

# **Insect, Nematode, and Disease Control in Michigan Field Crops**

## **MSU Bulletin E-1582 2006 Field Season**

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\*\*This bulletin contains information on the management of field crops insects, nematodes, and diseases, including recommendations for pesticide use. Every attempt is made to verify product names, formulations, use rates, and other important information, but products and labels may change before the field season begins. Always read the label of a product to reconfirm rates, precautions, PPE, and other important information before use.

### Alfalfa Insect Pests

For more info, visit the alfalfa insects IPM web site at <http://www.ipm.uiuc.edu/fieldcrops/alfalfa/insects.html>

Honeybee Safety Statement: Honeybees often visit alfalfa fields. The insecticide listed in this section, with the exception of Bt, are HIGHLY TOXIC to honeybees. Avoid spraying when bees are present.

#### Alfalfa Blotch Leafminer (ABL)

**For more information:** Minnesota fact sheet <http://www.mda.state.mn.us/pestsurvey/factsheets/ablm.htm>

**Pest status:** Common in the field; rarely an economic pest

**Description:** Adult = gnat-like fly; larvae = small maggot within leaf tissue.

**Life cycle:** Overwinters as pupa in soil; adults become active in the spring at temps over 45°F. Females lay eggs on leaves; larvae feed internally between upper and lower leaf tissue. Two to five generations per year, usually one generation per cutting.

**Type of damage:** Females create pinholes in leaves with ovipositor (egg laying device) and drink the plant juices. Larvae create distinctive mines as they feed internally on the leaf.

**Management:** Biological ~ Populations in the eastern U.S. generally controlled by parasitoid wasp. Cultural ~ Cutting kills larvae. Chemical ~ Rarely justified and NOT recommended.

**Sampling/scouting:** Examine 20 stems in 5 different locations of the field; look for pinholes and C-shaped leafmines.

**Threshold:** Rough guideline - pinholes on most leaves plus small mines present and more than two weeks before next cutting.

**Notes:** Non-native; first detected in the U.S. in 1968 and in Michigan in 1983.

**List of registered insecticides, \*RUP (rate per acre):**

Baythroid 2\* (2.0 to 2.8 oz)

Lorsban 4E\* (1 to 2 pt) or Chlorpyrifos 4E\* (1 to 2 pts)

Furadan 4F\* (1 to 2 pts)

Proaxis\* (3.84 oz)

Lannate LV\* (1.5 to 3.0 pts) or SP\* (0.5 to 1.0 lbs)

Warrior \* (3.84 fl oz)

#### Alfalfa Weevil

**Pest status:** Common insect, occasionally an economic pest.

**Description:** Adult is gray-brown snout beetle, dark stripe down back; larvae is green with white stripe down back and black head.

**Life cycle:** Overwinters as adult in fields, fence rows, wood lots, etc. Emerges in early spring. Adults feed on new growth. Eggs laid in holes chewed on stem by females. Small larvae feed on leaf tips; larger larvae eat entire leaf. Larvae pupate in cocoons on plant. New adults emerge in mid-June/ July, feed a short time, then become inactive until following season. One generation per year.

**Type of damage:** Defoliation, primarily by larvae. Large larvae skeletonize leaves

**Management:** Biological control is highly effective. Several species of parasitoid wasp usually provide adequate control. Timely cutting kills most larvae, pupae, some adults. Consider early cutting rather than spraying to preserve natural enemies.

**Sampling/ scouting:** Early season, use sweep net to detect adult emergence. Before first cutting, sample 20 stems in 5 different locations of the field; look for larvae and damage. After first cutting, check stubble or regrowth for larvae. Scouting ends in July.

**Threshold:** Before first cutting, 40% of stems damaged, plus live larvae present; after first cutting, 25% or more of new tips damaged, or 6 to 8 larvae per square foot of regrowth.

