

FORAGE INSECTS

NOTE: When spraying legume fields, apply insecticides between 8 p.m. and 8 a.m. to protect the local bee population. Never spray fields in bloom.

ALFALFA BLOTCH LEAFMINER

Alfalfa acreage in the upper Midwest was recently invaded by the alfalfa blotch leafminer (ABL). ABL is a gnatlike fly (Diptera) from Europe that was first detected in North America, in Massachusetts, in 1968. By 1994, populations of ABL reached northern Minnesota and by 1997 could be found throughout Wisconsin, the northern 2/3 of Minnesota, and the northeastern corner of Illinois. By October 1998, ABL was distributed throughout Minnesota, Wisconsin, northern Illinois, and eastern North Dakota. Observations suggest that this insect may reduce alfalfa yields by 7% to 20% and protein content by 10% to 20%. Both adults and larvae damage the plant.

Females feed by puncturing leaves with their ovipositors, creating characteristic "pinholes," and consuming plant juices. A single female creates an average of 3,769 pinholes during her lifetime. Larvae emerging from eggs create distinctive mines as they feed. Within a field, it is not uncommon for 70% or more of the leaflets to be attacked. The wounds also increase the susceptibility of alfalfa to diseases, especially spring black stem. Still unclear is the economic impact of damage caused by ABL, but the visible damage caused by even low numbers of flies can be disturbing. In the northeastern United States, populations have been suppressed by parasitic wasps and control is not recommended.

Severe infestations appear one year after initial colonization by the leafminer. Infestations have now spread to central North Dakota. The first generation in May-June causes the most visible damage. Infested fields take on a whitish cast due to the larval mines in the leaves. The same appearance can be confused with alfalfa weevil feeding; however, you do not have the skeletonizing of the leaves by the leafminers.

Alfalfa Blotch Leafminer Thresholds:

Treatment is suggested if 30% to 40% of the plants exhibit pinhole feeding injury. Though several insecticides are available for ABL control in alfalfa, insecticide efficacy trials in Minnesota have not demonstrated significant economic return. If insecticides are used, they must be applied during the "pinhole" stage.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.0155 - 0.022	2.0 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.5 - 1	1 - 2 pts	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.37 - 0.74 + 0.007 - 0.013	19 - 38 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
lambda-cyhalothrin Lambda-Cy Silencer (alfalfa only) <i>RUP</i>	0.03	3.84 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
lambda-cyhalothrin Kaiso 24 WG (alfalfa only)	0.03	2 oz	
<i>RUP</i>			
lambda-cyhalothrin Grizzly Z (alfalfa only)	0.02 - 0.03	2.56 - 3.84 fl oz	
<i>RUP</i>			
lambda-cyhalothrin Warrior II (alfalfa only)	0.03	1.92 fl oz	
<i>RUP</i>			
methomyl Lannate LV	0.45 - 0.9	1.5 - 3 pts	PHI = 0 days. Do not graze or feed to livestock for 7 days.
<i>RUP</i>			

RUP - Restricted use pesticide

ALFALFA WEEVIL

Larvae

Historically, alfalfa weevil larvae are not a widespread concern in North Dakota, occurring mainly in the southern counties when they are a problem. The light green larvae have a white stripe down the center of the back. They feed in the terminal buds of the growing alfalfa. They may be found in rolled up leaves at the growing tip of the plant. Feeding injury appears as small, circular holes in leaves. As larvae increase in size, feeding injury is more evident. Severely damaged fields take on a silvery appearance due to browning of injured leaf tissue.

Alfalfa Weevil Management:

If alfalfa weevil infestations are observed, one of the best strategies is to cut fields for hay early. After cutting, monitor carefully for signs of damage or delayed regrowth, particularly in the swath area where larvae may be concentrated.

