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EC90-1511 1990 Insect Management Guide for Alfalfa, Soybeans, Wheat, Range, and Pasture

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1990 Insect Management Guide

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for
Alfalfa, Soybeans, Wheat, Range, and Pasture

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Cooperative Extension provides information and educational programs to all people without regard to race, color, national origin, sex or handicap.

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1990 Insect Management Guide for Alfalfa, Soybeans, Wheat, Range, and Pasture

Insect management suggestions in this circular are based on University of Nebraska test results, data from surrounding states, USDA recommendations, previous experience, and label registrations. These suggestions are designed to guide Nebraska farmers when they select an insect management program. NebGuides and other publications containing additional information on insect identification, damage, and life cycles are referenced under insect headings and are available by mail order (Write: Bulletins, 105 ACB, University of Nebraska, Lincoln, NE 68583-0918) or from local University of Nebraska Cooperative Extension Offices.

There are several approaches to the management of insect pests in Nebraska. These include the use of cultural practices, resistant varieties, biological control, and/or insecticides. Before making a treatment decision, all appropriate management strategies should be considered. If insecticide use is indicated, consideration should be given to efficacy against the target pest or pest combination, label restrictions, formulation of the pesticide, cost, safety to non-target species (including humans), environmental conditions at the time of application, and other factors. THE USER IS RESPONSIBLE FOR THE EFFECTS OF PESTICIDE RESIDUES ON CROPS AND LIVESTOCK, AS WELL AS PESTICIDE DRIFT AND CONTAMINATION.

This publication does not supersede label information. Always read and carefully follow the instructions on the container label. For current information, contact your University of Nebraska Cooperative Extension Office.

The use of trade names in this circular is not an endorsement by University of Nebraska Cooperative Extension.

Toxicity of Insecticides

(NebGuides G85-758, G84-715, G79-460, G79-472, G79-473, G79-479)

All insecticides are poisonous and must be used with caution. Always store them in their original containers out of the reach of children, unauthorized personnel, and livestock.

Skull and crossbones and the words **Danger/Poison** appear in red on the label of highly toxic materials, and these products require special handling. Liquid formulations of these products are recommended only for use by commercial applicators. Granular formulations of these chemicals can be applied safely and effectively when proper precautions are followed as indicated on the label. Moderate and low toxicity pesticides are marked with the signal words *Warning* and *Caution*, respectively.

(R) Restricted Use (R)

Several insecticides listed in this circular are classified **RESTRICTED USE** by the Environmental Protection Agency. These compounds are marked with the symbol (R). Pesticides may be classified as Restricted Use based on their persistence, toxicity, or potential environmental hazards. To use these products, EPA certification is required. A valid certification card must be presented to your dealer when purchasing these chemicals. Your Cooperative Extension office will have a listing of the dates and locations where certification training can be obtained.

Remember that the status of a formulation can change at any time. When purchasing a pesticide, be certain to ask the dealer if the attached label is up-to-date.

Who to Call

The following telephone numbers are provided for your use in case of emergency:

Poison Center — Children's Memorial Hospital (Omaha)
(800) 955-9119

CHEMTREC — Pesticide Emergency Network
(800) 424-9300

EPA — Environmental Protection Agency
Lincoln, NE (402) 471-5080
Kansas City, KS (913) 236-2800

Nebraska Department of Environmental Control (DEC)
(402) 471-2186

Nebraska State Patrol (800) 525-5555

Nebraska Department of Agriculture — Bureau of Plant Industry (402) 471-2341

Nebraska Natural Resources Commission
(402) 471-2081

Important

Subscribe to the *Insect, Plant Disease, and Weed Science Newsletter* for the latest pest management recommendations, changes in pesticide registrations, and updates on the current status of insect pests. Full details and an order blank are provided on the last page of this circular.

Management Decision Guidelines/Economic Thresholds

Economic thresholds are flexible guidelines. They indicate the level of insect abundance or damage that can be tolerated before management actions should be taken. **THEY ARE NOT HARD RULES THAT APPLY TO EVERY SITUATION.** Used conscientiously, they should be helpful in making management decisions.

Many variables can affect your decision, including insect abundance, anticipated value of the crop, relative effectiveness of controls, and cost of the pesticide plus application. Timing and accuracy of application, as well as the effects of weather, also determine the ultimate degree of control.

Chemigation

The term "chemigation" refers to the injection and application of chemicals through irrigation systems. Proper equipment needs, procedures for calibration and other instructions for application through center pivot systems are provided in NebGuides G84-703, *Applying Insecticides Through Center Pivots,* and G73-43, *Anti-Pollution Devices for Applying Chemicals Through Irrigation Systems.*

The Nebraska Chemigation Act took effect Jan. 1, 1987. This legislation requires that the applicator attend a training session and pass a written examination for CERTIFICATION as defined in the State Law. Among additional requirements is the provision that a **permit** must be issued for the injection site verifying that all necessary anti-pollution equipment is installed and working properly.

Injection site inspections are performed by staff of the appropriate Natural Resources District. Copies of the chemigation law, rules, and regulations are available from the Nebraska Department of Environmental Control, 301 Centennial Mall South, P.O. Box 94877, Lincoln, NE 68509-4877.

In some cases, supplemental rules and regulations have been issued by individual Natural Resource Districts. These rules and regulations are available at the respective NRD offices.

Endangered Species Act

Rules and regulations are pending concerning the impact of pesticides on endangered plant and animal species in certain areas of Nebraska. **Before** applying any pesticide, refer to the *Pesticide Use Bulletin For Protection of Endangered Species* for the county you are working in, which is available from your pesticide dealer, Cooperative Extension office, or the Environmental Protection Agency.

Insect Prevention and Control in Farm-Stored Grain

(EC88-1534 and NebGuide 86-790)

Properly managed stored grain should have few insect problems during the first year of storage in Nebraska. If grain is to be stored for more than one year, additional effort is required to maintain quality. All bins should be inspected regularly for moisture content, temperature, mold development, and insect pests.

1) Push a sharp pointed stick or rod into the grain to see if hard, compacted areas are developing. 2) Check grain temperature at several locations. 3) Moisture content should be monitored, even if the grain was dry when binned. 4) Collect several grain samples from the surface and as deep as possible into the grain with a grain probe. 5) Screen the samples and look for evidence of insects. 6) Turn on the aeration fan for a few minutes and smell the air. Does it smell normal or does it have a spoiled or musty odor? 7) In addition to following sound sanitation practices, using good aeration management, and making regular inspections, insecticides and/or fumigation may be needed.

For more detailed information on insect management and a listing of currently recommended bin sprays, grain protectants, and fumigants, see EC88-1534, *Pest Management of Farm-Stored Grain,* available at your Cooperative Extension office.

Seed Treatments

Damage to corn, sorghum, soybean, and other seed by soil-dwelling, seed-feeding insects often is intensified by prolonged periods of cool, moist weather after planting or other conditions which delay germination.

In Nebraska, the major seed-feeding insects are wireworms, seedcorn maggots, and seedcorn beetles. Once planted, little can be done to protect seed from these insects. Probably the most effective way of reducing injury by seed-feeding insects is through the use of an approved planter-box seed treatment containing lindane and/or diazinon prior to planting. Diazinon is no longer labelled for use on sorghum, alfalfa, wheat, dried beans, or range grass.

These treatments are recommended for all labelled crops in Nebraska. In fields that have a history of serious seed-feeding insect problems, or in situations where stands have been seriously reduced and replanting is the only feasible recourse, a seed treatment plus an in-furrow application with an approved soil insecticide should be considered.

Note: Agricultural seed often is treated with an insecticide such as malathion to protect against damage from stored grain pests. These treatments will not provide protection against seed-feeding soil insects.

Insecticide Performance

When pest problems exist or are anticipated, select an appropriate management strategy. If pesticides are indicated:

1) Select the proper insecticide/miticide.
2) Read, understand, and follow label directions.
3) Calibrate application equipment for each use.
4) Document application rates and keep accurate records.
5) Leave untreated check strips.
6) Continue scouting on a regular basis to determine pest abundance and to evaluate product performance.

Insecticides can provide less than satisfactory control for a variety of reasons, including: 1) unusually high insect infestations, 2) inaccurate calibration, 3) improper placement and incorporation, 4) poor timing, 5) inappropriate product selection (low toxicity to target pest), 6) high soil or water pH, 7) pest resistance to insecticide, 8) enhanced microbial breakdown, 9) weather factors (excess rain, wind, drought, temperature), and 10) other environmental conditions.

If you suspect a problem with insecticide performance:

1) Compare treated areas of field to untreated check strips.
2) Reread product label for warranties, guarantees, and claims.
3) Consult an Extension agent or other pest management specialist and, if appropriate, contact your pesticide dealer and/or pesticide company representative as soon as possible.
4) Be prepared to document suspected loss.

When one product fails in a field while another product provides control, the manufacturer may have a responsibility to the grower. This could include replacement of the product, and/or compensation for lost yield.

