloom. Instead, cut and remove the hay. Two treatments may be necessary on first cutting. Watch regrowth for signs of damage, and treat if feeding damage is apparent.
Alfalfa weevil adults	*Furadan 4F Imidan 50WP Lorsban 4E[d] *Penncap-M	1-2 pt. 2 lb. 2 pt. 2-3 pt.	On foliage	As a stubble spray.
Aphids	Cygon 400 *Furadan 4F Lorsban 4E[d] malathion 57%EC *Penncap-M *Supracide 2E	½ pt. ½ pt. 1 pt. 1½ pt. 2 pt. 2 pt.	On foliage	When aphids average 100 or more per sweep and lady beetle larvae and adults, parasites, and diseases are not abundant.
Blister beetles	Sevin XLR	2 pt.	On foliage	Although blister beetles rarely cause economic damage to alfalfa, their presence in hay could injure horses if the horses ingest the beetles.
Clover leaf weevil	malathion 57%EC	1½ pt.	On foliage	When larvae are numerous (5 or more per crown) and leaf feeding is noticeable, usually in early to mid-April.
Cutworms	Dylox 80SP Lorsban 4E[d] Sevin XLR	10-20 oz. 2 pt. 2-3 pt.	On foliage	As needed on regrowth.
Fall armyworm	Dylox 80SP Lorsban 4E[d] Sevin XLR	20 oz. 2 pt. 2-3 pt.	On foliage	Usually in late summer or early fall on new seedlings or established stands.
Grasshoppers	Cygon 400 *Furadan 4F Lorsban 4E[d] *Penncap-M Sevin XLR	½-1 pt. ¼-½ pt. ½-1 pt. 1-3 pt. 2-3 pt.	On foliage	When grasshoppers are small and before damage is severe. The higher rates are suggested for control of adult grasshoppers.
Leafhoppers	Cygon 400 Dylox 80SP *Furadan 4F Imidan 50WP Lorsban 4E[d] *Penncap-M Sevin XLR *Supracide 2E	½-1 pt. 10-20 oz. 1 pt. 2 lb. 1-2 pt. 2-3 pt. 2 pt. 2 pt.	On foliage	Treatment is justified at these combinations of alfalfa height and leafhopper numbers: Alfalfa height (inches) / Leafhoppers per sweep 0-3 / 0.2 3-6 / 0.5 6-12 / 1.0 12 or taller / 1.5
Plant bugs	Cygon 400 Dylox 80SP *Furadan 4F Lorsban 4E[d] *Penncap-M Sevin XLR	½-1 pt. 20 oz. 2 pt. 1-2 pt. 2-3 pt. 2 pt.	On foliage	When tip damage is obvious and nymphs and adults are numerous.

Table 7. Alfalfa and Clover (continued)

Insect	Insecticide[a,b,c]	Amount of product per acre[b]	Placement	Timing of application, comments
Spittlebug	Imidan 50WP	2 lb.	On foliage	When spittle masses are found and nymphs average more than 1 per stem.
	Lorsban 4E[d]	1-2 pt.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	2-3 pt.		
Webworms	Dylox 80SP	20 oz.	On foliage	If damage appears.
	Sevin XLR	2-3 pt.		

* Use restricted to certified applicators only. [a] See Table 13 for insecticide restrictions.
[b] Before applying insecticides, be certain to clean all herbicides out of equipment. During bloom, apply very late in day or, if possible, avoid application during bloom.
[c] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.
[d] Young, tender, rapidly growing alfalfa may show some phytotoxic symptoms when treated with Lorsban 4E.

Spraying blossoming alfalfa can be extremely hazardous to bees. Coordinate with local beekeepers before applying sprays. Beekeepers' names and colony locations may be obtained from your County Extension Office.