When early cutting of the crop is not possible, treatment should be considered when 30% of the plants show feeding damage and larvae are still present. To sample, inspect 20 stems from each of 5 sites in the field, recording the percent of damaged plants and whether larvae were found.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL	0.0125 - 0.022	1.6 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
<i>RUP</i>			
carbaryl Sevin	1.5	rate varies by formulation	PHI = 7 days (alfalfa).
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only)	0.5 - 1	1 - 2 pts	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
<i>RUP</i>			
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only)	0.37 - 0.74 + 0.007 - 0.013	19 - 38 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
<i>RUP</i>			

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.025 - 0.044	1.6 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.01 - 0.015	2.56 - 3.84 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
indoxacarb Steward EC	0.065 - 0.11	6.7 - 11.3 fl oz	PHI = 7 days. Do not apply more than 45 fl oz per acre per season. Apply no more than 11.3 fl oz per cutting. When Steward EC is used alfalfa grown for seed, the seed may not be used for sprouts or livestock feed. All seed from treated crop must be tagged "Not for Human or Animal Use" at the processing plant. A reduced rate has been issued as a state 2 (ee) label for control of alfalfa weevil larvae when only 10 to 14 days of residual are needed. Or, when a tank-mixture with OP or pyrethroid insecticides is needed for control of alfalfa weevil larvae and aphids.
	0.034 - 0.065	Reduced Rate 4.0 - 6.7 fl oz	
lambda-cyhalothrin Lambda-Cy Silencer (alfalfa only) <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Kaiso 24 WG (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.33 - 2.0 oz	
lambda-cyhalothrin Grizzly Z (alfalfa only) <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.28 - 1.92 fl oz	
malathion Malathion 57EC	0.9 - 1.25	1.5 - 2 pts	No time limitation. Not effective on adults.
methomyl Lannate LV <i>RUP</i>	0.9	3 pts	PHI = 0 days. Do not graze or feed to livestock for 7 days.
methoxychlor Methoxychlor 2EC	1 - 1.5	2 - 3 qts	PHI = 7 days.
methyl parathion <i>RUP</i>	0.25 - 0.5	0.5 - 1 pt	PHI = 15 days of cutting or grazing. Do not enter treated fields within 48 hours after application.
permethrin Ambush 2E Pounce 3.2EC Arctic 3.2E Permethrin 2EC Perm-Up 25 WP Perm-Up 32. EC <i>RUP</i>	0.1 - 0.2	6.4 - 12.8 fl oz 4 - 8 fl oz 4 - 8 fl oz 4 - 8 fl oz 6.4 - 12.8 fl oz 4 - 8 fl oz	PHI = 14 days at rates above 0.1 lb/A. Do not apply more than 0.2 lb active/cutting.
phosmet Imidan 50 WP	0.75	2 lbs	Do not apply more than once per cutting. Do not graze or cut for hay within 7 days of application. Do not apply to alfalfa during the bloom period.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	PHI = 3 days of cutting or grazing or up to 7 days of harvesting seed. Do not make applications less than 7 days apart. Do not apply more than 0.075 lb AI per acre per season.

RUP - Restricted use pesticide

CUTWORMS

The variegated cutworm is an occasional pest of alfalfa and sweetclover in North Dakota. These larvae are about 2 inches long when full grown. Their color ranges from black to light greenish-yellow or tan. They have a distinctive row of pale yellow spots down the middle of their backs. Generally, the most serious damage from this cutworm would be on the stubble following the first cutting. Larvae may concentrate beneath windrows, causing severe damage to these areas.

Threshold:

Treatments would be justified when more than 2 worms per square foot are present after the hay has been cut - if larvae are not expected to pupate in the next 3 to 4 days.