Insect Pests in Conservation Tillage Systems

Modifications of the crop environment in conservation tillage systems could alter the relative importance of Nebraska's more traditional insect pests and possibly create conditions where normally incidental organisms achieve pest status. Cooler soil temperatures and slower drying in reduced tillage fields may delay planting in the spring and slow seed germination, leaving seeds and young plants susceptible to soil insects for longer periods. Improper placement and incorporation of soil insecticides may create additional problems where crop residues are heavy. Elimination of deep plowing and the resulting increased surface debris may permit certain insects to overwinter in greater numbers.

While the use of reduced tillage raises some questions regarding pest control, anticipated problems should not be a barrier to the development of new techniques. It is highly unlikely that insects will be damaging in all fields, and the beneficial effects of conservation tillage appear to outweigh insect control considerations.

Protect Bees

Honeybees collect nectar and/or pollen wherever they can, including field crops such as corn, sorghum, soybeans, and alfalfa. If bee colonies are nearby or bees are foraging in fields sprayed during flowering (pollen-shed stage for corn and sorghum), they may be killed in substantial numbers.

To avoid injury to important pollinators, try to observe the following precautions: 1) treat only if insect pests reach economic levels; 2) if possible, do not treat crops that are in bloom; 3) never directly spray honeybee colonies; 4) check the crop for heavy concentrations of flowering weeds and avoid spraying these areas; 5) treat only those parts of fields that have significant pest infestations; 6) when possible, select an insecticide that has a lower toxicity to bees; 7) make applications very early in the morning or later in the evening when bees are not actively foraging; and 8) properly dispose of unused pesticides.

In many cases, beekeepers will relocate bees from areas to be treated if given sufficient prior notice.

Sprayed by Mistake?

Gardens, particularly plantings of sweet corn, often are placed in or adjacent to crop fields that may be sprayed with an insecticide. The produce is safe to eat IF THE INSECTICIDE IS REGISTERED FOR USE ON THE VEGETABLE OR FRUIT AND THE SPECIFIED WAITING PERIOD HAS ELAPSED. We do not recommend using vegetables or fruit that have been treated with a pesticide not labeled for that commodity.

The following table shows some selected preharvest intervals (waiting periods). Check appropriate labels for any others. If you have questions regarding accidental applications, determine the specific pesticide formulation used, the application rate, and time of spraying. By checking the pesticide label, you can make an informed decision concerning use of the crop.

Minimum Number of Days Between Application and Harvest For Some Selected Crops

Insecticide	Tomatoes	Peppers	Sweet Corn	Cucumbers	Cabbage	Leaf Lettuce	Green Beans	Apple
Ambush 2E	NR	3	1	NR	1	1	NR	***
Asana 1.9 EC	1	7	1	3	3	NR	NR	21
Counter 15G	NR	NR	30	NR	NR	NR	NR	NR
Cygon 400	7	0	NR	NR	3	14	0	28
Diazinon AG500	1	5	0	7	7	10	7	NR
Diazinon 14G	**	**	**	**	**	**	**	NR
Dipel 2X	0	0	0	0	0	0	0	0
Di-Syston 8EC	30	NR	NR	NR	42	60	60	NR
Di-Syston 15G	30	NR	40	NR	14	NR	NR	NR
Dyfonate 4EC	*	*	*	NR	*	NR	*	NR
Dyfonate II 20G	NR	NR	30	NR	*	NR	NR	NR
Furadan 4F	NR	NR	7	NR	NR	NR	NR	NR
Furadan 15G	NR	NR	**	**	NR	NR	NR	NR
Imidan 50WP	NR	NR	14	NR	NR	NR	NR	7
Lannate 1.8L	1	3	0	1-3	1	NR	1-3	8
Lorsban 4E	NR	NR	35	NR	*	NR	NR	NR
Malathion EC	1-5	3	5	1	7	14	1	3
Metasystox-R 2SC	NR	**	7-21	**	7	NR	21	NR
Parathion 8E (ethyl)	10	15	12	15	10	21	15	14
Penncap-M	15	NR	3	NR	21	NR	15	14
Pounce 3.2EC	0	3	1	NR	1	1	NR	***
Pydrin 2.4EC	1	7	1	3	3	NR	3	21
Sevin 80S,XLR Plus	0	0	0	0	3	14	0	1
Thimet 20G	NR	NR	*	NR	NR	NR	*60	NR

NR = Not Registered
* = At or prior to planting time application only
** = Registered, preharvest interval not indicated on label
*** = Do not apply after petal fall

Some Suggested Field Re-entry Periods

Re-entry periods may be listed on the label. **Follow label directions and do not enter fields after treatment until the re-entry period has passed.**

Ambush 2E—When spray is dry
Asana 1.9EC—When spray is dry
Comite 6.5EC—When spray is dry
Counter 15G—7 days (foliar)
—After dust settles (soil)
Cygon 400 — 4 days
Diazinon AG500—When spray is dry
Diazinon 14G—After dust settles
Dipel 10G,ES—When dust settles or spray is dry
Di-Syston 8EC, 15G—24 hrs
Dyfonate II 20G—24 hrs (foliar)
— After dust settles (soil)
Dyfonate 4EC—24 hrs
Dylox 80S—When spray is dry
EPN 5EC—24 hrs
Furadan 15G—None stated on label
Furadan 4F — 24 hrs. (limited activity in fields)
—14 days (prolonged activity in fields)
Guthion 50WP—24 hrs
Imidan 50WP—When spray is dry
Lannate 1.8L, 90S—When spray is dry
Larvin 3.2F—When spray is dry
Lorsban 4E—24 hrs
Lorsban 15G—None stated on label
Malathion EC—When spray is dry
Metasystox—R 2E—48 hrs.
Parathion (ethyl and methyl)—48 hrs
Penncap-M—48 hrs
Pounce 3.2EC—When spray is dry
Pydrin 2.4EC—When spray is dry
Sevin, all formulations—When spray is dry
Thimet 20G — 7 days (foliar)—After dust settles (soil)

Container Disposal

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

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

Metal, Glass, or Plastic Containers: Thoroughly rinse containers at least three times with water and dump rinse material into tanks to be used with regular applications. Recycle 5 gallon or larger metal drums where possible after complete rinsing. Containers that cannot be recycled should be punctured, crushed, and buried in a landfill or 24 inches below the soil surface in a location that will not result in contamination of water, crops, man, or animals.

Abbreviations

AI/A - Active Ingredient Per Acre; **Form** - Formulation; **LS** - Liquid Solution; **E** - Emulsifiable; **G** - Granular; **oz** - Ounce; **EC** - Emulsifiable Concentrate; **L** - Liquid; **S** - Soluble; **ES** - Emulsifiable Suspension; **lb** - Pound; **SP** - Soluble Powder; **F** - Flowable; **LC** - Liquid Concentrate ; **WP** - Wettable Powder.

ALFALFA INSECTS

Protect Pollinators From Insecticides

Protection of honeybees and other pollinators requires communication and cooperation among producers, beekeepers, and pesticide applicators. Insecticides, when carelessly applied to legumes or other flowering crops, can destroy substantial numbers of honeybees and result in disastrous losses for beekeepers. The following are suggestions to help reduce bee losses:

1. Ensure through careful inspection that pest densities have reached treatment thresholds before applying an insecticide.
2. Harvest rather than spray if insects are threatening and alfalfa is beginning to bloom.
3. When insecticides are needed, apply when bees are not actively foraging. Late evening applications after bees have returned to the hive and early morning treatments before bees become active outside the hive are less hazardous than mid-day applications.
4. Avoid spraying alfalfa during bloom or if a field has numerous blossoming weeds, such as dandelions or mustards.
5. If insecticides must be applied to blooming alfalfa, notify local beekeepers at least 48 hours in advance so bees can be moved or confined during application.

Alfalfa Weevil

(NebGuide G73-30)