**For more information:** MSU bulletin E-2271.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W\* (6.4 to 12.8 oz)

Malathion 8F (1 to 2 pts) or ULV (1 pt)

Arctic 3.2 EC\* (4 to 8 oz)

Mustang\* (2.4 to 4.3 oz) or Mustang Max\* (2.24 to 4 oz)

Baythroid 2\* (1.6 to 2.8 oz)

Pounce 3.2 EC\* (4 to 8 oz) and 25WP\* (6.4 to 12.8 oz)

Furadan 4F\* (0.5 to 2 pt for larvae, 1 to 2 pt for adults)

Pounce WSB\* (0.4 to 0.8 lbs)

Imidan 70W (1.0 to 1.33 lb)

Proaxis\* (3.84 oz)

Lannate LV\* (3 pt) or SP\* (1 lb)

Sevin 4F and XLR Plus (1.5 qt)

Lorsban 4E\* (1 to 2 pt) or Chlorpyrifos 4E\* (1 to 2 pts)

Sevin 80S and 80WSP (1.87 lb)

Malathion 5 EC (1.5 to 2.0 pts) or 57EC (1.5 to 2.25 pts)

Warrior \* (2.56 to 3.84 oz)

### Aphids (pea aphid & spotted alfalfa aphid)

**Pest status:** Common insect, rarely an economic pest

**Description:** Small oval to pear shaped soft-bodied insects. Color varies from bright green to pink to brown. Pea aphids have long cornicles (“tail pipes”).

**Life cycle:** Aphids present during the field season are all female, and do not need to mate to reproduce; females produce live young. Multiple overlapping generations.

**Type of damage:** Sucks plant sap from leaves, stems; heavy infestation may lead to stunting, curling of leaves, and general weakening of plants.

**Conditions favoring damage:** Pea aphid - cool, wet weather; spotted alfalfa aphid - hot, dry weather.

**Management:** Biological - natural enemies (ladybugs, lacewings, and wasps) and fungi generally keep populations in check.

**Threshold:** 1 or more colonies on plants less than 6 inches; 1 or more colonies per stem for larger plants (colony = 30 or more aphids)

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W* (3.2 to 12.8 oz)	Malathion 5EC (1.5 to 2.0 pts) or 57EC (1.5 to 2.25 pts)
Arctic 3.2EC* (2 to 8 oz)	Malathion 8F (1 to 2 pts) or 8 Aquamul (1.25 to 2 pts)
Baythroid 2* (1.6 to 2.8 oz)	Mustang* (2.4 to 4.3 oz) or Mustang Max* (2.24 to 4 oz)
Digon 400 (0.5 to 1 pt)	Pounce 3.2EC* (2 to 8 oz) or 25WP* (3.2 to 12.8 oz)
Dimethoate 4EC (0.5 to 1 pt) or 5lb (6.4 to 12.8 oz)	Pounce WSB* (0.2 to 0.8 lbs)
Furadan 4F* (0.5 to 2 pt)	Proaxis* (2.56 to 3.84 oz)
Lannate LV* (1.5 to 3 pt) or SP* (0.5 to 1 lb)	Warrior * (2.56 to 3.84 oz)
Lorsban 4E* (1 to 2 pt)	

### Armyworms

**Pest status:** Occasional pest, depending on the season

**Description:** Caterpillars variable in color (black/brown/green). Narrow light stripe across back and broad stripes running down sides of body.

**Life cycle:** Move north into Michigan each spring. 2-3 generations per year.

**Type of damage:** Defoliation by larvae.

**Threshold:** Treat when there are four or more armyworms per foot of row.

**List of registered insecticides, \*RUP (rate per acre):**

Agree WG (0.5 to 2 lbs)	Lorsban 4E* (1 to 2 pt) or Chlorpyrifos 4E* (1 to 2 pts)
Ambush 25W* (3.2 to 12.8 oz)	Malathion 5EC (2 pts) or 57EC (2 to 2.25 pts)
Arctic 3.2EC* (2 to 8 oz)	Malathion 8 Aquamul (1.25 to 2 pts) or 8F (1 to 2 pts)
Baythroid 2* (1.6 to 2.8 oz)	Mustang* (3.0 to 4.3 oz) or Mustang Max* (2.8 to 4 oz)
Biobit HP (0.5 to 2.0 lbs)	Proaxis* (2.56 to 3.84 oz)
Pounce 3.2 EC (2 to 8 oz)* or 25WP* (3.2 to 12.8 oz)	Sevin 4F and XLR Plus (1.0 to 1.5 qt)
Pounce WSB* (0.2 to 0.8 lbs)	Sevin 80S and 80WSP (1.25 to 1.875 lb)
Lannate LV* (0.75 to 1.5 pts) or SP* (0.25 to 0.5 lb)	Warrior 1EC* (2.56 to 3.84 oz)