Another management strategy is to delay cutting if larvae are close to full size and about to pupate. By delaying cutting, the feeding is distributed through the dense canopy of an established stand which is less detrimental than concentrated feeding on the young regrowth.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.0065 - 0.0125	0.8 - 1.6 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
carbaryl Sevin	1.5	rate varies by formulation	PHI = 7 days (alfalfa).
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.5 - 1	1 - 2 pts	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.25 - 0.51 + 0.004 - 0.009	13 - 26 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.013 - 0.025	0.8 - 1.6 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.0075 - 0.0125	1.92 - 3.2 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Lambda-Cy Silencer Grizzly Z (alfalfa only) <i>RUP</i>	0.015 - 0.025	1.92 - 3.20 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
lambda-cyhalothrin Kaiso 24 WG (alfalfa only) <i>RUP</i>	0.015 - 0.025	1.0 - 1.67 oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.015 - 0.025	0.96 - 1.60 fl oz	
methomyl Lannate LV <i>RUP</i>	0.23 - 0.9	0.75 - 3 pts	PHI = 0 days. Do not graze or feed to livestock for 7 days.
methyl parathion <i>RUP</i>	0.25 - 0.5	0.5 - 1 pt	Wait 15 days before cutting or grazing. Do not enter treated fields within 48 hours after application.
permethrin Ambush 2E Pounce 3.2EC Arctic 3.2E Permethrin 2EC Perm-Up 25 WP Perm-Up 32. EC <i>RUP</i>	0.1 - 0.2 0.1 - 0.2 0.1 - 0.2 0.1 - 0.2 0.05 - 0.2 0.05 - 0.2	6.4 - 12.8 fl oz 4 - 8 fl oz 4 - 8 fl oz 4 - 8 fl oz 3.2 - 12.8 fl oz 2 - 8 fl oz	PHI = 14 days at rates above 0.1 lb/A. Do not apply more than 0.2 lb active/cutting.
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	PHI = 3 days of cutting or grazing or up to 7 days of harvesting seed. Do not make applications less than 7 days apart. Do not apply more than 0.075 lb AI per acre per season.

RUP - Restricted use pesticide

GRASSHOPPERS

In the Northern Plains, grasshopper egg hatch normally begins in late April to early May. Most grasshoppers emerge from eggs deposited in uncultivated ground or where plant cover attracted adults the previous season. Infestations could occur any time after emergence begins. Later infestations may develop when grasshopper adults migrate from harvested fields.

Grasshopper Thresholds: Infestation Ratings: Threatening is considered the action threshold for grasshoppers. Since it is difficult to estimate the number of grasshoppers per square yard when population densities are high, pest managers can use four 180-degree sweeps with a 15-inch sweep net, which is equivalent to the number of adult (or nymph) grasshoppers per square yard.

Rating	Nymphs (young hoppers) per square yard		Adults per square yard	
	Margin	Field	Margin	Field
Light	25-35	15-23	10-20	3-7
Threatening	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very Severe	200+	120	80+	28+

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.0155 - 0.022	2.0 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
carbaryl Sevin	1 - 1.5	rate varies by formulation	PHI = 7 days (alfalfa).

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
chlorpyrifos Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.25 - 0.5	0.5 - 1 pt	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.14 - 0.25 + 0.003 - 0.004	7 - 13 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
dimethoate Digon 400, Dimethoate 400	0.25 - 0.5	0.5 - 1 pt	Do not apply to alfalfa in bloom. PHI = 10 days or pasturing. Make only 1 application per cutting. Do not enter treated fields without protective clothing until spray dries.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.01 - 0.015	2.56 - 3.84 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground. Proaxis may be used in bordering, non-crop areas that are not hayed or grazed
lambda-cyhalothrin Lambda-Cy Silencer Grizzly Z (alfalfa only) <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai (3.84 fl oz) per acre per cutting. Do not apply more than 0.12 lb ai (15.36 fl oz) per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Kaiso 24 WG (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.33 - 2.0 oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.28 - 1.92 fl oz	
malathion Malathion 57EC	1	1.5 pts	No limitation on cutting or grazing.
malathion Malathion ULV	0.6	8 oz	Aerial application. Applied alone or dissolved in 1 pint of diesel oil per acre. No time limitation on cutting or grazing.
methyl parathion <i>RUP</i>	0.25 - 0.5	0.5 - 1 pt	PHI = 15 days, cutting or grazing. Do not enter treated fields within 48 hours after application.
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	PHI = 3 days of cutting or grazing or up to 7 days of harvesting seed. Do not make applications less than 7 days apart. Do not apply more than 0.075 lb AI per acre per season.