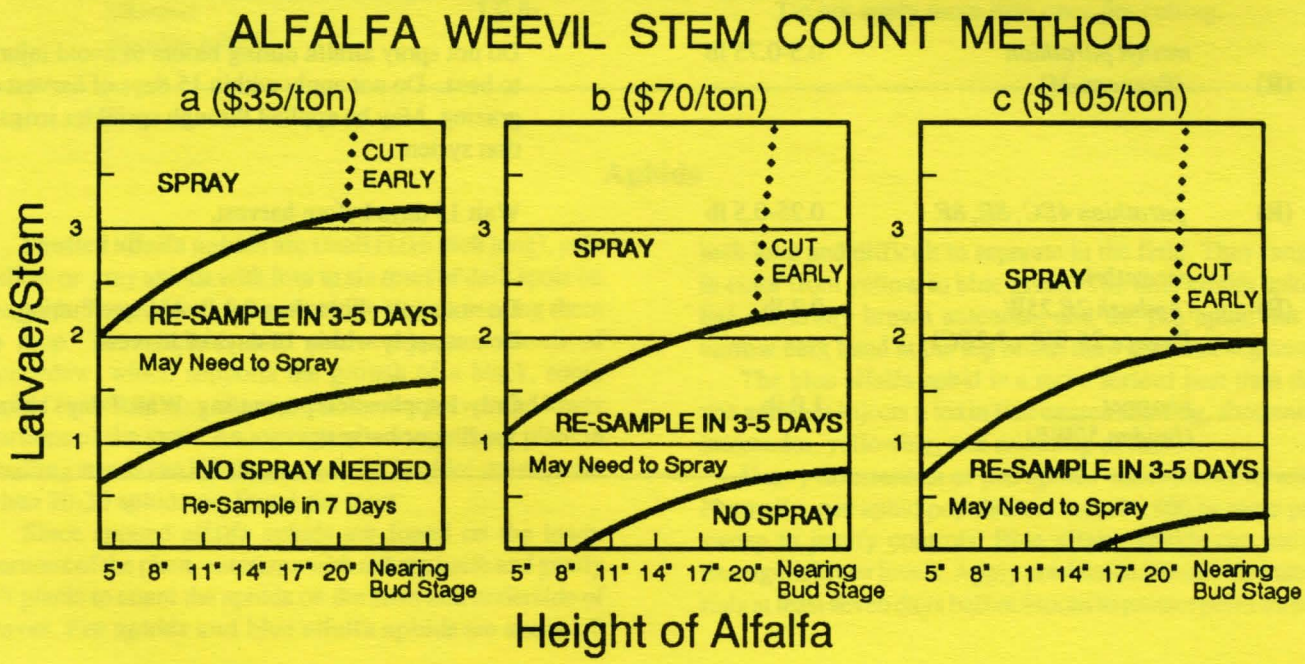
Check alfalfa in April and May for the first signs of larval feeding in the tips of alfalfa stems. Earliest damage appears as tiny shot holes on terminal foliage and buds. Look for small, green or yellow larvae, about 1/8-inch long, with dark brown heads, and a light-colored stripe down the middle of the back. When fully grown, the larvae are about 3/8-inch long. The following scouting and decision-making method has been developed by Kansas State University entomologists. Its use is suggested to assist in determining the need for alfalfa weevil management procedures.

The stem-count decision method — Carefully break off 30 to 50 stems, selected at random from across the field, and shake them individually into a deep-sided bucket. Remember to take stems from each of several different areas of the field to ensure that a representative sample is obtained. Count the stems and determine the average stem height. Count the larvae and determine the average number of larvae per stem. By plotting the average stem height versus the average number of larvae on the charts below, the appropriate course of action is suggested.

Please note that Chart "a" was developed assuming an alfalfa value of approximately $35 per ton. You can adjust this method to account for varying alfalfa prices by adjusting the lines on the chart. The decision curves should be lowered when the value of alfalfa increases, and raised when it decreases.

For example, if the price of alfalfa hay is expected to be $70 per ton when you sell it, the decision curves on the chart should be lowered to one half their height in Chart "a." Chart "b" shows the curves for $70 alfalfa. If hay is selling for $105 per ton, the curves should be lowered to one third their height in Chart "a." Chart "c" shows the curves for $105 per ton alfalfa.

After bud stage, it is probably more profitable to harvest the alfalfa than to treat with an insecticide. Resistant alfalfa varieties are available that will reduce (but not eliminate) damage by the alfalfa weevil.



Spraying blooming alfalfa can be extremely hazardous to bees. Coordinate with local beekeepers before applying insecticides.

Registered for Control of Alfalfa Weevil Larvae

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S, XLR Plus)	1.0-1.5 lb	Highly toxic to bees. Avoid application during bloom stage. Wait 7 days before harvest.
(R)	*carbofuran (Furadan 4F)*	0.25-1.0 lb	Apply only to pure stands of alfalfa. Do not apply more than once per cutting or twice per year. Do not move bees into treated areas within 7 days of application. See label for harvest restrictions.
	chlorpyrifos (Lorsban 4E)	0.5-1.0 lb	Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation system.
	malathion ULV 9.33	1.2 lb	Wait 5 days before harvest. Apply when day temperatures are expected to exceed 65° F. Do not apply during bloom. Do not apply to seed alfalfa.
	malathion 57EC	1.0-1.25 lb	No waiting period. During bloom, apply only in the evening or early morning.
(R)	*methidathion (Supracide 2E)*	0.5-1.0 lb	Do not apply during bloom. Wait 10 days before harvest. One application per cutting.
(R)	*methomyl (Lannate 1.8L, 90SP)*	0.9 lb	Wait 7 days before harvest. Do not apply to dormant or semi-dormant alfalfa when temperature is 50° or lower. Do not apply when alfalfa is in bloom.
	methoxychlor 2EC	1.0-1.5 lb	Wait 7 days before harvest.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not spray alfalfa during bloom to avoid injury to bees. Do not apply within 15 days of harvest or grazing. May be applied through sprinkler irrigation system.
(R)	*parathion 4EC, 8E, 8F*	0.25-0.5 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush 2E,25W Pounce 25 WP, 3.2EC)*	0.2 lb	Do not apply more than 0.2 lb AI/Acre/cutting. Do not apply within 14 days of harvest.
	phosmet (Imidan 50WP)	1.0 lb	Only 1 application per cutting. Wait 7 days before grazing or harvest.

Stubble Treatments

Following the cutting and removal of the hay, examine the stubble in several areas for evidence of continued feeding. Sift through windrows and under litter. Check in and around crowns for larvae, cocoons, and adult weevils.

Adults have long snouts, are light brown to gray with a dark stripe down the back, and are about 3/8 inch long. If normal regrowth is not forthcoming after five to seven days and adult weevils or larvae are numerous, a stubble treatment may be necessary.

Registered for Control of Alfalfa Weevil Adults

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*carbofuran (Furadan 4F)*	0.5-1.0 lb	Apply only to pure stands of alfalfa. Do not apply more than once per cutting or twice per year. See label for harvest restrictions.
	chlorpyrifos (Lorsban 4E)	0.5-1.0 lb	Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation system.
(R)	*methidathion (Supracide 2E)*	0.5 lb	Wait 10 days before harvest. One application per cutting.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Wait 15 days before harvest. One application per cutting. May be applied through overhead sprinkler irrigation system.
(R)	*parathion 4EC,8E,8F*	0.25-0.5 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush 2E,25W, Pounce 25WP,3.2EC)*	0.2 lb	Do not apply more than 0.2 lb AI/Acre/cutting. Do not apply within 14 days of harvest.
	phosmet (Imidan 50WP)	1.0 lb	Do not apply more than once per cutting.

Aphids

Spotted alfalfa aphids are small (1/16 inch long), pale yellow or gray aphids with four to six rows of dark spots on the back. They inject a toxin that kills leaves, causing them to drop. These aphids also produce large amounts of honeydew, which supports the growth of a black, sooty mold. This mold may in some cases cover leaves and lower portions of the stem. An average of one aphid per plant in seedling stands can kill the entire field. In older stands, treat when 20-30 aphids are found per stem.

Since spotted alfalfa aphids are found on the lower portions of the plant, cut stems with a sharp knife and gently lift plants to count the aphids on the stem and underside of leaves. **Pea aphids and blue alfalfa aphids** are about 1/8 inch long and difficult to separate in the field. They range in color from yellow to blue-green. The blue alfalfa aphid has uniformly brown antennae, and the pea aphid has a narrow dark band at the top of the third antennal segment.

The blue alfalfa aphid is a more serious pest than the pea aphid. It injects a toxin that causes stunting, shortened internodes, yellowing, and crinkling of leaves.

Heavy infestations of pea aphids cause plants to wilt. Normally, pea aphid populations must be 300 or more per sweep to justify controls. Blue alfalfa aphids can cause damage at lower levels. Apply pre-bloom insecticide materials at least seven days before bloom to protect pollinators.

Spraying blooming alfalfa can be extremely hazardous to bees.
Coordinate with local beekeepers before applying insecticides.

Registered for Aphid Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*carbofuran (Furadan 4F)*	0.25-1.0 lb	Apply only to pure stands of alfalfa. Do not apply more than once per cutting or twice per year. Do not move bees into treated areas within 7 days of application. See label for harvest restrictions.
	chlorpyrifos (Lorsban 4E)	0.25 lb	For suppression only. Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation system.
	dimethoate (Cygon 400)	0.25-0.50 lb	Wait 10 days before harvest or grazing. One application per cutting. Do not apply during bloom.
	malathion 57EC	1.0-1.25 lb	No waiting period. During bloom, apply only in the evening or early morning.
(R)	*methidathion (Supracide 2E)*	0.5-1.0 lb	Do not apply during bloom. Wait 10 days before harvest.
(R)	*methomyl (Lannate 1.8L,90SP)*	0.45-0.9 lb	Wait 7 days before harvest. Do not apply to dormant or semi-dormant alfalfa when temperature is 50°F or lower. Do not apply when alfalfa is in bloom.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not apply during bloom. Wait 15 days before harvest or grazing. Not registered for spotted alfalfa aphid. May be applied through overhead sprinkler irrigation system.
(R)	*parathion 4EC,8E,8F*	0.25-0.50 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush 2E,25W, Pounce 25WP, 3.2EC)*	0.05-0.2 lb	Use higher dosage for increased pest pressure or increased residual control. Do not apply more than 0.2 lb AI/Acre/cutting. When rates of 0.1 lb AI/Acre or less are used, application may be made on day of harvest. When rates greater than 0.1 lb AI/Acre are used, do not apply within 14 days of harvest.
	phosmet + dimethoate (Imidan 50WP) + (Cygon 400)	1.0 + 0.125-0.25 lb	Do not apply more than once per cutting. Do not graze or cut for hay within 10 days. Do not apply to alfalfa during the bloom period.