Table 8. Grain Sorghum Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Chinch bug	Lorsban 4E[c]	2 pt.	At plant base	Use only ground equipment and apply 20 to 40 gallons of finished spray per acre.
	Sevin XLR	4 pt.		
Corn earworm	Lannate, Nudrin 90WSP	¼-½ lb.	Over row	When there is an average of 2 worms per head.
	Lorsban 4E	2 pt.		
	Sevin XLR	2-4 pt.		
Corn leaf aphid	Cygon 400	½-1 pt.	Over row	Corn leaf aphids rarely cause economic damage unless populations are heavy and drouth conditions exist.
	Lorsban 4E[c]	½-1 pt.		
	malathion 57%EC	1½ pt.		
Cutworms	Lorsban 15G	8 oz. per 1,000 ft. row	Band	At planting.
	Lorsban 4E[c]	2 pt.	Broadcast	When seedling plants are being cut.
Fall armyworm	Lannate, Nudrin 90WSP	¼-½ lb.	Over row	When there is an average of 2 worms per head. Leaf feeding or whorl damage is seldom economic.
	Lorsban 4E[c]	2 pt.		
Grasshoppers	Cygon 400	1 pt.	Over row	As needed. The higher rates are suggested for control of adult grasshoppers.
	Lorsban 4E[c]	½-1 pt.		
	Sevin XLR	1-3 pt.		
Greenbug	Cygon 400	½-1 pt.	Over row	When greenbug damage is sufficient to cause death of more than 2 normal-sized leaves before the hard-dough stage. CAUTION: Some sorghum varieties are sensitive to organophosphate insecticides.
	Lorsban 4E[c]	½-1 pt.		
	malathion 57%EC	1½ pt.		
	*Counter 15G	8 oz. per 1,000 ft. row	Band	At planting.
	*Furadan 15G	8 oz. per 1,000 ft. row	Band, furrow	
	*Thimet 20G	6 oz. per 1,000 ft. row	Band	
Sorghum midge	Diazinon AG 500	½ pt.	Over row	Apply during bloom when 50% of heads have begun to bloom and there are 1 or more midge adults (flies) per head.
	Lorsban 4E[c]	½ pt.		
	Sevin XLR	2 pt.		

Table 8. Grain Sorghum (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Webworms	Lorsban 4E[c]	2 pt.	Over row	When 5 or more larvae per head are found.
	Sevin XLR	2-4 pt.		
White grubs	*Counter 15G	8 oz. per 1,000 ft. row	Band	At planting.
Wireworms	*Counter 15G	8 oz. per 1,000 ft. row	Band	At planting.
	*Furadan 15G	8 oz. per 1,000 ft. row	Furrow	
	lindane	See label	On seed	Use seed treatment formulations.
Yellow sugarcane aphid	Cygon 400	1 pt.	Over row	Sprays should be applied at first sign of damage to seedling sorghum; 5 to 10 aphids per leaf.
	Lorsban 4E[c]	½-1 pt.		
	*Furadan 15G	8 oz. per 1,000 ft. row	Band, furrow	At planting.

* Use restricted to certified applicators only.
[a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.
[c] To avoid phytotoxicity, do not treat plants that are under extreme heat and drouth stress.

Table 9. Small Grains (Barley, Oats, Rye, Wheat) Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Armyworm	Dylox 80SP	10-20 oz.	On foliage	When there are 6 or more armyworms per linear foot of row and before extensive head cutting occurs. Do not use Dylox or Penncap-M on rye.
	Lannate, Nudrin 90WSP	¼-½ lb.		
	*Penncap-M	2-3 pt.		
	Sevin XLR	2 pt.		
Cereal leaf beetle	*Furadan 4F	½ pt.	On foliage	When there are one or more small larvae per stem or flag leaf. Apply Furadan before heads emerge from the boot.
	*Lannate 90WSP	¼-½ lb.		
	malathion 57%EC	1½ pt.		
	Sevin XLR	2 pt.		
Fall armyworm	Dylox 80SP	10-20 oz.	On foliage	During fall when damage to new growth is apparent. Do not use Dylox on rye.
	Sevin XLR	2-3 pt.		
Grasshoppers	Cygon 400	¾ pt.	On foliage	During fall when damage is apparent, treat field borders and noncrop areas to stop migration. The higher rates are suggested for control of adult grasshoppers. Do not apply Penncap-M to rye.
	*Furadan 4F	¼-½ pt.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	1-3 pt.		
	Sevin XLR	1-3 pt.		
Greenbug, English grain aphid, oat bird-cherry aphid	Cygon 400	½-¾ pt.	On foliage	Aphids damage plants indirectly by transmitting disease. Once yellowing is noticeable, it is usually too late to treat. Use Cygon on wheat only. Do not apply Penncap-M to rye.
	Lannate 90WSP	¼-½ lb.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	1-2 pt.		
Variegated cutworm	Dylox 80SP	10-20 oz.	On foliage	As needed. Do not use Dylox on rye.
Wheat stem maggot	None	. .	. . .	No chemical control. Damage shows as white heads when field is still green.