RUP - Restricted use pesticide

LEAFHOPPERS

The potato leafhopper is wedge-shaped and pale green in color. It is only 1/8 inch long. Adults are very active, jumping or flying when disturbed. Both adults and nymphs will run backwards or sideways rapidly. Damage by leafhoppers is referred to as hopper burn. Foliage becomes dwarfed, crinkled and curled. Small triangular brown areas appear at the tips of leaves, gradually spreading around the entire leaf margin.

Potato Leafhopper Thresholds:

Suggested treatment guidelines are presented below. Thresholds are based on the number of leafhoppers per sweep when swinging a sweep net in a pendulumlike motion through the tops of the plants.

<u>Stem Length (inches)</u>	<u>Average No. Leafhoppers/Sweep</u>
3 or less	0.2
6	0.5
8 - 10	1.0
12 -14	2.0

Insecticides Registered for Leafhopper Management in Alfalfa

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.0065 - 0.0125	0.8 - 1.6 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
carbaryl Sevin	1	rate varies by formulation	PHI = 7 days (alfalfa).
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.14 - 0.25 + 0.003 - 0.004	7 - 13 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.5 - 1	1 - 2 pts	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.013 - 0.025	0.8 - 1.6 fl oz	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
dimethoate Digon 400, Dimethoate 400	0.25 - 0.5	0.5 - 1 pt	PHI = 10 days of harvest or pasturing. Make only 1 application per cutting. Do not enter treated fields within 4 days after application.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.01 - 0.015	2.56 - 3.84 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground. Rates for leafhoppers are lower; refer to label.
indoxacarb Steward EC	0.09 - 0.11	9.2 - 11.3 fl oz	PHI = 7 days. Do not apply more than 45 fl oz per acre per season. Apply no more than 11.3 fl oz per cutting. When Steward EC is used alfalfa grown for seed, the seed may not be used for sprouts or livestock feed. All seed from treated crop must be tagged "Not for Human or Animal Use" at the processing plant.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
lambda-cyhalothrin Lambda-Cy Grizzly Z (alfalfa only) <i>RUP</i>	0.015 - 0.025	1.92 - 3.20 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Kaiso 24 WG (alfalfa only) <i>RUP</i>	0.015 - 0.025	1.0 - 1.67 oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.015 - 0.025	0.96 - 1.60 fl oz	
malathion Malathion 57EC	1	1.5 pts	No preharvest interval on foraging or grazing.
permethrin Ambush 2E Pounce 3.2EC Arctic 3.2E Permethrin 2EC Perm-Up 25 WP Perm-Up 32. EC <i>RUP</i>	0.05 - 0.2 0.05 - 0.2 0.05 - 0.2 0.05 - 0.2 0.1 - 0.2 0.1 - 0.2	3.2 - 12.8 fl oz 2 - 8 fl oz 2 - 8 fl oz 2 - 8 fl oz 6.4 - 12.8 fl oz 4 - 8 fl oz	PHI = 14 days at rates above 0.1 lb/A. Do not apply more than 0.2 lb active/cutting.
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	

RUP - Restricted use pesticide

LYGUS OR PLANT BUGS

Lygus bugs are a serious pest of alfalfa seed production. These insects are 1/4 inch long and range in color from pale green to light brown to reddish-brown. There is a light-colored, heart-shaped spot on the back. The nymphs are pale green and look similar to aphids, but are much more active movers. Lygus bugs feed on foliage, but the most serious feeding is on the flower buds, flowers, and developing seeds. Feeding causes blossoms to drop, and seeds to shrivel, turn brown and then fail to germinate.