Webworms

Fully developed webworm larvae are yellow or green to nearly black in color. They are 1 to 1 1/4 inches long with dark and light stripes extending down the center of the back, and three small dark spots on either side of each segment. Infestations are often the result of migrations from weedy areas, so webworms are more commonly a problem in older fields or where stands are thin and weedy. However, webworms also occasionally defoliate established fields and reduce stands of newly-seeded alfalfa. When larvae feed, they spin silken webs in the tops of plants and tie leaves together.

No Nebraska threshold data are available for webworms, but Texas A & M University entomologists recommend treatment when 25 to 30 percent of plant terminals are infested and the crop is more than two weeks from harvest. Otherwise, early cutting is suggested.

Registered for Webworm Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S, XLR Plus)	1.0-1.5 lb	Wait 3 days before harvest.
(R)	*parathion 4EC,8E,8F*	0.25-0.50 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush 2E,25W, Pounce 25WP, 3.2EC)*	0.05-0.2 lb	Use higher dosage for increased pest pressure or increased residual control. Do not apply more than 0.2 lb AI/Acre/cutting. When rates of 0.1 lb AI/Acre or less are used, application may be made on day of harvest. When rates greater than 0.1 lb AI/Acre are used, do not apply within 14 days of harvest.
	trichlorfon (Dylox 80SP)	0.25-1.0 lb	Do not apply more than 3 times per cutting. No waiting period.

Cutworms

Several species of night-flying millers, including the variegated and army cutworm moths, deposit eggs in alfalfa. When larvae emerge and begin to feed, they are about 1/8 inch long, but eventually reach a length of one inch or longer. Cutworms feed at night, usually climbing onto the plants to feed on leaves, and they hide in the soil by day.

In newly-seeded alfalfa, food reserves in the roots are limited and a small amount of feeding is enough to kill individual plants. Established alfalfa is not likely to suffer stand loss, but growth may be delayed and yields reduced if cutworms are numerous. Apply insecticides in the evening or early morning for best control.

Registered for Cutworm Control

Insecticide	Rate AI/Acre	Restrictions and Comments
carbaryl (Sevin 80S, XLR Plus)	1.5 lb	Wait 3 days before harvest.
chlorpyrifos (Lorsban 4E)	0.5-1.0 lb	Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation systems.

Registered for Cutworm Control (continued)

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*methyl parathion (Penncap-M)*	0.5-1.0 lb	Do not apply during bloom. Wait 15 days before harvest or grazing. May be applied through overhead sprinkler irrigation system.
(R)	*parathion 4EC,8E,8F*	0.25-0.50 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush,2E, 25W, Pounce 25WP,3.2EC)*	0.05-0.2 lb	Use higher dosage for increased pest pressure or increased residual control. Do not apply more than 0.2 lb AI/Acre/cutting. When rates of 0.1 lb AI/Acre or less are used, application may be made on day of harvest. When rates greater than 0.1 lb AI/Acre are used, do not apply within 14 days of harvest.
	trichlorfon (Dylox 80SP)	0.5-1.0 lb	Do not apply more than 3 times per cutting. No waiting period.

Potato Leafhopper

These small (1/8 inch long), green, wedge-shaped insects frequently become abundant in alfalfa, but only occasionally cause economic damage. Normally, our harvesting practices interrupt the leafhopper life cycle in the egg stage. Damage, caused by injection of a toxin as the leafhopper feeds, is expressed as yellow or purple triangular-shaped areas on individual leaflets.

If leafhoppers are abundant, leaves may yellow and drop. In Nebraska, potato leafhoppers are usually more important on the second and third cuttings. Certain alfalfa varieties are somewhat resistant to potato leafhopper damage. The following treatment thresholds are recommended for potato leafhoppers:

Average height of alfalfa (inches)	*Average number of potato leafhoppers per sweep of a 15" diameter insect net*
0-3	0.2
3-6	0.5
6-12	1.0
12 or more*	1.5

*If alfalfa exceeds 12 inches or is approaching bloom, consider an early harvest rather than treatment.

Registered for Potato Leafhopper Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S, XLR Plus)	1.25 lb	Wait 3 days before harvest.
(R)	*carbofuran (Furadan 4F)*	0.5-1.0 lb	Apply only to pure stands of alfalfa. Do not apply more than once per cutting or twice per year. Do not move bees into treated areas within 7 days of application. See label for harvest restrictions.
	chlorpyrifos (Lorsban 4E)	0.5-2.0 lb	Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation systems.

Registered for Potato Leafhopper Control (continued)

	Insecticide	Rate AI/Acre	Restrictions and Comments
	dimethoate (Cygon 400)	0.25-0.5 lb	Wait 10 days before harvest. Only 1 application per cutting. Do not apply during bloom.
	malathion 57EC	1.0-1.25 lb	No waiting period. During bloom, apply only in the evening or early morning.
(R)	*methidathion (Supracide 2E)*	0.5-1.0 lb	Do not apply during bloom. Wait 10 days before harvest.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not spray alfalfa during bloom to avoid injury to bees. Do not apply within 15 days of harvest or grazing. May be applied through sprinkler irrigation system.
(R)	*parathion 4EC,8E,8F*	0.25-0.50 lb	Wait 15 days before harvest.
(R)	*permethrin (Ambush 2E,25W, Pounce 25WP, 3.2EC)*	0.1-0.2 lb	Use higher dosage for increased pest pressure or increased residual control. Do not apply more than 0.2 lb AI/Acre/cutting. When rates of 0.1 lb AI/Acre or less are used, application may be made on day of harvest. When rates greater than 0.1 lb AI/Acre are used, do not apply within 14 days of harvest.
	phosmet (Imidan 50WP)	1.0 lb	Only 1 application per cutting. Wait 7 days before grazing or harvest.
	trichlorfon (Dylox 80SP)	0.5-1.0 lb	Do not apply more than 3 times per cutting. No waiting period.

Grasshoppers

(NebGuide G86-791)

Grasshoppers are best controlled while they are small and still feeding in field margins. If hoppers average 21-40 in field margins or 8-14 per square yard in the alfalfa, an insecticide application should be considered. Look for increased grasshopper activity in weedy alfalfa and fields surrounded by weedy waste areas or pasture. Hoppers become especially abundant during dry seasons.

When establishing new stands of alfalfa, field margins should be treated **before** plants begin to emerge, if grasshoppers are present at threshold levels. Refer to the following table for grasshopper treatment thresholds in fields and margins.

Treatment Thresholds for Grasshoppers in Fields and Field Margins (Non-crop Areas)

Number of nymphs or adult hoppers per square yard

Classification	Field	Field Margin	Treatment Necessary?
Non-economic	0 to 2	5 to 10	Usually not
Light	3 to 7	11 to 20	Questionable
Moderate	8 to 14	21 to 40	Probably
Abundant	15 or more	41 or more	Yes

Registered for Grasshopper Control in Alfalfa

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S,4F,XLR Plus)	0.5-1.5 lb	Wait 3 days before harvest.
(R)	*carbofuran (Furadan 4F)*	0.125-0.25 lb	Apply only to pure stands of alfalfa. Do not apply more than once per cutting or twice per year. Do not move bees into treated areas within 7 days of application. See label for harvest restriction.
	chlorpyrifos (Lorsban 4E)	0.25-0.5 lb	Do not apply more than once per cutting or 4 times per year. See label for harvest restrictions. Some phytotoxic symptoms may occur on young foliage. May be applied through overhead sprinkler irrigation system.
	dimethoate (Cygon 400)	0.25-0.50 lb	Wait 10 days before harvest. Only 1 application per cutting. Do not apply during bloom.
	malathion 57EC	1.0-1.25 lb	No waiting period. During bloom, apply only in the evening or early morning.
	malathion ULV 9.33	0.6 lb	No waiting period. Do not apply to alfalfa in bloom. Do not apply to seed alfalfa.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not spray alfalfa during bloom to avoid injury to bees. Do not apply within 15 days of harvest or grazing. May be applied through sprinkler irrigation system. Use higher rates if majority of grasshoppers are large or weather is cool.
(R)	*parathion 4EC,8E,8F*	0.25-0.50 lb	Wait 15 days before harvest.

Registered for Control of Grasshoppers in Non-Crop and Waste Areas

Rates are active ingredient per acre.