* Use restricted to certified applicators only.
[a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.

Table 10. Grass Pasture Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Armyworms	Dylox 80SP	20 oz.	On foliage	As needed. Sevin and Dylox may be applied without removal of grazing livestock.
	malathion 57%EC	2 pt.		
	*Penncap-M	2-3 pt.		
	Sevin XLR	2 pt.		Do not apply when weeds are blooming.
Grasshoppers	Diazinon AG 500	1 pt.	On foliage	As needed. The higher rates are suggested for control of adult grasshoppers.
	malathion 57%EC	1½ pt.		
	*Penncap-M	1-3 pt.		
	Sevin XLR	1-3 pt.		Do not apply when weeds are blooming.

* Use restricted to certified applicators only.
[a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.

Table 11. Noncrop Area Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Grasshoppers	*Asana 1.9EC	0.85-1.7 oz.	On foliage	When grasshopper nymphs average 15 to 20 per square yard along roadsides and fence rows. Apply treatments while hoppers are small and before they migrate into row crops. The higher rates are suggested for control of adult grasshoppers. Do not spray areas adjacent to water or where runoff is likely to occur.
	Diazinon AG 500	1 pt.		
	malathion 57%EC	1½ pt.		
	*Penncap-M	1-3 pt.		
	*Pydrin 2.4EC	2⅔-5⅓ oz.		
	Sevin XLR	1-3 pt.		

* Use restricted to certified applicators only. [a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.

To avoid injury to bees, do not apply sprays to noncrop areas if weeds are blooming.

Table 12. Sunflower Insect Control

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Armyworm	Sevin XLR	3-4 pt.	Over row	When defoliation reaches 25%.
Cutworms	Sevin XLR	3 pt.	Over row	When 10% of the seedlings are damaged.
	Lorsban 4E	2-3 pt.		
Fall armyworm	Sevin XLR	3-4 pt.	Over row	When defoliation reaches 25%.
Grasshoppers	*Furadan 4F	¼-1 pt.	Over row	When defoliation reaches 25%. Use higher rates for adult grasshoppers.
	Lorsban 4E	1 pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	Sevin XLR	1-3 pt.		
Seed weevils	*Furadan 4F	1 pt.	Over row	When there are 10 to 12 adults per plant.
	Lorsban 4E	1-1½ pt.		
	*Supracide 2E	2 pt.		
Stem weevil	*Furadan 4F	1 pt.	Over row	When there are 2 or more beetles per plant.
	Lorsban 4E	1-1½ pt.		
	Sevin XLR	2-4 pt.		
	*Supracide 2E	2 pt.		

Table 12. Sunflower (continued)

Insect	Insecticide[a,b]	Amount of product per acre[b]	Placement	Timing of application, comments
Sunflower beetle	*Furadan 4F	¼-½ pt.	Over row	When defoliation reaches 25%.
	Lorsban 4E	1-1½ pt.		
	*Pydrin 2.4EC	2⅔-5⅓ oz.		
	Sevin XLR	2-4 pt.		
Sunflower moth larvae	*Furadan 4F	1 pt.	Over row	Apply first treatment when a field has reached 20 to 25% bloom and moths are present.
	Lorsban 4E	1-1½ pt.		
	*Pydrin 2.4EC	5⅓-10⅔ oz.		
	*Supracide 2E	2 pt.		