### Clover Root Curculio

**Pest status:** Rare.

**Description:** snout beetle; black/brown, 1/8<sup>th</sup> inch long.

**Life cycle:** Adults overwinter. Females lay eggs in spring or fall on lower plant surface or soil; larvae enter soil and feed on roots. One generation per year.

**Type of damage:** Larvae feed on nodules and small rootlets, chew furrows on main root, and leave extensive scarring. Pathogens may enter these wounds. Can shorten stand life and enhance winter kill.

**Conditions favoring damage:** Alfalfa planted in or near an old infested field is at greater risk.

**Management:** Chemical ~ no insecticides available at this time.

**Sampling/scouting:** No set sampling method. Check roots of unhealthy plants for curculio damage.

**Notes:** If you have a problem with this insect, contact your local MSU extension agent.

### Cutworms

**Pest status:** Rarely an economic pest

**Description:** Caterpillar is up to 2 inches long. Variable coloration (black, tan, greenish-yellow), with a row of light yellow spots down the back.

**Life cycle:** Adults migrate into Michigan in early spring and lay eggs on legumes. Several generations per season.

**Type of damage:** Larvae feed on leaves and stems. Greatest risk for damage is in new seedlings or regrowth.

**Management:** Cultural - if larvae are large (1.5-2 inches), delay cutting of established stand until after pupation, to avoid concentrated feeding on regrowth.

**Threshold:** 5% or more of plants showing cutworm damage.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W* (3.2 to 12.8 oz)	Pounce 3.2EC* (2 to 8 oz) or 25WP* (3.2 to 12.8 oz)
Arctic 3.2EC* (2 to 8 oz)	Pounce WSB* (0.2 to 0.8 lbs)
Baythroid 2* (0.8 to 1.6 oz)	Proaxis* (1.92 to 3.2 oz)
Lannate LV* (0.75 to 3 pts) or SP* (0.25 to 1 lb)	Sevin 4F and XLR Plus (1.0 to 1.5 qt)
Lorsban 4E* (1 to 2 pt) or Chlorpyrifos 4E* (1 to 2 pts)	Sevin 80S and 80WSP (1.25 to 1.875 lb)
Mustang* (2.4 to 4.3 oz) or Mustang Max* (2.24 to 4 oz)	Warrior* (1.92 to 3.2 oz)

### Grasshoppers

**Pest status:** Common insect, occasional outbreaks

**Life cycle:** Eggs overwinter in soil; nymphs hatch in June. As nymphs grow, feeding damage increases. Females lay eggs in soil in late summer.

**Type of damage:** Defoliation by nymphs and adults.

**Conditions favoring damage:** Unplowed or fallow areas are preferred egg-laying sites, and may contribute to populations in nearby fields. Dry, warm weather enhances nymph survival.

**Management:** Biological - A fungal pathogen kills many eggs and nymphs under wet spring conditions. Natural enemies (birds, rodents, amphibians) also feed on grasshoppers, but may not keep up during outbreaks.

**Threshold:** 8 or more per square yard for plants less than 6 inches; 16 or more per square yard for taller plants.

**Notes:** Usually a problem only around field edges, but during outbreak years may infest entire field.

**List of registered insecticides, \*RUP (rate per acre):**

Baythroid 2* (2.0 to 2.8 oz)	Malathion 8F (1.0 to 2.0 pts)
Dimethoate 4EC (0.5 to 1 pt) or 5lb (6.4 to 12.8 oz)	Malathion ULV (0.5 pts)
Furadan 4F* (0.25 to 0.5 pts)	Mustang* (3.0 to 4.3 oz) or Mustang Max* (2.24 to 4 oz)
Imidan 70W (1 to 1.33 lbs)	Proaxis* (2.56 to 3.84 oz)
Lorsban 4E* (0.5 to 1 pt) or Chlorpyrifos 4E* (0.5 to 2 pts)	Sevin 4F and XLR Plus (0.5 to 1.5 qt)
Malathion 5EC (1.5 to 2.0 pt) or 57EC (1.5 to 2.25 pt)	Sevin 80S and 80WSP (0.625 to 1.875 lb)
Malathion 8 Aquamul (1.25 to 2.0 pts)	Warrior* (2.56 to 3.84 oz)