	Insecticide	Rate AI/Acre
	acephate (Orthene 75S)	0.125-0.5 lb
	carbaryl (Sevin 4-F, XLR Plus, 80S)	0.5-1.5 lb
(R)	*fenvalerate (Pydrin 2.4 EC)*	0.05-0.1 lb
	malathion ULV 9.33	0.6-0.9 lb

Blister Beetles

Blister beetles feed in clusters on the foliage and flowers of numerous weeds and agricultural crops. Several species commonly are found in alfalfa and can be abundant in July and August.

Adults are elongate, cylindrical, soft-bodied beetles that range in length from 1/2 to 1 inch. Beetles are typically black, gray, spotted or striped, with conspicuous heads and wing covers that do not cover the tip of the abdomen.

When large aggregations of beetles are feeding, fields take on a ragged, stunted appearance. The larvae of some blister beetles are predaceous on the eggs of grasshoppers and in this capacity are considered beneficial. The body fluids of most blister beetles contain cantharidin, a chemical substance capable of producing large, watery blisters if allowed to come in contact with the skin.

When consumed along with hay or feed, blister beetles can seriously affect livestock health. Horses are particularly sensitive, with as few as two to five ingested beetles capable of causing colic, abortion, lethargy, or urinary tract infections. Alfalfa producers should check fields for the presence of blister beetles before harvest, particularly for cuttings made late in the season. If beetles are numerous, an insecticide application should be considered. The use of a hay "crimper" may accentuate the problem if beetles are crushed along with the hay, rather than being allowed to move out of the field following cutting.

Spraying blooming alfalfa can be extremely hazardous to bees. Coordinate with local beekeepers before applying insecticides.

Registered for Blister Beetle Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S,XLR Plus)	1.0 lb	Wait 3 days before harvest.
(R)	*parathion 4EC, 8E, 8F*	0.25-0.5 lb	Wait 15 days before harvest.

Lygus Bugs

Lygus bugs are major pests of alfalfa seed in most areas of the country. Both adults and nymphs feed on buds, flowers and seeds with their sucking mouthparts. Adults are green or brown bugs, about 3/16 inch long, and about half as wide. There is a distinct triangle about 1/3 of the distance down the back. The young nymphs are tiny, aphid-like in appearance, and blue-green in color. Nymphs can be distinguished from adults by the presence of wing pads instead of wings.

Lygus bugs do their greatest damage by feeding on alfalfa buds. Feeding by nymphs is more destructive than that of adults. Alfalfa buds bleach, die, and drop two to five days after feeding. The bugs also feed on the immature seeds within the pods, causing them to shrivel and turn brown. Lygus bug feeding during blossoming causes flowers to drop, although not all flower drop can be attributed to lygus bugs.

Economic levels of lygus bugs for various growth stages are as follows (although smaller in size, nymphs count the same as adults because of greater damage potential): pre-bloom — two per sweep; full bloom — five per sweep; post-bloom — eight per sweep. Pre-bloom sprays should be applied seven to 14 days before pollinators appear.

Registered for Control of Lygus Bugs on Alfalfa

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*carbofuran (Furadan 4F)*	1.0 lb	Pre-bloom only. One application per season. Do not harvest or graze within 28 days of application. Use at least 14 days before bloom.
	dimethoate (Cygon 400)	0.25-0.5 lb	Pre-bloom only. Do not feed, graze, or harvest within 10 days of application. Use at least 7 days before bloom.
	endosulfan (Thiodan 3EC)	1.5 lb	Pre-bloom only. Allow 21 days before harvest. Do not feed treated forage to meat or dairy animals. Use at least 7 days before bloom.
	malathion 57EC	1.0-1.25 lb	No time limitations. During bloom, apply only in the evening or early morning.
(R)	*methidathion (Supracide 2EC)*	0.5-1.0 lb	Pre-bloom only. Do not harvest or feed treated foliage within 10 days of application. Use at least 7 days before bloom.
	trichlorfon (Dylox 80SP)	1.0 lb	Pre-bloom or bloom. Wait 7 days to harvest. Use of alkaline water in spray mixture may reduce effectiveness. Acidify to pH 5.5 or 6.

SOYBEAN INSECTS

(NebGuides G73-397 and G84-703)

Most insects that damage soybeans can be placed in one of two large groups: chewing insects or sucking insects.

Chewing insects are the most common soybean pests and may damage any part of the plant, depending on the time of the season and the growth stage of the plant. Bean leaf beetles, green cloverworms, and grasshoppers are the most common chewing insect pests of soybeans in Nebraska. Other chewing insects include woollybear caterpillars, soil cutworms, loopers, variegated cutworms, and, to a lesser extent, leafminers, webworms, blister beetles, corn earworms, western bean cutworms, imported longhorn weevils, and Mexican bean beetles.

Sucking insects and mites injure soybean plants by probing plant parts with their piercing, needle-like mouthparts. Damage is produced when plant juices are removed and/or toxins are injected, causing plants to appear stippled, mottled, and to take on a yellow or discolored appearance.

Sucking insects are relatively minor pests of soybeans in Nebraska. Stink bugs occasionally attack pods and may discolor the developing bean within the pod. Spider mites may be of concern during hot, dry years. Thrips and plant bugs are other sucking insects that may feed on soybeans.

Scouting and Decision-making

Treatment guidelines usually are based on number of insects per foot of row, percent damage, and growth stage of the plant. Other than soil insects, the best way to scout soybean pests is with a drop cloth.

Attach a 3 ft x 3 ft square piece of light-colored canvas to two dowels. Carefully insert the cloth between two soybean rows and spread underneath. Knocking the plants from each row over the cloth will give you the number of insects per 6 ft of row (3 ft on each side).

Do this in at least five places in the field to obtain a representative count for the entire field. In solid-seeded soybeans, a sweep net must be used to sample insects.

Caution: Certain organophosphate soil insecticides may produce a cross reaction (burning) with the herbicide metribuzin (Sencor/Lexone). **The use of a preventative soil insecticide is not recommended on soybeans.**

Spraying flowering soybeans can be extremely hazardous to bees.
Coordinate with local beekeepers before applying insecticides.

Bean Leaf Beetle

Bean leaf beetles are about 1/4 inch long and vary in color from yellow to tan or red. They have a black triangle behind the head, with two black spots and black outside borders on each wing cover. Bean leaf beetles are present early in the season and from July to frost. They feed on cotyledons, leaves, and pods.

Treatment Guidelines for Bean Leaf Beetles

Growth stage	*Guidelines*
Seedling	Beetles present, 1 cotyledon destroyed per foot of row and/or defoliation reaching 50%.
Postseedling before bloom	Beetles present and defoliation reaching 50%.
Bloom to maturity	Beetles present and defoliation reaching 25% or pod damage reaching 10%.

Registered for Bean Leaf Beetle Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
	acephate (Orthene 75S)	0.5-1.0 lb	Wait 14 days to harvest. Do not graze or cut vines for hay or forage.
(R)	*azinphos methyl (Guthion 2S,2L)*	0.375-0.5 lb	One or 2 applications of rates up to 2 pts per acre may be made up to within 14 days of harvest. For additional applications or for use of rates above 2 pts per acre, do not apply within 45 days of harvest. Do not graze or feed treated vines to livestock.
	carbaryl (Sevin 80S XLR Plus, 50W, 4F)	0.5-1.0 lb	No waiting period. May be applied through overhead irrigation system.
	chlorpyrifos (Lorsban 4E)	0.5-1.0 lb	Do not apply more than 6 pts (3 lbs AI) per acre per season. Do not apply last treatment within 28 days before harvest nor apply last two 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. May be applied through overhead irrigation system.
	dimethoate (Cygon 400)	0.5 lb	Wait 21 days to harvest. Do not feed or graze within 5 days of last application.
(R)	*esfenvalerate (Asana 1.9EC)*	0.025--0.05 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.2 lb AI/A per season.
(R)	*fenvalerate (Pydrin 2.4EC)*	0.1-0.2 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.8 lb AI/A per season.
(R)	*methomyl (Lannate 90SP, 1.8L, 2.4LV)*	0.25-0.5 lb	Wait 14 days to harvest, 3 days for forage, 7 days for hay, 90SP formulations are not restricted.

Registered for Beaf Leaf Beetle Control (continued)

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Wait 20 days to harvest or graze. Do not make more than 2 applications per season. May be applied through overhead irrigation system.
(R)	*permethrin (Ambush 2E, 25W, Pounce 3.2EC,25WP)*	0.05-0.1 lb	Wait 60 days to harvest. Do not graze or feed forage or hay. Do not make more than 2 applications per season of Ambush. Pounce may be ap plied through an overhead irrigation system.
	thiodicarb (Larvin 3.2F)	0.45-0.75 lb	Wait 28 days to harvest. Do not feed treated forage, hay, or straw to livestock.

Green Cloverworm

Cloverworms are green caterpillars with a narrow, white stripe down each side. When fully grown, they are about 1 1/4 inch long. High numbers can strip soybeans of foliage.

Control cloverworms when 12 or more half-grown (about 1/2 inch long) worms are found per foot of row, and 25 percent defoliation occurs during bloom through pod fill.

Registered for Control of Green Cloverworm

Rate is active ingredient per acre unless otherwise noted.