* Use restricted to certified applicators only. [a] See Table 13 for insecticide restrictions.
[b] The formulation of the product most commonly used in Illinois is listed. If you use another formulation, READ THE LABEL to determine the amount of product per acre.

Spraying blossoming sunflowers can be extremely hazardous to bees. Coordinate with local beekeepers before applying sprays. Beekeepers' names and colony locations may be obtained from your County Extension Office.

Table 13. Harvest Restrictions: Limitations in Days Between Application of the Insecticide and Harvest of Crop and Restrictions on Use of Insecticides for Field Crop Insect Control (These are only guidelines — read the label for more detailed information)

(Blanks denote that the product may not be labeled or suggested for that specific use in Illinois)

	Field corn		Grain	Forage crops		
	Grain	Ensilage	Sorghum	Alfalfa	Clover	Pasture
*Aastar G (phorate + flucythrinate)	A	60	...	...	...	...
*Ambush 2E (permethrin)[a,b]	B	B	...	...	...	...
*Asana 1.9EC (esfenvalerate)	21,C	21,C	...	...	...	...
Broot 15GX (trimethacarb)	90	90	...	...	...	...
*Counter 15G (terbufos)	A	30,D	E	...	...	...
Cygon 400 (dimethoate)[b]	14,F	14,F	28,F	10,G	...	...
Diazinon AG 500	A	A	7	10	10	0
Dipel (*Bacillus thuringiensis*)	A	A	...	...	...	...
*Dyfonate 20G, 4E (fonofos)[a,b]	30	30	...	...	...	...
Dylox 80SP (trichlorfon)	H	H	...	0,H	0,H	0,H
*Furadan 15G, 4F (carbofuran)[a,b]	30,I,J	30,I,J	75	K	...	...
Imidan 50WP (phosmet)	14	14	...	7,F	...	...
Lannate 90WSP (methomyl)[a,b]	A	3	14	...	...	...
Lorsban 15G, 4E (chlorpyrifos)	35,L	14,L	60,M	21,N	...	...
Malathion 57% EC	5	5	7	0	0	0
*Mocap 15G (ethoprop)	A	A	...	...	...	...
Nudrin 90WSP (methomyl)[a,b]	A	0	14	0	...	...
*Penncap-M (microencapsulated methyl parathion)[a,b]	12	12	...	15	...	15
*Pounce 3.2EC, 1.5G (permethrin)[a,b]	P	P	...	...	...	...
*Pydrin 2.4EC (fenvalerate)[a,b]	21,Q	21,Q	...	...	...	...
Sevin XLR (carbaryl)	0	0	21	3	0	0
*Supracide 2E (methidathion)[a,b]	...	...	...	10,R	...	...
*Thimet 20G (phorate)	30,S	30,S	...	...	...	...

Table 13. Harvest Restrictions (continued)

	Barley	Oats	Rye	Wheat	Soybeans	Sunflowers
*Ambush 2E (permethrin)[a,b]	...	...	...	...	60,T	...
*Asana 1.9EC (esfenvalerate)	...	...	...	...	21,U	...
Cygon 400 (dimethoate)[b]	...	...	...	60	21	...
Dipel, Thuricide, Bactur, SOK (*Bacillus thuringiensis*)	...	...	...	...	0	...
Dylox 80SP (trichlorfon)	21	21	...	21	...	...
*Furadan 15G, 4F (carbofuran)[a,b]	V	V	...	V	21,W	28,X
Lannate 90WSP (methomyl)[a,b]	7	7	7	7	...	...
Larvin 3.2F (thiodicarb)	...	...	...	...	28,Y	...
Lorsban 15G, 4E (chlorpyrifos)	...	...	...	...	28,Z	42,AA
Malathion 57% EC	7	7	7	7	0	...
Nudrin 90WSP (methomyl)[a,b]	7	7	7	7	...	...
Orthene 75S (acephate)	...	...	...	...	14,Y	...
*Penncap-M (microencapsulated methyl parathion)[a,b]	15	15	...	15	20,BB	...
*Pounce 3.2EC (permethrin)[a,b]	...	...	...	...	60,T	...
*Pydrin 2.4EC (fenvalerate)[a,b]	...	...	...	...	21,CC	28,CC
Sevin XLR (carbaryl)	...	...	...	21	0	60
*Supracide 2E (methidathion)[a,b]	...	...	...	...	...	50,Y

Read the label for more detailed information.