### Leaf Beetles

(Japanese beetle, bean leaf beetles, corn rootworm adults, cucumber beetles, others)

**Pest status:** Common insects, rarely economic pests

**Description:** Various, depending on species.

**Life cycle:** These beetles originate in other crops, i.e., bean leaf beetles from soybean, rootworm from corn, cucumber beetles from cucurbits, and Japanese beetle from many host plants. One generation per year.

**Type of damage:** Defoliation

**Management:** Typically do not cause enough damage to warrant treatment.

**Threshold:** Rough guideline is to treat areas where nearly all leaf tips show damage from leaf-feeding beetles.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W* (6.4 to 12.8 oz)	Proaxis* (2.56 to 3.84 oz)
Arctic 3.2EC* (4 to 8 oz)	Pyganic EC1.4 (16 to 64 oz) or EC5.0 (4.5 to 18 oz)
Lorsban 4E* (0.5 to 1 pt) or Chlorpyrifos 4E* (1 to 2 pts)	Sevin 4F and XLR Plus (1.0 qt)
Pounce 3.2EC* (4 to 8 oz) or 25WP* (6.4 to 12.8 oz)	Sevin 80S and 80WSP (1.25 lb)
Pounce WSB* (0.4 to 0.8 lbs)	Warrior* (2.56 to 3.84 oz)

### Potato leafhopper (PLH)

**Pest status:** Key pest; widespread and abundant

**Description:** Small, bright green, torpedo shaped insects. Fast moving, in a “crab-like” fashion. Nymphs resemble adults but are lime green/yellow, much smaller, lack wings.

**Life cycle:** Adults are carried into Michigan from the south on weather fronts in May/early June. Females lay eggs inside stems. Nymphs hatch in 7-10 days, begin feeding immediately, and reach adult stage in 2-3 weeks. Multiple overlapping generations.

**Type of damage:** Sucking pest. Both adults and nymphs remove plant sap and inject toxic saliva as they feed. Typical symptom is “hopperburn”. Other symptoms include stunting, curling, and slow development, especially of new seedlings.

**Conditions favoring damage:** Dry conditions (drought) enhance PLH damage.

**Management:** Biological - a naturally occurring fungal pathogen reduces PLH numbers under favorable conditions. Cultural - timely cutting kills eggs and many nymphs. Consider early cutting rather than spraying. Varietal selection – tolerant “hairy” alfalfa varieties are available, but may need to be treated under high population pressure. Chemical - Most insecticides are effective against PLH.

**Sampling/scouting:** Begin scouting in early June. Take 5 sets of 20 sweeps in several parts of the field. Count adults and nymphs.

**Threshold:** Varies with plant height in inches:

Under 3 inches = 20 adult PLH/ 100 sweeps

3 to 8 inches = 50 adult PLH/ 100 sweeps

8 to 12 inches = 100 adults and/or nymphs/ 100 sweeps

Over 12 inches = 200 adults and/or nymphs/ 100 sweeps

**Note:** Hopperburn may be confused with drought damage or boron deficiency.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W\* and 25WP\* (3.2 to 12.8 oz)

Arctic 3.2EC\* (4 to 8 oz)

Atrapa 5E (1.5 to 2.0 pts)

Baythroid 2\* (0.8 to 1.6 oz)

Digon 400 (0.5 to 1 pt)

Dimethoate 4EC (0.5 to 1 pt) or 5lb (6.4 to 12.8 oz)

Furadan 4F\* (1 to 2 pts)

Imidan 70W (1 to 1.33 lbs)

Lorsban 4E\* (0.5 to 1 pt) or Chlorpyrifos 4E\* (1 to 2 pts)