Threshold:

Treatments are justified when sweep net samples collect an average of 3 to 5 lygus bugs (adults and nymphs) per pendulum sweep. If insecticides are considered, attempt to time treatments for the control of nymphs prior to the onset of bloom. Protecting insect pollinators in seed production fields is very important.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.0125 - 0.022	1.6 - 2.8 fl oz	Preharvest interval or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
bifenthrin Capture 2EC** **Allowable under North Dakota state label #90-0003, issued 4/2/90. <i>RUP</i>	0.06 - 0.1	3.8 - 6.4 fl oz	

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.5 - 1	1 - 2 pts	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.37 - 0.74 + 0.007 - 0.013	19 - 38 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.025 - 0.044	1.6 - 2.8 fl oz	Preharvest interval or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
dimethoate Digon 400, Dimethoate 400	0.25 - 0.5	0.5 - 1 pt	Do not apply to alfalfa in bloom. PHI = 10 days. Make only 1 application per cutting. Do not enter treated fields without protective clothing until sprays have dried.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.01 - 0.015	2.56 - 3.84 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Lambda-Cy Grizzly Z Silencer (alfalfa only) <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Kaiso 24 WG (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.33 - 2.0 oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.28 - 1.92 fl oz	
malathion Malathion 57EC	1.25	2 pts	No preharvest interval.
methomyl Lannate LV <i>RUP</i>	0.45 - 0.9	1.5 - 3 pts	PHI = 0 days. Do not graze or feed to livestock for 7 days.
methyl parathion <i>RUP</i>	0.5 - 1.0	1 - 2 pts	Do not apply within 15 days of harvest, cutting or grazing. Do not enter treated fields within 48 hours after application.
permethrin Ambush 2E Pounce 3.2EC Arctic 3.2E Permethrin 2EC Perm-Up 25 WP Perm-Up 32. EC <i>RUP</i>	0.05 - 0.2 0.05 - 0.2 0.05 - 0.2 0.05 - 0.2 0.1 - 0.2 0.1 - 0.2	3.2 - 12.8 fl oz 2 - 8 fl oz 2 - 8 fl oz 2 - 8 fl oz 6.4 - 12.8 fl oz 4 - 8 fl oz	PHI = 14 days at rates above 0.1 lb/A. Do not apply more than 0.2 lb active/cutting.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	PHI = 3 days of cutting or grazing or up to 7 days of harvesting seed. Do not make applications less than 7 days apart. Do not apply more than 0.075 lb AI per acre per season.

RUP - Restricted use pesticide

PEA APHID

The pea aphid is light green and about 1/4 inch long. Alfalfa infested by pea aphids may appear wilted and have a bronze color. When present, pea aphids will crowd together on the terminal shoot, leaves or stems. Monitor fields closely during periods of slow plant growth.

Pea Aphid Thresholds:

Many aphids per plant are required before the vigor of that plant is reduced. Light populations may be beneficial by providing a food source for predatory and parasitic insects. On 10-inch tall alfalfa, treatment would not be needed until aphids exceed 50 per stem. Taller alfalfa will tolerate greater numbers.