	Insecticide	Rate AI/Acre	Restrictions and Comments
	acephate (Orthene 75S)	0.5-1.0 lb	Wait 14 days to harvest. Do not graze or cut vines for hay or forage.
(R)	*azinphos methyl (Guthion 2S)*	0.375-0.5 lb	One or two applications of rates up to 2 pts per acre may be made up to 14 days of harvest. For additional applications or for use of rates above 2 pts per acre, do not apply within 45 days of harvest. Do not graze or feed treated vines to livestock.
	Bacillus thuringiensis (Dipel ES)	0.25-0.5 (form)*	None
	carbaryl (Sevin 80S, XLR Plus, 50W, 4F)	0.5-1.0 lb	No waiting period. May be applied through overhead irrigation system.
	chlorpyrifos (Lorsban 4E)	0.25-0.5 lb	Do not apply more than 6 pts (3 lbs AI) per acre per season. Do not apply last treatment within 28 days before harvest, nor apply last two 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. May be applied through overhead irrigation system.

Registered for Control of Green Cloverworm (continued)

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*esfenvalerate (Asana 1.9EC)*	0.0125-0.025 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.2 lb AI/A per season.
(R)	*fenvalerate (Pydrin 2.4EC)*	0.05-0.1 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.8 lb AI/A season.
	malathion ULV 9.33	0.6 lb	Wait 7 days to harvest or graze.
	malathion 57EC	1.87 lb	May be applied on the day of harvest or forage use.
(R)	*methomyl (Lannate 90SP, 1.8L, 2.4LV)*	0.25-0.51 lb	Wait 14 days to harvest, 3 days for forage, 7 days for hay. 90SP formulations are not restricted.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Wait 20 days to harvest or grazing. Do not make more than 2 applications per season. May be applied through overhead irrigation system.
(R)	*parathion 4EC,8EC*	0.5 lb	Wait 20 days to harvest. Do not apply more than 2 times per season.
(R)	*permethrin (Ambush 2E 25W, Pounce 3.2EC,25WP)*	0.05-0.11 lb	Wait 60 days to harvest. Do not graze or feed forage for hay. Do not make more than 2 applications per season of Ambush. May be applied through an overhead irrigation system.
	thiodicarb (Larvin 3.2F)	0.25-0.4 lb	Wait 28 days to harvest. Do not feed forage, hay, or straw to livestock.
(R)	*tralomethrin (Scout 0.3EC)*	0.014-0.16 lb	Wait 21 days to harvest. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply more than 0.12 lb AI/Acre per season.

* Rate is formulation per acre.

Grasshoppers

Grasshoppers breed in waste vegetation (e.g.roadsides, borrow pits, fence rows, benches, terraces) and pastures, moving into border rows of soybeans in midsummer. Hoppers are best controlled in these staging areas before they invade soybeans.

Plan to treat if hoppers average 20 or more per square yard in field margins or 15 or more per square yard in the soybean field itself. Refer to grasshopper recommendations in the alfalfa section for a listing of insecticides registered for control of grasshoppers in non-crop and waste areas.

The following are suggested for control of hoppers once they have moved into the soybean field.

Registered for Control of Grasshoppers in Soybeans

	Insecticide	Rate AI/Acre	Restrictions and Comments
	acephate (Orthene 75S)	0.25-0.5 lb	Wait 14 days to harvest. Do not graze or cut vines for hay or forage.
	carbaryl (Sevin 80S,XLR Plus,50W, 4F)	1.0 lb	No waiting period. May be applied through overhead irrigation system.
(R)	*carbofuran (Furadan 4F)*	0.125-0.25 lb	Wait 21 days to harvest. Do not graze, forage, or cut for silage or hay. Do not make more than 2 applications per season. Do not apply if Furadan 10G,15G, or 4F was applied at planting time.
	chlorpyrifos (Lorsban 4E)	0.25-0.5 lb	Do not apply more than 6 pts (3 lbs AI) per acre per season. Do not apply last treatment within 28 days before harvest nor apply last two 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. May be applied through overhead irrigation system.
	dimethoate (Cygon 400)	0.5 lb	Wait 21 days to harvest. Do not feed or graze within 5 days of last application.
(R)	*esfenvalerate (Asana 1.9EC)*	0.025-0.05 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.2 lb AI/A per season.
(R)	*fenvalerate (Pydrin 2.4EC)*	0.1-0.2 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.8 lb AI/A per season.
	malathion ULV 9.33	0.6 lb	Wait 7 days to harvest or graze.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Wait 20 days to harvest or graze. Do not make more than 2 applications per season. May be applied through overhead irrigation system.
(R)	*parathion 4EC,8EC*	0.5 lb	Wait 20 days to harvest. Do not apply more than 2 times per season.
(R)	*tralomethrin (Scout 0.3EC)*	0.015-0.19 lb	Wait 21 days to harvest. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply more than 0.12 lb AI/A per season.

Soil Cutworms

Soil cutworms are occasional pests of seedling soybeans. The most common species involved is the black cutworm. This pest is a greasy black or gray worm with a brown head that may be over one inch long when feeding is completed.

Black cutworms feed primarily at night and hide under debris or in the soil during the day. Young black cutworms feed on aboveground portions of plants, while older cutworms cut plants at or below the soil surface. Controls are suggested when 20 percent of the plants are cut, stands have gaps of one foot or more, and cutworms are present.

Registered for Control of Soil Cutworms

Rate is active ingredient per acre unless otherwise noted.

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S,XLR Plus,50W,4F)	1.0 lb	No waiting period. May be applied through overhead irrigation system.
	chlorpyrifos (Lorsban 15G)	8 oz form*	Planting time or postemergence. Do not make more than one application per season.
	(Lorsban 4E)	0.5-1.0 lb	Planting time or postemergence. Do not apply more than 6 pts (3 lbs AI) per acre per season. Wait 28 days to harvest. Do not graze or feed treated foliage or straw to livestock.
	diazinon 14G,50WP, AG 500	2.0-4.0 lb	Preplant only. No restrictions.
(R)	*esfenvalerate (Asana 1.9EC)*	0.025-0.05 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.2 lb AI/A per season.
(R)	*fenvalerate (Pydrin 2.4EC)*	0.1-0.2 lb	Wait 21 days to harvest. Do not feed or graze livestock on treated plants. Do not exceed 0.8 lb AI/A per season.
(R)	*permethrin (Pounce 3.2EC,25WP)*	0.05-0.1 lb	Wait 60 days to harvest. Do not graze or feed soybean forage or hay. Do not apply more than 0.4 lb AI/A per season.
	thiodicarb (Larvin 3.2F)	0.5-0.75 lb	Wait 28 days to harvest. Do not feed forage, hay, or straw to livestock.
(R)	*tralomethrin (Scout 0.3EC)*	0.015-0.019 lb	Wait 21 days to harvest. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply more than 0.12 lb AI/A per season.

* Rate is formulation per 1,000 row feet.

Spider Mites

Control is suggested if mites are abundant on underside of leaves and lower leaves are beginning to drop as a result of mite damage.

Registered for Control of Spider Mites

Insecticide	Rate AI/Acre	Restrictions and Comments
chlorpyrifos (Lorsban 4E)	0.25-0.5 lb	Do not apply more than 6 pts (3 lbs AI) per acre per season. Do not apply last treatment within 28 days before harvest nor apply last two 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. May be applied through overhead irrigation system.
dimethoate (Cygon 400)	0.5 lb	Wait 21 days to harvest. Do not feed or graze within 5 days of last application.

Wireworms and Seed Damaging Insects

Planter box seed treatments of diazinon and/or lindane. Follow label directions for amounts and restrictions.

Other Foliage Feeders

Treat when defoliation reaches 50 percent before bloom and 25 percent between bloom and maturity.

Registered for Chewing Insects on Soybeans

Rate is active ingredient per acre unless otherwise noted.