Malathion 5 EC (1.5 to 2.0 pts) or 57 EC (1.5 to 2.25 pts)

Malathion 8 Aquamul (1.25 to 2 pts) or 8F (1.0 to 2.0 pts)

Mustang\* (2.4 to 4.3 oz) or Mustang Max\* (2.24 to 4 oz)

Pounce 3.2EC\* (4 to 8 oz) or 25WP\* (6.4 to 12.8 oz)

Pounce WSB\* (0.4 to 0.8 lbs)

Proaxis\* (1.92 to 3.2 oz)

Pyganic EC1.4 (16 to 64 oz) or EC5.0 (4.5 to 18 oz)

Sevin 4 F and XLR Plus (1.0 qt)

Sevin 80 S and 80 WSP (1.25 lb)

Warrior\* (1.92 to 3.2 fl oz)

### Plant Bugs

(alfalfa plant bug, tarnished plant bug)

**Pest status:** Common insects, occasionally economic pests

**Description:** 1/8<sup>th</sup> to 1 inch long, oval “true bugs”. Alfalfa PB is greenish. Tarnished PB is dark brown with yellow V-shaped mark on back. Nymphs resemble adults, but lack wings.

**Life cycle:** Adults overwinter. Eggs laid into plant tissue. Multiple generations.

**Type of damage:** Sucking pest. Adults and nymphs remove plant sap and inject a toxic saliva during feeding, resulting in a characteristic crinkling of leaves.

**Management:** Cultural – cutting may reduce populations; check regrowth and treat if necessary.

**Sampling/ scouting:** Take 5 sets of 20 sweeps in different parts of the field.

**Threshold:** Rough guideline ~ plants less than 6 inches, two or more per sweep; larger plants, five or more per sweep.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W\* and 25WP\* (6.4 to 12.8 oz)

Arctic 3.2EC\* (4 to 8 oz)

Atrapa 5E (1.5 to 2.0 pts)

Baythroid 2\* (1.6 to 2.8 oz)

Digon 400 (0.5 to 1 pt)

Dimethoate 4EC (0.5 to 1 pt) or 5lb (6.4 to 12.8 oz)

Furadan 4F\* (1 qt)

Lannate LV\* (1.5 to 3 pt) & SP\* (0.5 to 1.0 lb)

Lorsban 4E\* (1 to 2 pts) or Chlorpyrifos 4E\* (1 to 2 pts)

Malathion 5 EC (1.5 to 2.0 pts) or 57 EC (1.5 to 2.25pts)

Malathion 8F (1.0 to 2.0 pts)

Mustang\* (3.0 to 4.3 oz) or Mustang Max\* (2.24 to 4 oz)

Pounce 3.2EC\* (4 to 8 oz) or 25WP\* (6.4 to 12.8 oz)

Pounce WSB\* (0.4 to 0.8 lbs)

Proaxis\* (2.56 to 3.84 oz)

Sevin 4F and XLR Plus (0.5 to 1.5 qt)

Sevin 80S and 80WSP (1.25 to 1.875 lb)

Warrior\* (2.56 to 3.84 fl oz)

### Slugs

**Pest Status:** Rarely an economic pest

**Type of damage:** Feeding on the new plants, possibly to the point that replanting is necessary.

**Conditions favoring damage:** New seedlings planted into heavy sod or crop residue. Fields with a recent history of slug damage. Cool, wet conditions.

**Threshold:** No thresholds are established for slugs in alfalfa. Consider treatment if slug damage threatens to reduce stand density below an acceptable level.

**List of registered insecticides, \*RUP (rate per acre):**

Deadline MPs 4% bait (10 to 40 lbs)

Snail & Slug Pellets (various manufactures and rates)

### Spittlebugs

**Pest status:** Common insect, rarely an economic pest

**Description:** Small, orange/greenish insects, 3/8 inch long. Nymphs hide in frothy spittle mass.

**Life cycle:** Overwinter as eggs. Nymphs emerge and feed in the spring. Adults do not produce spittle. One generation per year.