A. No specific restriction when used as recommended.

B. Apply prior to the brown silk stage.

C. Do not exceed 0.25 pound of active ingredient per acre per season for field and seed corn. Do not exceed 0.5 pound of active ingredient per acre per season for popcorn.

D. Only 1 postemergence incorporated treatment or 1 cultivation-time treatment may be used in addition to treatment at planting time.

E. Only one application per year may be used.

F. Make no more than 3 applications per year. Do not apply to sorghum after heading.

G. Apply only once per cutting; do not apply during bloom.

H. Three applications may be made per season on corn, and 3 applications may be made per cutting of alfalfa or grasses. Can be applied up to harvest.

I. Do not make a foliar application if Furadan 15G was applied at more than 8 ounces per 1,000 linear feet of row (6.7 pounds per acre with 40-inch row spacing) at planting. Do not make more than 2 foliar applications of Furadan 15G per season.

J. Do not make more than 2 applications of Furadan 4F per season at the 1½-2 pint use rate. Do not make more than 4 applications per season at the 1 pint use rate. Do not apply Furadan 4F on seed corn less than 14 days prior to detasseling or rogueing. If prolonged, intimate contact with corn or sorghum foliage will result, do not reenter treated field within 14 days of application without wearing proper clothing. For all other situations do not renter fields less than 24 hours following application unless appropriate clothing is worn.

K. Make no more than 2 applications per season. Do not apply more than once per cutting. Do not use more than 1 pint per acre in the second application. Apply only to fields planted to pure stands of alfalfa. When using no more than ¼ pound per acre, allow 7 days between application and harvest. When using ¼ to ½ pound per acre, allow 14 days between application and harvest. When using ½ to 1 pound per acre, allow 28 days between application and harvest. Do not move bees to alfalfa fields within 7 days of application.

L. For soil insect control, do not exceed the equivalent of 16 ounces of Lorsban 15G per 1,000 feet of row or 13.5 pounds of Lorsban 15G per acre per crop season. For foliar insect control, do not exceed the equivalent of 16 ounces of Lorsban 15G per 1,000 feet of row or 13 pounds of Lorsban 15G per acre per crop season. Do not apply more than a total of 15 pints of Lorsban 4E per acre per season. 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.

M. The treated crop is not to be used for forage, fodder, hay, or silage within 30 days after application of 1 pint of Lorsban 4E per acre or within 60 days after application of rates above 1 pint per acre. Do not treat sweet varieties of sorghum. Do not apply more than 3 pints of Lorsban 4E per acre per season. Do not make more than one application of Lorsban 15G per season.

N. Do not apply more than once per cutting. Do not cut or graze treated alfalfa within 7 days of application of ½ pint of Lorsban 4E per acre, within 14 days after application of 1 pint per acre, or within 21 days after application of rates above 1 pint per acre. Do not make more than 4 applications per year.

P. Apply Pounce 3.2EC prior to the brown silk stage. Do not apply more than 0.4 pound active ingredient of Pounce 1.5G per acre after brown silk stage. Do not exceed a total of 1.0 pound active per acre per season.

Q. Do not exceed 1.0 pound of active ingredient per acre per season for field and seed corn. Do not exceed 2 pounds of active ingredient per acre per season for popcorn.

R. Make no more than 1 foliage and 1 stubble application per alfalfa cutting.

S. Do not make more than one application over the plant.

T. Do not graze or feed soybean forage or hay. Do not apply more than 0.4 lb. a.i. per acre per season.

U. Do not feed or graze livestock on treated plants. Do not exceed 0.2 pound of active ingredient per acre per season.

V. Apply before heads emerge from boot. Do not make more than 2 applications per season. Do not feed treated forage to livestock.