Insect		Insecticide	Rate AI/Acre
Blister Beetles		*carbaryl (Sevin 80S,SLR Plus, 50W,4F)*	1.0 lb
Loopers		*acephate (Orthene 75S)*	0.5-1.0 lb
		Bacillus thuringiensis (Dipel ES)	0.5-1.0 pt (form)
	(R)	*esfenvalerate (Asana 1.9 EC)*	0.025-0.05 lb
	(R)	*fenvalerate (Pydrin 2.4 EC)*	0.1-0.2 lb
	(R)	*methomyl (Lannate 1.8L, 90SP)*	0.5-1.0 lb
	(R)	*permethrin (Ambush 2E,25WP, Pounce 3.2EC)*	0.05-0.10 lb
		thiodicarb (Larvin 3.2F)	0.5-0.75 lb
	(R)	*tralomethrin (Scout 0.3EC)*	0.015-0.019 lb
Thistle Caterpillar		*carbaryl (Sevin 80S,XLR Plus,50W,4F)*	2.0 lb
Variegated Cutworm		*carbaryl (Sevin 80S,XLR Plus, 50W,4F)*	1.0 lb
		chlorpyrifos (Lorsban 4E)	0.5-1.0 lb
	(R)	*esfenvalerate (Asana 1.9EC)*	0.025-0.05 lb

Registered for Chewing Insects on Soybeans (continued)

Insect		Insecticide	Rate AI/Acre
Variegated Cutworm (continued)			
	(R)	*fenvalerate (Pydrin 2.4EC)*	0.1-0.2 lb
		thiodicarb (Larvin 3.2F)	0.5-0.75 lb
	(R)	*tralomethrin (Scout 0.3 EC)*	0.015-0.019 lb
Webworms		*carbaryl (Sevin 80S,XLR Plus,50W,4F)*	1.0 lb
	(R)	*methyl parathion (Penncap-M)*	0.25 lb
	(R)	*parathion 4EC,8EC*	0.25 lb
Woollybear Caterpillar		*chlorpyrifos (Lorsban 4E)*	0.50-1.0 lb
	(R)	*esfenvalerate (Asana 1.9EC)*	0.0125-0.05 lb
	(R)	*fenvalerate (Pydrin 2.4EC)*	0.05-0.10 lb
	(R)	*permethrin (Ambush 2E,Pounce 3.2EC)*	0.05-0.10 lb
		thiodicarb (Larvin 3.2F)	0.25-0.4 lb

WHEAT INSECTS

The principal insects that damage wheat in Nebraska are the pale western and army cutworms, armyworms, grasshoppers, greenbugs, Russian wheat aphids, other aphids, the Hessian fly, and various seed and seedling feeding insects, including wireworms.

Much of the loss to the wheat crop from insect pests can be prevented by proper cropping practices. Control of volunteer wheat and delayed seeding, for example, are important control measures for Russian wheat aphid, the Hessian fly, and wheat curl mite. Timeliness of application is important when chemicals are used for insect control. Check appropriate NebGuides for additional information.

Seed and Seedling Attacking Insects

Drill box seed treatment with lindane. Follow label directions for rates and restrictions.

Pale Western and Army Cutworms

(NebGuide G74-130)

Sporadic outbreaks of pale western and army cutworms have occurred in Nebraska following periods of drought. Thin stands on lighter soils are more subject to attack. The pale western cutworm is gray, up to 1 inch long, and feeds beneath the soil surface, destroying plants and causing serious damage. One pale western cutworm per foot of drill row is considered an economic level in early spring.

The army cutworm is mottled brown, up to 1 1/4 inches long, and "grazes" the wheat above ground. Army cutworms are not considered serious pests unless conditions are dry and worms average two to three per square foot. Apply insecticide treatments during the early morning or evening for best results.

Registered for Pale Western and Army Cutworm Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
(R)	*parathion 4EC, 8EC*	0.5 lb	Wait 15 days before harvest.

Armyworms

(True, Fall, Wheathead, Yellowstriped)
(NebGuide G82-615)

Four species of armyworm occur in Nebraska. They are generally associated with field crops and small grains, but also feed on pasture grasses. These pests hide in the soil or beneath debris by day, and emerge at night to feed on foliage. Hail-damaged fields that become weedy with foxtail and other grasses are particularly susceptible to armyworm infestations. Spray in early morning or evening for best results.

Registered for Armyworm Control

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 80S,XLR Plus, 4F)	0.1-1.5 lb	No waiting period on forage. Wait 21 days before harvesting grain.
(R)	*methomyl (Lannate 1.8L,90SP)*	0.225-0.45 lb	Wait 7 days before harvest, 10 days before grazing.
(R)	*methyl parathion (Penncap-M)*	0.5-0.75 lb	Wait 15 days before harvest or grazing.
(R)	*parathion 4EC,8EC*	0.5 lb	Wait 15 days before harvest.

Grasshoppers

(NebGuide G86-791)

Minimize economic damage to wheat by controlling grasshoppers when there are 20 or more adults per square yard in field margins, or eight or more in the field itself. Time of day, temperature, wind, plant density, and height of vegetation affect grasshopper activity and should be considered in making counts. For grasshopper control recommendations in non-crop and waste areas, refer to that portion of the alfalfa section of this publication.

Registered for Grasshopper Control in Wheat

Rate is active ingredient per acre unless otherwise noted.

	Insecticide	Rate AI/Acre	Restrictions and Comments
	carbaryl (Sevin 5% bait)	20-40 lb form*	No waiting period on forage. Wait 21 days before harvesting grain.
	(Sevin 80S,XLR Plus)	0.5-1.5 lb	No waiting period on forage. Wait 21 days before harvesting grain.
(R)	*carbofuran (Furadan 4F)*	0.25-0.5 lb	Apply before heads emerge. Do not make more than 2 applications per season. Do not feed treated forage to livestock.
(R)	*disulfoton (Di-Syston 8EC)*	0.5 lb	Wait 30 days before harvest. Do not graze.
(R)	*(Di-Syston 15G)*	1.0 lb	Planting time application. Wait 30 days to graze or cut for forage.

Registered for Grasshopper Control in Wheat (continued)

	Insecticide	Rate AI/Acre	Restrictions and Comments
	dimethoate (Cygon 400)	0.375 lb	Wait 14 days for grazing, 35 days for harvest. Maximum of 2 applications per season.
	malathion 57EC	1.0 lb	Wait 7 days before harvest or forage use.
	malathion ULV 9.33	0.6 lb	Wait 7 days before harvest or forage use.
	methyl parathion (Penncap-M)	0.75 lb	Wait 15 days before harvest or grazing.
(R)	*parathion 4EC,8EC*	0.5 lb	Wait 15 days before harvest.
(R)	*phorate (Thimet 20G)*	1.0 lb	Apply in seed furrow at planting. Wait 45 days to graze.

* Rate is formulation per acre.

NOTE: Thimet 20G at a rate of 1.2 oz per 1,000 feet (minimum 8 inch row spacing) and Di-Syston 15 G (disulfoton) at a rate of 1.7 oz per 1,000 feet can be used in the seed furrow at planting time. Only the border 30-40 feet normally benefit from treatment. Wait at least 45 days before grazing after applying Thimet 20G, and 30 days after applying Di-Syston 15G. Do not make any later applications after planting time treatment. Do not mix granules with wheat seed in drill box.

Aphids and Greenbugs

(NebGuides G73-49 and G87-853)

Although a number of aphid species can infest wheat and other small grains, the Russian wheat aphid and greenbug are the aphids that most often cause economic damage in Nebraska.

The **Russian Wheat Aphid** (RWA) has become a serious threat to Nebraska wheat production. Continue to examine wheat for this pest from plant emergence through the fall, and in spring from the time wheat resumes growth through the bloom stage. RWA feeding prevents infested leaves from unrolling and causes the leaves to turn purple with yellow or white lengthwise stripes. Heavily infested plants become prostrate, with young tillers lying parallel to the ground.

RWA is difficult to control due to its habit of feeding in rolled up leaves of new growth. Feeding by RWA on flag leaves can cause premature death and distorted white heads. Damage often appears in circular, purple or reddish-brown areas in a field.

The RWA is a small aphid, with an olive-green, spindle-shaped body, and short antennae. Its "double-tailed" appearance and reduced cornicles ("tailpipes") help distinguish it from greenbugs and other aphids commonly found in wheat. Contact your University of Nebraska Cooperative Extension office or crop consultant for assistance in distinguishing these aphid species.

Heavy infestations of RWA can reduce yields up to 100 percent. While no insecticides currently are registered for this relatively new pest, most of the following could be used under their "aphid" labeling.

Caution: Several other species of aphids occur in wheat, including the greenbug, oat-bird cherry aphid, English grain aphid, and corn leaf aphid. The last three species rarely cause serious damage. Therefore, identification is critical. Do not make a control decision until you are sure which aphids you have in your fields.

In the fall, control of field border RWA infestations may be justified when 50 percent or more of the plants are infested, while control of full-field infestations should be considered if 10 percent or more of the tillers are damaged. Control of RWA in the spring appears justified when 10 percent or more of the plants are infested. Control with spot treatments in only those infested areas reduces costs and may eliminate the need for large scale treatments later on.

Foliar treatments with systemic insecticides such as disulfoton, and, to some extent dimethoate, appear to be the most effective chemical controls. Contact insecticides (such as ethyl and methyl parathion) may provide reasonable control, particularly early when leaves are not as tightly curled around the colonies, and later when the aphids are exposed and feeding on the heads. Whatever foliar insecticide is used, thorough plant coverage is important. Use at least 2 gallons of finished spray per acre to obtain reasonable control by aerial application.

Unless RWA infested summer hosts are nearby, fall planting-time treatment with granular systemic insecticides is economically questionable. In addition, keep in mind that treatment in the fall will not prevent spring infestations.

Wheat fields infested by **greenbugs** (GB) develop yellow or dead areas during late fall or early spring. These areas gradually increase in size.

Examination of these areas should reveal the small green aphids feeding on the underside of leaves. The GB injects phytotoxic saliva as it feeds. Plants under stress from other causes may need to be treated even though GB numbers are relatively low.

Fall planting time treatments for GB are economically questionable because damaging fall infestations are relatively unusual. The following table indicates approximate growth stages and treatment thresholds for GB control:

Treatment thresholds for greenbugs at various growth stages of wheat.