**Type of damage:** Sucking pest. Removes plant sap.

**Management:** Chemical control is generally not necessary; alfalfa can support a large number of spittlebugs.

**Sampling/ scouting:** Examine 20 plants in 5 different locations for spittle masses.

**Threshold:** one or more spittlebugs (spittle mass) per stem.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W\* (6.4 to 12.8 oz)

Arctic 3.2EC\* (4 to 8 oz)

Baythroid 2\* (0.8 to 1.6 oz )

Imidan 70W (1 to 1.33 lbs)

Lorsban 4E\* (1 to 2 pts) or Chlorpyrifos 4E\* (1 to 2 pts)

Malathion 5EC (1.5 to 2.0 pts) or 8F (1.0 to 2.0 pts)

Mustang\* (2.4 to 4.3 oz) or Mustang Max\* (2.24 to 4 oz)

Pounce 3.2EC\* (4 to 8 oz) or 25WP\* (6.4 to 12.8 oz)

Pounce WSB\* (0.4 to 0.8 lbs)

Proaxis\* (2.56 to 3.84 oz)

Warrior\* (2.56 to 3.84 fl oz)

### Sweetclover Weevil

**Threshold:** Treat when one-third of plants or more show feeding of adult weevil early in the season. When used to treat other pests, malathion will provide some control.

**NOTE:** An insecticide may be legally applied for a pest not listed on the label as long as it is labeled for the crop (site) and for another insect target that occurs on the crop at a similar timing. Follow all rates and restrictions indicated on the label, including pre-harvest interval. The manufacturer assumes no responsibility for product performance. See page 8 for further information.

### Webworms

**Pest status:** Occasional

**Description:** Larvae = slender, greenish-black or pink caterpillars, with 6 dark spots on each body segment.

**Life cycle:** 2-3 generations per year.

**Type of damage:** Ties leaves together with silk, feeds within the webbing.

**Management:** Cultural = cutting destroys larvae. Chemical = insecticides generally not needed; may not be effective because larvae hide in webbing.

**Sampling/ scouting:** Examine 20 stems in 5 locations of the field, or take 100 sweeps.

**Threshold:** Rough guidelines - one or more webworms per plant; 25% of tips infested; or 5-6 larvae per sweep.

**List of registered insecticides, \*RUP (rate per acre):**

Ambush 25W\* (3.2 to 12.8 oz)

Arctic 3.2EC\* (2 to 8 oz)

Baythroid 2\* (1.6 to 2.8 oz )

Mustang\* (2.4 to 4.3 oz) or Mustang Max\* (2.24 to 4 oz)

Pounce 3.2EC\* (2 to 8 oz) or 25WP\* (3.2 to 12.8 oz)

Pounce WSB\* (0.2 to 0.8 lbs)

Proaxis\* (2.56 to 3.84 oz)

Pyganic EC1.4 (16 to 64 oz) or EC5.0 (4.5 to 18 oz)

Sevin 4F and XLR Plus (0.5 to 1.5 qt)

Sevin 80S (1.25 to 1.875 lb)

Warrior\* (1.92 to 3.2 fl oz)