W. Do not use Furadan 4F as a foliar application if Furadan 10G, Furadan 15G, Furadan 4F was applied to soybeans at planting time. Do not make more than 2 foliar applications per season. Do not graze or feed foliar-treated forage to livestock or cut for silage or hay.

X. No more than 4 applications per season.

Y. Do not graze or feed treated crop to livestock.

Z. Do not apply more than 6 pints of Lorsban 4E per acre or 3 pounds of chlorpyrifos (active ingredient) per acre per season. Do not apply last treatment within 28 days before harvest or apply last 2 treatments closer than 14 days apart. Do not allow livestock to graze in treated areas or otherwise feed treated soybean forage, hay, and straw to meat or dairy animals. On determinate soybeans do not apply more than one application after pod set.

AA. Do not apply more than 9 pints of Lorsban 4E per acre per season. Do not allow livestock to graze in treated areas.

BB. Do not make more than 2 applications per season.

CC. Do not feed or graze livestock on treated plants. Do not exceed 0.8 pound active ingredient per acre per season.

* Use restricted to certified applicators only.

[a] Workers should be warned in advance of treatments. Workers may not enter fields treated with the insecticides without wearing protective clothing for the intervals indicated. They may not enter a field treated with other insecticides without protective clothing until the spray has dried or the dust has settled. Protective clothing includes a hat, long-sleeved shirt, full length pants, and shoes and socks.

[b] Sprays to be applied only by experienced operators wearing proper protective clothing.

Table 14. Relative Toxicities of Commonly Used Agricultural Insecticides

Trade name	Chemical class[b]	Chemical name	Toxicity to mammals[a]		Toxicity to		
			Acute oral	Acute dermal	Birds	Fish	Bees
*Aastar	OP,P	Phorate + flucythrinate	high	high	moderate	very high	moderate
*Ambush	P	permethrin	low	low	low	very high	high
*Asana	P	esfenvalerate	moderate	low	low	very high	high
Broot	C	trimethacarb	moderate	low	moderate	moderate	. . .
*Counter	OP	terbufos	high	high	high	very high	. . .
Cygon	OP	dimethoate	moderate	moderate	moderate	very low	very high
Diazinon	OP	diazinon	moderate	moderate	high	high	high
Dipel, Bactur, Topside, Thuricide, SOK	. . .	*Bacillus thuringiensis*	very low	very low	very low	very low	very low
*Dyfonate	OP	fonofos	high	moderate	high	very high	. . .
Dylox	OP	trichlorfon	low	low	low	very low	low
*Furadan	C	carbofuran	high	moderate	high	moderate	high
Imidan	OP	phosmet	moderate	low	moderate	moderate	very high
Lannate WSP, Nudrin WSP	C	methomyl	high	moderate	low	moderate	high
Larvin	C	thiodicarb	moderate	low	low	moderate	moderate
Lorsban	OP	chlorpyrifos	moderate	moderate	moderate	very high	high
Malathion	OP	malathion	low	low	low	moderate	high
*Mocap	OP	ethoprop	moderate	high	moderate	. . .	moderate
Orthene	OP	acephate	moderate	moderate	moderate	low	high
*Penncap-M	OP	microencapsulated methyl parathion	moderate	low	moderate	very low	high
*Pounce	P	permethrin	low	low	low	very high	high
*Pydrin	P	fenvalerate	moderate	low	low	very high	very high
Sevin	C	carbaryl	low	low	very low	very low	high
*Supracide	OP	methidathion	high	moderate	moderate	high	high
*Thimet	OP	phorate	high	high	moderate	very high	moderate

* Use restricted to certified applicators only.

[a] Relative toxicities based on acute oral and acute dermal LD_{50} values of technical insecticide. Toxicities of formulated materials vary.

[b] OP = organophosphate, P = pyrethroid, C = carbamate.

Always read the label before applying insecticides.

WORKER REENTRY PERIODS IN FIELDS WHERE INSECTICIDES HAVE BEEN APPLIED

Most insecticide labels contain a statement about the length of time that should elapse before a person enters a treated field. The following is a summary of minimum field reentry times for insecticides commonly used in field crops. Follow label directions and do not enter treated fields without protective clothing until the reentry period has passed. Protective clothing is defined on most insecticide labels as a hat or other suitable head covering, a long-sleeved shirt and long-legged trousers or a coverall type garment, shoes, and socks.