Insecticides Registered for Pea Aphid Management in Alfalfa

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
beta-cyfluthrin Baythroid XL <i>RUP</i>	0.022	2.8 fl oz (aphid suppression)	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
carbaryl Sevin	1	rate varies by formulation	PHI = 7 days (alfalfa).
chlorpyrifos + gamma-cyhalothrin Cobalt (alfalfa only) <i>RUP</i>	0.25 - 0.51 + 0.004 - 0.009	13 - 26 fl oz	PHI = 7 days for 13 fl oz per acre, 14 days for 26 fl oz per acre, 21 days for greater than 26 fl oz per acre. Do not make more than 4 applications or make a second application within 10 days of the first application.
chlorpyrifos Chlorpyrifos 4E AG Lorsban 4E Lorsban Advanced Warhawk Yuma 4E (alfalfa only) <i>RUP</i>	0.25	0.5 pt (suppression only)	Do not cut or graze treated alfalfa within 7 days after application of ½ pint 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 season or one application per cutting of any product containing chlorpyrifos. Do not make a second application within 10 days of the first application. Apply in at least 2 to 5 GPA by air and 10 GPA by ground. REI = 24 hours.
cyfluthrin Tombstone Tombstone Helios <i>RUP</i>	0.44	2.8 fl oz (aphid suppression)	PHI or pre-grazing interval is 7 days. Maximum allowed per cutting: 3.2 fl oz/acre. A total of 12.8 fl oz may be applied per acre per season. Due to potential injury to bees, do not apply to alfalfa grown for seed.
dimethoate Digon 400, Dimethoate 400	0.25 - 0.5	0.5 - 1 pt	PHI = 10 days of harvest or pasturing. Make only 1 application per cutting. Do not enter treated fields within 4 days after application.
gamma-cyhalothrin Proaxis <i>RUP</i>	0.01 - 0.015	2.56 - 3.84 fl oz	PHI = 1 day for forage or within 7 days for hay. Apply in minimum of 2 gal/A by air or 10 gal/A by ground. Rates for leafhoppers are lower; refer to label.

INSECTICIDE	DOSAGE IN LB	PRODUCT	RESTRICTIONS ON USE
	AI/ACRE	PER ACRE	
indoxacarb Steward EC	0.09 - 0.11	9.2 - 11.3 fl oz	PHI = 7 days. Do not apply more than 45 fl oz per acre per season. Apply no more than 11.3 fl oz per cutting. When Steward EC is used alfalfa grown for seed, the seed may not be used for sprouts or livestock feed. All seed from treated crop must be tagged "Not for Human or Animal Use" at the processing plant.
lambda-cyhalothrin Lambda-Cy Grizzly Z Silencer (alfalfa only) <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz (suppression)	Apply only to pure stands of alfalfa. PHI = 1 day for forage or within 7 days for hay. Do not apply more than 0.03 lb ai per acre per cutting. Do not apply more than 0.12 lb ai per acre per season. Avoid application when bees are actively foraging. Apply in minimum of 2 gal/A by air or 10 gal/A by ground.
lambda-cyhalothrin Kasio 24 WG (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.33 - 2.0 oz	
lambda-cyhalothrin Warrior II (alfalfa only) <i>RUP</i>	0.02 - 0.03	1.28 - 1.92 fl oz	
malathion Malathion 57EC	1	1.5 pts	No preharvest interval on foraging or grazing.
methomyl Lannate LV <i>RUP</i>	0.45 - 0.9	1.5 - 3 pts	PHI = 0 days. Do not graze or feed to livestock for 7 days.
methyl parathion <i>RUP</i>	0.25 - 0.5	0.5 - 1 pt	Wait 15 days before cutting or grazing. Do not enter treated fields within 48 hours after application.
permethrin Ambush 2E Pounce 3.2EC Arctic 3.2E Permethrin 2EC Perm-Up 25 WP Perm-Up 32. EC <i>RUP</i>	0.1 - 0.2 0.1 - 0.2 0.1 - 0.2 0.1 - 0.2 0.05 - 0.2 0.05 - 0.2	6.4 - 12.8 fl oz 4 - 8 fl oz 4 - 8 fl oz 4 - 8 fl oz 3.2 - 12.8 fl oz 2 - 8 fl oz	PHI = 14 days at rates above 0.1 lb/A. Do not apply more than 0.2 lb active/cutting.
zeta-cypermethrin Mustang Max Mustang Max EC Respect (alfalfa only) <i>RUP</i>	0.014 - 0.025	2.24 - 4 fl oz	PHI = 3 days of cutting or grazing or up to 7 days of harvesting seed. Do not make applications less than 7 days apart. Do not apply more than 0.075 lb AI per acre per season.

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