## Insecticides Registered for Alfalfa

Trade Name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Ambush 25W (RUP)	permethrin	Pyr	Alfalfa weevil, aphids, armyworm, cutworm, leaf beetles, PLH, plant bug, spittlebug, webworm	0 at $\leq 6.4$ oz 14 at $> 6.4$ oz	12	Maximum of 12.8 oz formulated product per cutting.
Arctic 3.2 EC (RUP)	permethrin	Pyr	Alfalfa weevil, aphids, armyworm, cutworm, leaf beetles, PLH, plant bugs, spittlebug, webworm	14 at $> 0.1$ lb	12	Max 0.2 lbs. active ingredient per cutting.
Baythroid 2 (RUP)	cyfluthrin	Pyr	ABL, alfalfa weevil, aphids, cutworm, grasshopper, PLH, plant bugs, spittlebug, webworm	7	12	One application per cutting.
Bt (Agree WG, Dipel, Javelin, Biobit, Condor, Lepinox)	<i>Bacillus thuringiensis</i>	Bio	Armyworm	0	4	Use only to control small armyworms when populations are low. Full coverage is important.
Deadline M-Ps	metaldehyde	--	Snails, slugs	--	12	Broadcast by ground or air every 3 to 4 weeks during season as needed. For best results apply in the evening, preferably after a rain or irrigation. Use caution around pets – may be fatal to dogs.
Digon 400 and Dimethoate 4EC, 5lb	dimethoate	OP	Aphids, grasshoppers, PLH, plant bug	10	48	Maximum 1 application per cutting. Dimethoate is systemic and full coverage is not required.
Furadan 4F (RUP)	carbofuran	Carb	Alfalfa weevil, aphids, PLH, plant bug	7 at 0.5 pt 14 at 1 pt 28 at 2 pt	48	Maximum 1 application per season. Furadan is systemic and full coverage is not required.
Imidan 70W	phosmet	OP	Alfalfa weevil, grasshopper, PLH, spittlebug	7	24	Maximum of 1 application per cutting.
Lannate (RUP) LV & SP	methomyl	Carb	Alfalfa weevil, aphids, armyworm, plant bug	7	48	Maximum 3.6 lbs active ingredient per acre per season.
Lorsban 4E (RUP)  (Also generics = Chlorpyrifos 4E, Govern 4E, & Nufos 4E)	chlorpyrifos	OP	ABL, alfalfa weevil, aphids, armyworm, cutworm, grasshopper, leaf beetles, PLH, plant bug, spittlebug	7 at 0.5 pt 14 at 1 pt 21 at $> 1$ pt	24	Maximum 1 application per cutting and 4 applications per season.
Malathion 5EC, 8 Aquamul, 57EC	malathion	OP	Alfalfa weevil, aphids, armyworm, grasshopper, PLH, plant bug, spittlebug	0 for ECs 0 to 7 for Aquamul	12	
Malathion - ULV	malathion	OP	Alfalfa weevil, grasshopper	0	12	

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Trade Name	Common name	Class	Recommended for:	PHI days	REI hrs	Precautions and Remarks
Mustang & Mustang Max (RUP)	zeta-cypermethrin	Pyr	Alfalfa weevil, aphids, armyworm, cutworm, grasshopper, PLH, plant bug, spittlebug, webworm	3	12	Do not make applications less than 7 days apart. Maximum use: Mustang - 4.3 oz. per cutting, 12.9 oz per season; Mustang Max - 4 oz. per cutting, 12 oz per season.
Pounce (RUP) 3.2EC, 25WP, WSB	permethrin	Pyr	Alfalfa weevil, aphids, armyworm, cutworm, leaf beetles, PLH, plant bug, spittlebug, webworm	0 at 0.1 lb 14 at >0.1 lb	12	Maximum of 0.2 lb active ingredient per cutting. Several generics are available.
Proaxis (RUP)	gamma-cyhalothrin	Pyr	ABL, alfalfa weevil, aphids, armyworm, cutworm, grasshopper, leaf beetles, PLH, plant bug, spittlebug, webworm	1 forage 7 hay	24	Maximum 0.24 pints per acre per cutting, 0.96 pints per acre per season.
Pyganic EC1.4, EC5.0	pyrethrum	Bio	leaf beetles, PLH, webworm	0	12	Listed by the Organic Materials Review Institute (OMRI) for use in organic production.
Sevin 4 F, XLR Plus, 50W, 80S, 80WSP	carbaryl	Carb	Alfalfa weevil, armyworm, cutworm, grasshoppers, leaf beetles, PLH, plant bug, webworm	7	12	Do not apply to small plants if they are wet or rain is expected within 48 hrs (may bleach tender foliage). Maximum 1 application per cutting.
Snail and Slug Pellets 3.5 % bait	metaldehyde	--	Snails, slugs	--	12	May apply every 2 weeks as needed. Do not allow pellets to contact edible portion of plant. Keep children, pets, and poultry away from treated areas.
Warrior (RUP)	lambda-cyhalothrin	Pyreth	ABL, alfalfa weevil, aphids, armyworm, cutworm, grasshopper, leaf beetles, PLH, plant bug, spittlebug, webworm	1 forage 7 hay	24	Maximum 0.24 pints per acre per cutting, 0.96 pints per acre per season.