Insecticide	*Reentry statement on label*
Aastar G	Do not enter treated areas without protective clothing until treatments have been completed.
Ambush 2E	Wait until spray is dry.
Asana 1.9EC	After spray has dried.
Broot 15G	After dust has settled in treated field.
Counter 15G	Do not enter treated area without protective clothing until treatments have been completed.

Insecticide	*Reentry statement on label*
Cygon 400	Wait four days, unless protective clothing is worn.
Diazinon AG 500	After spray is dry.
Dyfonate 4EC	Wait 24 hours unless protective clothing is worn.
Dyfonate 20G	Wait 24 hours unless protective clothing is worn.
Furadan 4F Furadan 15G	If prolonged intimate contact with corn and sorghum will result, do not reenter treated field within 14 days without proper protective clothing. For all other situtions, do not reenter field less than 24 hours following application.
Imidian	After spray has dried.
Lannate 90WSP	After spray has dried.
Larvin 3.2F	After spray has dried.
Lorsban 4E	Wait 24 hours, unless protective clothing is worn.
Lorsban 15G	None specified on label.
Malathion 57EC	After spray has dried.
Mocap 15G	After chemical has been mixed in soil.
Nudrin 90WSP	After spray has dried.
Orthene 75SP	After spray has dried.
Penncap-M	After spray has dried.
Pounce 3.2EC	After spray has dried.
Pydrin 2.4EC	After spray has dried.
Sevin XLR Plus	After spray has dried.
Supracide 2E	Wait 48 hours.
Thimet 20G	Do not enter treated areas until soil treatment is completed; 7 days for foliar application.

INFORMATION SOURCES

Additional sources of information regarding insect management in field and forage crops are available from your county Extension office or from Extension Entomology, 172 Natural Resources Building, 607 East Peabody Drive, Champaign, IL 61820; telephone (217)333-6652.

Insect Fact Sheets

Fact sheets (designated by NHE numbers) that discuss nonchemical control methods and give descriptions of specific insects and their life history and biology have been prepared for most of the insects that attack field and forage crops in Illinois. Color picture sheets are also available in this series. Individual fact sheets and color picture sheets are $.25 each.

Insect Pest Management Guides

Other insect pest management guides available are Circular 897, *Insect Pest Management Guide: Commercial Vegetable Crops and Greenhouse Vegetables;* Circular 898, *Insect Pest Management Guide: Livestock and Livestock Buildings;* Circular 900, *Insect Pest Management Guide: Home, Yard, and Garden;* and Circular 1242, *Insect Pest Management Guide: Stored Grain.* Copies of these circulars are available from the Office of Agricultural Publications, address below.

Illinois Pest Control Handbook

All of the above-mentioned circulars, other references regarding management of insects, weeds, plant diseases, and vetebrate pests (including rats and mice), and pesticide application guidelines are bound together annually in the *Illinois Pest Control Handbook.* This is a valuable reference for pesticide dealers and applicators, farm managers, and anyone who frequently must answer questions about pest control. This publication can be obtained from the Office of Agricultural Publications, 54 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois, 61801; telephone (217)333-2007.

Conference Proceedings

The proceedings of the Illinois Agricultural Pesticides Conference '88 (Spray School) are available from Extension Entomology (see address and telephone listed previously). This 200-page reference contains about 40 articles concerning recent research information about insect, weed, and plant disease control and about recent advances in pesticide application technology.

Insect, Weed, and Plant Disease Survey Bulletin

The *Insect, Weed, and Plant Disease Survey Bulletin* is issued weekly from April through August. This series of bulletins provides a timely look at the agricultural insect, weed, and plant disease situation, along with suggested control measures. New developments in pesticide application are also included. To subscribe to this valuable newsletter, contact the Agricultural Newsletter Service, 116 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois 61801; telephone 217/333-2666.

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