Stage and Development of Plants	*Number of greenbugs per linear foot of drill row*
Seedlings, thin stands, less than 3 tillers	50 (fewer if plants are very small)
3 to 6 inch wheat, 3 tillers or more	100 - 300
6 to 10 inch wheat	300 - 500

Registered for Control of Aphids and Greenbugs

	Insecticide	Rate AI/Acre	Restrictions and Comments
	dimethoate (Cygon 400)	0.25-0.375 lb	Wait 35 days before harvest, 14 days to graze. Maximum of two applications per season.
(R)	*disulfoton (Di-Syston 8EC)*	0.5-0.75 lb	Wait 30 days before harvest. Do not graze.
(R)	*(Di-Syston 15G)*	1.0 lb	Planting time application. Wait 30 days to graze or cut for forage.
	malathion 57EC	1.0 lb	Wait 7 days before harvest or forage use.
(R)	*methyl parathion (Penncap-M)*	0.5 lb	Wait 15 days before harvest or grazing.
(R)	*parathion 4EC, 8EC*	0.5 lb	Wait 15 days before harvest.
(R)	*phorate (Thimet 20G)*	1.0 lb	Apply in seed furrow at planting. Wait 45 days to graze.

NOTE: Thimet 20G at a rate of 1.2 oz per 1,000 feet of drill row (minimum 8-inch row spacing) and Di-Syston 15G (disulfoton) at a rate of 1.7 oz per 1,000 feet of drill row can be used in the seed furrow at planting time. Only the border 30-40 feet normally benefit from treatment. Wait at least 45 days before grazing after applying Thimet 20G, and 30 days after applying Di-Syston 15G. Do not make any later applications after planting time treatment. Do not mix granules with wheat seed in drill box.

Hessian Fly

(NebGuide G73-46)

Injury caused by the Hessian fly is not conspicuous at first, but can be devastating. Wheat infested in the fall becomes stunted. Leaves of infested plants take on a dark blue-green color, are distinctly thickened, and stand more erect than those of non-infested plants. Controls consist primarily of cultural methods.

In eastern and central Nebraska, delay planting until after the summer generation of flies has died to reduce fall infestations. Fly-free dates for planting wheat in your area can be obtained from your University of Nebraska Cooperative Extension office.

In addition, destroying wheat stubble helps reduce the fly population. However, in western Nebraska, because of wind erosion, this practice may not always be practical.

The planting of fly-resistant wheat varieties also is important in reducing the overall fly infestation. Two systemic insecticides, disulfoton [(R) Di-Syston 15G)] and phorate [(R) Thimet 20G)] are registered for Hessian fly control, but the economics and effectiveness of preventive insecticide treatments in Nebraska have not been demonstrated.

Chinch Bugs

(NebGuide G86-806)

Adults leave overwintering sites and migrate to small grains in the spring. Heavy spring infestations in wheat may result in reduced yields, particularly if wheat is under stress from other causes.

Usually either a partial or full generation occurs in wheat fields before chinch bugs migrate to corn or sorghum. Controls are seldom necessary, but 0.5 lb AI/Acre of (R) parathion applied aerially can be used at least 15 days prior to harvest. Damage to fall-sown wheat seldom occurs because chinch bugs are usually in the process of moving to overwintering sites.

White Grubs

White grubs occasionally damage fall-sown wheat in southwestern Nebraska. Treatment is suggested when grubs average three to four per square foot and insecticides must be applied at or before planting. Once plants have emerged from the soil, little can be done. Phorate [(R) Thimet 20G)] is federally registered as a planting time treatment, applied in-furrow at a rate of 1.2 oz formulation per 1,000 feet of drill row (minimum 8 inch row spacings).

Brown Wheat Mites

Brown wheat mites can be a problem in wheat in the early spring when conditions are dry. The brown wheat mite is a small, dark brown mite about 0.5 mm long. Like all mites, it has four pairs of legs, and the front pair of legs is markedly longer than the remaining pairs. This mite is quite cold hardy and begins its development in the fall. It can continue to reproduce in the winter during periods of warmer weather. Once temperatures warm and spring wheat growth begins, mite populations increase more rapidly. As temperatures increase later in the spring, the mites lay eggs that will be dormant until fall.

Damage symptoms range from a stippling of the leaves to dying back of the leaf tips. Significant damage results only in plants already under severe drought stress, so it is difficult to distinguish what is the result of mite damage or drought.

Rains of only 0.25-0.5 inch may be enough to reduce mite infestations and allow the wheat to outgrow severe re-infestation. However, if wheat is under severe drought stress, the added stress of large brown wheat mite infestations (30-50 mites/plant) may be enough to cause significant damage. The value of chemical control needs to be assessed in each situation based on the yield potential of the wheat and prospects for rain. The application of an insecticide for mite control will not solve the major problem of drought stress. The only pesticide labeled for brown wheat mite control in wheat is dimethoate (Cygon 400), to be applied at rates of 0.17 to 0.25 lb AI/per acre.

Black Grass Bug

The black grass bug can cause significant damage to wheatgrasses and wheat. The primary host of the black grass bug is crested wheatgrass. Eggs are laid and early nymphal development begins on crested wheatgrass. As nymphs develop they move out of the crested wheatgrass and into adjoining areas of other wheatgrasses or wheat.

Wheat fields are seldom severely infested except for borders (10-20 feet) that adjoin crested wheatgrass ditches or set-aside areas. The best control of the black grass bug is to graze or hay the wheatgrass during the summer. This removes many of the eggs laid on the wheatgrass stems early in the summer.

Because set aside areas cannot be grazed or hayed, they are particularly vulnerable to large buildups of the black grass bug. Wheat fields adjoining unharvested wheatgrass areas should be scouted in April and May for infestations of black grass bugs along the borders. If black grass bugs are causing significant discoloration of the wheat and the majority of the bugs are still in the nymph stage, a border treatment of the infested area may be justified. In most instances a border treatment of 50 feet or less is sufficient to reduce damage. More extensive treatments generally do not improve control.

Registered for Control of Black Grass Bug

Insecticide	Rate/Acre	Restrictions and Comments
malathion (Cythion 9.33 ULV 9.33)	8-1/2 oz form	Non-agricultural areas
carbaryl (Sevin XLR Plus)	0.5-1.0 lb AI	Non-agricultural areas and rangeland
acephate (Orthene 75S)	0.094-0.87 AI	Non-agricultural areas, pasture, and rangeland. Wait 21 days to harvest hay.

RANGE AND PASTURE INSECTS

(NebGuides G86-791, G82-615, and G87-841)

Range and pastures in Nebraska are attacked by several insect pests, with grasshoppers the most important. Grasshoppers usually affect large areas, while areas damaged by other species are usually much smaller.

It may not be economical to spray large areas of range and pasture without supplemental financial assistance. Small infested areas may be sprayed to control the insects and prevent their spread. Leafhoppers, western harvester ants, blister beetles, and army cutworms also may cause damage, but there are no insecticides currently registered for control of these insects on range or pasture.

Recommended for Control of Range and Pasture Insects

Rate is active ingredient per acre unless otherwise noted.

Insect	Insecticide	Rate AI/Acre	Restrictions and Comments
Grasshoppers	*acephate (Orthene 75S)*	0.094-0.125 lb	Minimum of 1/2 gallon of solution by air or 10 to 20 gallons per acre by ground. Do not apply when lactating dairy cattle are present. Do not pasture or feed treated hay to lactating dairy cattle within 21 days after application. Remove meat animals from treated areas at least one day before slaughter if they were present at application or grazed treated areas within 21 days after application. Do not make more than one application per season.
	carbaryl (Sevin XLR Plus, 80S,4F,20% bait)	0.5-1.5 lb	No restrictions.
	(R) *ethyl parathion 4EC,8EC*	0.5-0.75 lb	Do not apply within 15 days of harvest or grazing.
	malathion 57EC	1-1.5 lb	May be applied on the day of harvest or grazing.
	malathion ULV 9.33	8-12 oz form*	May be applied on the day of harvest or grazing.
	(R) *methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not apply within 15 days of harvest or grazing.
Grasshoppers	*naled (Dibrom 8EC)*	0.5-0.75 lb	See label for restrictions.
Armyworms	*carbaryl (80S,XLR Plus)*	1-1.5 lb	No restrictions.
	(R) *ethyl parathion 4EC, 8EC*	0.5-0.75 lb	Do not apply within 15 days of harvest or grazing.
	malathion 57EC	1.5 lb	No waiting period.
	(R) *methyl parathion (Penncap-M)*	0.5-0.75 lb	Do not apply within 15 days of harvest.
Black Grass Bugs (*Labops* sp.)	*carbaryl (Sevin XLR Plus, 80S)*	1-1.5 lb	No restrictions
	(R) *ethyl parathion 4EC,8EC*	0.5-0.75 lb	Wait 15 days before harvest or grazing.
	malathion ULV 9.33	8-12 oz form*	May be applied on the day of harvest or grazing.

*Rate is formulation per acre.

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